HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

TABLE OF CONTENTS

OPENING REMARKS

H.E. Giulio Terzi, Ambassador of Italy to the United States.................................................8

The Hon. Ferruccio Fazio, Minister of Health of Italy...............................................................12

Rear Admiral Susan J. Blumenthal, MD, MPA, Chair, Global Health Program, Meridian International Center..............................................................................................................16

Richard Hodes, M.D., Director, National Institute on Aging, National Institutes of Health...........................................................................................................................................21

Prof. Enrico Garaci, President, Istituto Superiore di Sanità ......................................................41

PANEL 1: THE SCIENCE OF AGING AND LONGEVITY

Carol Greider, Ph.D., 2009 Nobel Laureate in Physiology or Medicine; Daniel Nathans Professor & Director, Molecular Biology & Genetics Lab, Department of Molecular Biology & Genetics, The Johns Hopkins University School of Medicine:
“Short telomere and age-related disease”

Rafael de Cabo, Ph.D., Head, Aging, Metabolism, and Nutrition Unit; National Institute on Aging, NIH:
“Nutrition and Aging” .................................................................................................................................46

Lewis Lipsitz, M.D., Chief, Division of Gerontology, Beth Israel Deaconess Med. Ctr; Professor of Medicine, Harvard Medical School:
“80 is the new 60: Why and How to Make it Happen” ........................................................................58

Ronald McKay, Ph.D., Lieber Institute for Brain Development, The Johns Hopkins University School of Medicine:
“Regenerative Medicine”
GLOBAL HEALTH FORUM 2010

PANEL 2:
BEHAVIORAL, ENVIRONMENTAL AND QUALITY OF LIFE ISSUES

Luigi Ferrucci, M.D., Ph.D., Chief, Longitudinal Studies Section, National Institute on Aging, NIH:
“Walking for Healthy Aging” ................................................................. 84

Prof. Luigi Fontana, Nutrition and Aging Division, Istituto Superiore di Sanità (ISS) and Washington University School of Medicine:
“Nutritional Modulation of Aging and Age-Associated Diseases by Caloric Restriction” .................................................. 97

Jeffrey Kaye, M.D., Director, Oregon Center for Aging and Technology, Oregon Health and Science University:
“How can we measure aging?” ............................................................. 101

REMARKS

The Hon. Ferruccio Fazio, Minister of Health of Italy............................................. 118

PANEL 3:
INFORMATION TECHNOLOGY REVOLUTIONIZING HEALTH CARE

David Blumenthal, M.D., National Coordinator for Health Information Technology, US Department of Health and Human Services:
“The U.S. Health Information Technology Agenda” ........................................ 121

Prof. Sergio Pecorelli, President, Agenzia Italiana del Farmaco (AIFA), Professor of Gynecology, University of Brescia:
“Aging and Pharma: New Perspectives” .................................................... 127

Prof. Roberto Bernabei, Professor of Gerontology, Università Cattolica del Sacro Cuore, Roma:
“Standardized assessment instrument as the technology of health services for the elderly” .............................................................. 134

Jay Bernhardt, Ph.D., M.D., Dept. of Health Education, University of Florida School of Medicine, Gainesville, Florida:
“Healthy Aging 2.0: The Power of Digital Health and Wellness” ....................... 163
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Prof. Niccolò Marchionni, Professor of Gerontology and Geriatrics, Università di Firenze:
“Impact of ageism in acute care settings” ..........................................................174

PANEL 4:
HEALTH POLICIES TO PROMOTE HEALTHY AGING GLOBALLY

Prof. Francesco Bove, Professor in Orthopedics and Traumatology, University of Rome “La Sapienza”, President of the Foundation for the Fight Against Arthritis and Osteoporosis (Aila):
“Investing in Health: Aging and Awareness” .......................................................187

Dr. Paola Pisanti, Direzione Generale Programmazione Sanitaria, Ministry of Health:
“The Role of the Italian Health Care System to Promote Healthy Aging in Italy” ....192

Enrique Vega Garcia, M.D., Regional Advisor on Aging and Health, Pan American Health Organization:
“Aging and Health in Latin American and the Caribbean. Challenges and Opportunities” ..................................................................................................................203

Edwin Walker, J.D., Deputy Assistant Secretary for Program Operations, Administration on Aging, U.S. Department of Health and Human Services:
“Translating research to create a healthy nation” ..................................................215

Jessica Frank López, Chair, NGO Committee on Ageing, United Nations; Senior Advisor, AARP Office of International Affairs:
“Translating Science into Action: NGO’s Perspectives” ........................................221

Armin Fidler, MD, MPH, Lead Advisor for Health Policy, The World Bank:
“Country Preparedness for Demographic Growth” ..............................................224

Dr. Sergio Dompé, President, Farmindustria, Italy:

Dr. Dalmer Hoskins, Director, Division of Program Studies, U.S. Social Security Administration; Former Secretary General of the International Social Security Association:
“Demography as destiny: unmet needs” ..................................................................246
Sharon Hrynkow, Ph.D., Senior Advisor to the Assistant Secretary, Bureau of Oceans and International Environmental and Scientific Affairs, U.S. Department of State: “Global health in a foreign policy context” .................................................................249

Prof. Massimo Fini, Scientific Director IRCCS (Italian Scientific Institute Conducting Clinical and Biomedical Research), San Raffaele Pisana, Rome: “Making Healthy Policies for Active Aging” .................................................................252

CONCLUDING REMARKS

Rear Admiral Susan J. Blumenthal, M.D., Chair, Global Health Program, Meridian International Center, Former Assistant Surgeon General of the United States...............265

H.E. Giulio Terzi, Ambassador of Italy to the United States.........................................268

APPENDIX

The Italian Medicines Agency (AIFA) .................................................................271

Farmindustria ...........................................................................................................274
OPENING REMARKS
2010 GLOBAL HEALTH FORUM
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Opening Remarks

H.E. Giulio Terzi
Ambassador of Italy to the United States
Welcome to everybody. It is a great pleasure to have you all here to attend the Global Health symposium, on “Healthy Aging Globally: A Life Cycle Approach”.

A warm welcome to our distinguished representative of the Government of Italy, the Hon. Minister Ferruccio Fazio, Minister of Health. Professor Fazio is well known to all of you, but I will say a few introductory words later on.

Ladies and Gentlemen, the Global Health Forum is an initiative which has been promoted by the Embassy in Washington since 2006; but this year’s symposium is a special one for at least three reasons.

First and foremost, we are honored to have the Italian Minister of Health, Professor Ferruccio Fazio, opening this conference today. His presence, in his capacity of Minister of the Italian Republic, and also as a renowned scientist, outlines both the importance of the topic which we will address and the strength of the ties between Italy and the United States in science, and, namely, in health cooperation.

Secondly, I would like to welcome and thank the speakers and all the participants to the symposium. Today’s event comes right after the celebrations for the Columbus Day, a sign of the great intensity of relations between our Governments and our People. The Global Health Forum 2010 is part of a program promoted by the Embassy, Italy@150, to celebrate the 150th anniversary of the Italian unity. Placed under the auspices of the President of the Republic of Italy, this program aims at celebrating in the United States the anniversary of the unification. This anniversary and this celebration are also a tribute to our unique partnership as well as to our shared values.

Today one of the most relevant features of these close ties is indeed science. A large number of Italian researchers work in the laboratories of the National Institutes of Health and of the main Universities in the U.S.. Many of them have provided key contributions to medicine and in some cases their work has been recognized by the Royal Swedish Academy with Nobel Prizes.

Scientific cooperation between Italy and the United States covers indeed all realms of medicine. The benefits reaped are shared equally, not only in our countries, but throughout the world. This environment is conducive to the further deepening of programs in biotechnologies and pharmaceuticals.

This leads me to the third point, that is our topic today: healthy aging globally. I believe that this topic is timely because a health reform is just being implemented in the United States, and we can therefore share our experiences in health policies and compare them in the context of our partly diverging demographics.

The latest OECD data show that health spending accounts for 9.1% of the Italian GDP and that between 2000 and 2008 the health spending per capita in real terms has increased by 1.9% per year, well below therefore the OECD average of 4.2%. In 2007 life expectancy at birth in Italy was 81 and a half years, two years above the OECD average, while in the U.S., as a comparison, average life expectancy was 77.9 years. In 2009 the percentage of the Italian population over 65 was 20.1%, while it was 12.9% in the U.S.

From these demographic data we also garner other important information. The percentage of people over 65 is growing throughout the world. Vaccines and medicine
help us reach advanced age in good health, but we are learning from the wisdom of the Classics, and often unwittingly, are following, or trying to, Seneca words of advice, “Ante senectutem curavi ut bene viverem”, which I take the liberty of translating “We have to do our best to age well”.

At the same time the opportunities of this forum and this seminar address a challenge. Aging as a critical emerging global health issue needs to be addressed from scientific, behavioral, economic, environmental and political perspectives. Scientists, both in Italy and in the United States, are actively engaged in this endeavor. The science of aging is a field in which Italy and the United States definitely enjoy an edge, thanks to the relevance that is given in both our countries to this new global issue.

The Italian Government - and let me remind that personally Prime Minister Berlusconi is engaged in promoting research and cooperation in this specific area - is strongly supporting research. I will only mention an initiative which Minister Fazio knows very well, the initiative called “Quo Vadis” by Don Verze’, the founder of the Ospedale San Raffaele, which is aimed at the creation of a research center in Italy dedicated to the science of longevity.

Health is a priority for Italy also in terms of its aid and development policy. This is how the dimension of global health has to be stressed. My Country is heavily involved in furthering the United Nations’ and the G8 initiatives targeted at improving public health and fighting diseases. And among these I would like to recall the Global Fund to Fight AIDS, Tuberculosis and Malaria launched by Italy at the G8 Summit in Genoa in the year 2000, which has contributed to saving over two million lives, and the significant steps forward that were made in the G8 at L’Aquila in 2009.

In fact, defeating pandemics and endemic diseases, and strengthening the health systems in developing countries are crucial and closely interlinked objectives. We are committed in this direction both on the bilateral and multilateral level, playing a role also in promoting innovative funding in the struggle against HIV-AIDS, tuberculosis and malaria.

The engine behind all this progress is the continuous relationship between fundamental research and development. The great strides made in genetics, nanotechnology and chemistry are quickly incorporated in this ever evolving science: Medicine.

This event owes much indeed to Rear Admiral Dr. Susan Blumenthal. Her enthusiasm, experience and expertise have been truly invaluable and the driving force for this symposium. Thank you, Doctor Blumenthal, for making this event possible.

I’m deeply honored to give the floor to Professor Ferruccio Fazio, Professor of Diagnostic, Imaging and Radiation Oncology at the University of Milano-Bicocca. Minister Fazio has also been Chairman of the Department of Nuclear Medicine and Radiation Oncology at the Scientific Institute San Raffaele in Milan, and Director of the Institute for Molecular Imaging and Physiology of the Centro Nazionale delle Ricerche, Director of the PET/Cyclotron Center at the Scientific HS San Raffaele, Milan, and he has published a very impressive amount and qualitative set of scientific papers: 350 full
papers on international peer-reviewed journals. Minister Fazio is a world recognized scientist and a true leader in the Italian and the European medical environment. Thank you very much, Minister Fazio, for being with us.

H.E. Giulio Terzi
Ambassador of Italy to the United States
Opening Remarks

The Hon. Ferruccio Fazio,
Minister of Health of Italy
Thank you, Ambassador, for your words and for organizing together with Admiral Susan Blumenthal this Forum, which is indeed very timely.

I wonder whether some of you have read a report published a few days ago by Standard & Poor’s entitled “Global Aging 2010”. It says that public debt of Countries with advanced economies will explode in the next 40 years due to population aging. Assuming no changes in fiscal policies, public debt-to-GDP ratio will rise for Countries such as France, Germany, UK and the United States over 400% in 40 years. The report considers 32 advanced economies and 17 emerging Countries. World population over 65 will increase worldwide in 2050 from today’s 7.6% to 16.2%. The report points out there was an opportunity window to implement fiscal sustainability strategy until 2020, but this has been hampered by the recent crisis which has increased deficit and public debt in most advanced economies.

After the year 2020 population aging will further increase with serious consequences for Governments’ finances. Thus the report urges advanced Countries to adopt measures not only to further reduce public expenditure and to increase economic growth, but also to reform pension schemes and health policies. In this regard, Italy is in a better position as compared to other Countries: the debt-to-GDP ratio will, according to the report, rise from 115% to 245% in 2050, whereas in France and Germany the increase will be from 75 to 400. This is because of the progress made by Italy in the last 20 years on pensions and retirement policies, and to a certain extent because of the pretty good quality of the health system as well.

The report underlines the need to prepare and to adapt the health system to global aging. Aging has a tremendous impact on health systems. Numbers are known: 20% in Italy are over 65, and 1 over 2 persons over 65 has a probability of having two or more chronic diseases, which means several hospitalizations. As today in Italy 20% of people are over 65 and account for 40% of hospital admissions, in 2050 we will certainly have no sustainability. Furthermore, elderly people don’t like to go in and out of hospitals; they are better taken care of at home, in residential situations where relatives can visit them. It is more like a hotel situation rather than a hospital. But aside from that, there won’t simply be any sustainability if we don’t change the system.

So what can we do? There are three things that I suggest could be done: prevention policies, strengthening primary care and governing appropriateness. On prevention: in Italy, for instance, there is a program called “Gaining Health” (“Guadagnare Salute”), which is based on nutrition. In this symposium somebody will talk about caloric restriction. In elderly people, this is important; it is important to know what elderly people should eat and how they should eat. Physical activity is also important, as non smoking and not drinking alcohol, that’s obvious.

But I think the crux of the matter is strengthening primary care. How? First, one should progressively reduce acute hospital beds. We have now in Italy 3.8 hospital beds per 1000 inhabitants; we had 10 years ago 4.5; we are aiming in 2 years to reach 3.5 and in 3-4 years to reach 3 beds per 1000 people. But if you reduce acute beds because elderly people should not be treated for their chronic conditions in acute beds, you have to reinforce primary care. The first thing is to strengthen primary care by favoring
General Practitioners (GP) working associations - which are teams of 10-20 GPs. In Italy we now have approximately 55% of GPs already working in association, but that will become the rule. Together with the GPs, we are working for a bill that should favor these type of association; and I remind you that the same is happening in the United Kingdom as a consequence of a recently approved bill.

We have recently promoted a bill - which is going through the Parliament - where we change and expand the role of pharmacies. At pharmacies people will be able, from now on, to book diagnostic examinations and get the report: so you book your examination, you go to the center to carry it out and then you can get the report back in the pharmacy which is closer to your house. In the pharmacy you can have access to a rehabilitation nurse and a physiotherapist, to medication for diabetes, anticoagulants, ECG with telemedicine, spirometers and so forth. The pharmacy will become the primary health center, which being connected to GPs will become the nucleus where citizens should go first instead of crowding emergency rooms. Thus, we need to create, and we are creating, a path; we are creating an itinerary for the patients approaching the national health service where the gatekeeper is the GP, or those pharmacies with the GPs associated with them, and diagnoses, if not too complicated, should be made outside the hospital, before entering the hospital. There is no reason to make diagnoses in the hospital unless they are very complicated ones. As for chronic therapies, rehabilitation should be performed in rehabilitation center, oncological patient to oncological rehabilitation and so on. One thing to mention is that Italy is facilitated in this work by the fact that we have very strong family ties, and the role of family is very important in this respect.

Finally, we have specific projects for elderly people. One project, for instance, will be presented in this meeting: “Criteria for Identification of Frail Elderlies in the Emergency Department Triage” (it’s called the “silver code”), in order to alert the system and optimize the allocation of those old frail patients in wards. And the aim, again, will be that of shortening the hospital stay.

Another thing – again, as we will show - is implementation of case managers at the community level to ensure continuous care to all persons with chronic multi-morbidity. Then there is something I don’t think will be shown here but is of interest, and that is implementing domotic technologies - such as the use of friendly domestic appliances and architectonic technologies - to allow elderly persons to be more self-sufficient.

And lastly, on the primary care theme, I wish to emphasize the educational level - schools of medicine, postgraduate programs. What we are doing, together with the Minister of Education is to promote the growth of primary care operators by giving priority to geriatricians, rehabilitators and nurses.

My third and last point is on governing appropriateness. What is governing appropriateness? It’s measuring what happens in the system. I don’t think this is being done in the United States. Measuring health means measuring appropriateness of hospital admissions, appropriateness of outpatient diagnostic procedures, drug consumption (in hospitals, pharmacies, drugstores) and purchases of medical devices.
(SLIDE) You see here a number of Italian Regions and you see one of them featuring a lot of inappropriateness; and you can see that a lot of indicators are in the red, which means they need to be improved. For instance, you have the indicator of hospitalization showing that too many patients are hospitalized. In hospitals you should have complex procedures; you should not admit patients needing simple procedures. Then there are indicators of primary care inappropriateness: too many patients with pneumonia and too many patients with chronic diseases. This spells inappropriateness of primary care, because those patients should be treated by GPs, they should not be treated in hospitals. But if you change Region, you may that many indicators fall right in the centre. So we are working on Regions which are less performing and utilizing the experience made on the Regions – we have 21 Regions in Italy – which are better performing. The message here is not to show which Region is better, but that the measurement of what is going on is feasible and very important, as far as health is concerned.

In summary, I believe that in advanced Countries from now on health policies should no longer be generic guidelines but a stringent, severe, accurate monitoring. And this is possible because of e-health (I don’t want to elaborate on that). If this doesn’t happen there will be no sustainability in 40 years from now.

I think this meeting today will face a number of these problems, and I just tried to give the general framework in which these problems should be discussed.

Thank you.

The Hon. Ferruccio Fazio
Minister of Health of Italy
2010 GLOBAL HEALTH FORUM
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Opening Remarks

Rear Admiral Susan J. Blumenthal
MD, MPA
Thank you so much, Ambassador Terzi for that wonderful introduction and for your leadership. It is such an honor to be here today. I want to join the Ambassador in welcoming all of you to this joint Italy-US scientific global health symposium sponsored by the Embassy of Italy that is now in its 5th year. I am proud to have worked with the Embassy to launch the First Global Health Conference in 2005 and to have collaborated with you and Professor Alberto Devoto, your outstanding science attaché, in organizing today’s meeting.

Minister Fazio, our gratitude for your important health leadership, for Italy’s sponsorship of this conference, for your very pertinent remarks and for framing today’s meeting. You provided us with some key health statistics and issue for Italy. Now let me paint a picture for the United States. America has some of the best medicine in the world—cutting edge science and technology. however, the United States spends 18% of its GDP on health care but ranks only 49th on life expectancy internationally and 37th on the health status of our citizens according to a World Health Organization report. There are also significant health disparities for certain racial/ethnic groups and for the poor in America. The United States spends twice as much on health care as any other nation, yet Americans get the correct treatment only 55% of the time.

The historic Health Care Legislation passed in March of this year will transform the United States system by ensuring that all Americans have access to quality health care, by promoting efficiency, effectiveness and equity in the system, by creating a seamless system of care with the use of health information technology, and by emphasizing the power of prevention. A critical element of this prescription will be to promote healthy aging ...and that is what today’s conference is all about.

This year we have gathered to learn about the latest research and policy innovations to promote healthy aging over the life cycle worldwide. We know that how we age is a mix of our genes, behavior and environment and that this trajectory starts at the very beginning of our lives. These deep links between development and aging offer clues to the aging process as well as opportunities to boost our chances for a healthier future across the lifespan.

So that is the goal of today’s symposium: to promote awareness and action on one of the most pressing global health challenges of our time: the aging of the global population.

And what better place for us to discuss aging than in this beautiful conference room. Italy has given the world so much with your landmark contributions to art, science, medicine, opera, film, and design.

From Da Vinci and Galileo to Volta, who invented the battery in 1800, Italians have provided pioneering leadership in making groundbreaking discoveries that have benefitted humankind.

You gave us Christopher Columbus who discovered America and you continue this tradition in exploring the new frontiers and world of aging!

Italy has also given us the world’s best team of diplomats, Ambassador Giulio Terzi and Antonella Cinque. Ambassador Terzi combines the brilliance of your inventors, the creativity of your artists, with the extraordinary abilities of your explorers to forge
new frontiers with his laserlike intelligence and leadership in international security and human rights.

Antonella Cinque served as the President of Italy’s drug administration. She brought to this position the intelligence and vision of Dr. Maria Montessori, Italy’s first woman doctor who understood the power of education and prevention to improve health as does Antonella, a public health champion who began Italy’s first national smoking prevention campaign.

Together, this dynamic couple ensures that Italy and the United States have the world’s greatest friendship.

We also look to Italy as a model for a long and healthy life. You have the second oldest population in the world. What are the secrets of your longevity? Perhaps it is the vitamin D from your warm and wonderful climate and your Mediterranean diet, with its heart-healthy oils and vegetables ---although we all secretly wish it’s the pasta!!

Perhaps it is the quality of life that comes from such a rich culture of scientific, artistic and musical accomplishment. We feel such gratitude for these gifts that you share with us including the distinguished doctors and researchers who join us today from Italy to share their perspectives on healthy aging with leading scientists and policymakers from the United States.

Consider this: in the year 1900, the average life expectancy in both of our countries was 48. People died then of infectious diseases and for women, also complications of childbirth.

Now flash forward a century later. Due to the triumph of public health and medical interventions, life expectancy has almost doubled in our nations.

According to the world health organization, in many countries the proportion of people over the age of 60 is growing faster than any other age group, doubling over the past 30 years, as a result of both longer life expectancy and declining fertility rates. As a result, by 2050, the global population of older persons will total 2 billion with implications for us all.

In 2008, in the United States, the senior population – people age 65 years or older - represented 12.8% of the U.S. population, about one in every eight Americans. By 2030, 1 in 5 people in America will be over 65. In Italy, 20% of the population in is over 65 and by 2030, they will represent 1 out of every 4 Italians.

Centenarians—people over the age of 100-- are the fastest growing demographic in the developed world. In Italy, which ranks 2nd among all countries for the oldest population, the Island of Sardinia is an oasis of longevity. In the United States, there are more than 100,000 people over the age of 100 today and this number is projected to increase to 500,000 in the next decade. For those who celebrate a century of life, there are 5 women alive for every two men. Women both live longer and are also the caretakers for aging family members.

The number of older people in societies can be viewed as a success story for public health policies and for socioeconomic development, reflecting a nation’s ability to optimize the health and well being of older citizens as well as their social participation in society.
However, there is a dark side to this progress with the economic costs of an aging population, a concurrent chronic disease pandemic including rising rates of dementia and Alzheimer’s that increase exponentially after the age of 65 and affect 50% of those living to be more than 100.

While older persons play an invaluable role in all societies, as leaders, caregivers, and volunteers—they are also vulnerable to discrimination, abuse, and neglect.

The aging of the world’s population challenges all countries and their governments to shape 21st century health care systems as well as economic and other policies that address the needs of seniors. Despite the dramatic demographic of aging and all of its impacts on countries worldwide, there is no Millennium challenge goal—MDG—on chronic disease or aging. This must change.

Aging is a critical global health issue that must be addressed from scientific, behavioral, economic, environmental and political perspectives to promote quality years of life and decrease the costs associated with chronic diseases.

Promoting healthy aging requires both personal and social responsibility, mobilizing all sectors of society to prepare for this demographic reality. And that is what this conference is all about.

What are the secrets of longevity? Can the aging process be delayed? Can cells and organs be regenerated? What is the impact of our lifestyles and the environment on our health? What are the implications of the chronic disease pandemic for individuals and society? What public policies are needed to promote healthy aging worldwide?

Today, in our keynote address and panel discussions, our distinguished speakers from Italy and the United States will share advances from science about the secrets of a long life and innovative approaches to thwart the aging process, the importance of putting prevention into practice, the role of information technology to create 21st century health systems including the role of new media in empowering consumers to take charge of their health, and the urgent need for policy innovations to address the needs of our senior populations worldwide.

In the Greek myth of Aurora and Tithonius, Aurora was the goddess of the dawn and Tithonius was her mortal husband. She asked Zeus to grant Tithonius immortal life but forgot to say immortal youth. Consequently, he grew old until he could no longer move a hand or foot, compelling Aurora to close the door to his room in pity. His story is a metaphor with implications for today and underscores why we must all work together, across all sectors of society, to create a call to action on new frontiers of aging—a roadmap to ensure that the extra years of life we hopefully will gain in the 21st century will truly be better years of life.

INTRODUCTION OF RICHARD HODES, M.D

Director of the National Institute of Aging

To speak with us about that roadmap towards a healthier future by promoting healthy aging is a world renowned expert.
When you go to the dictionary and look up the words “pioneering leadership on aging”, you will find the picture of Doctor Richard Hodes, who has been the Director of the National Institute on Aging (NIA) at the National Institutes of Health since 1993. The NIA is the medical oasis for aging research in America. His mission at the institute is to develop and direct the nation’s cutting edge research program on aging. Dr. Hodes also continues to pursue his own important research as director of the immune regulation section of the national cancer institute. In 1997, Dr. Hodes was elected as a fellow of the American Association for the Advancement of Science. In 1999 he was elected to the prestigious institute of medicine. Dr. Hodes is the author of more than 250 research papers, and has received numerous awards for his significant contributions to improving health in the United States and globally. I want to express my deep appreciation to him for his leadership, vision and important contributions to the organization of this conference.
Opening Remarks

Richard Hodes, M.D.
Director, National Institute on Aging, National Institutes of Health
Thank you.

I want to above all thank our hosts for organizing this meeting on a truly historic topic, and what I’d like to do in the next minutes is to provide an outline, by way of introduction to the very rich program that we will be seeing, which will deal with issues of aging and longevity, ranging from basic science through behavioral science, information technologies, and the importance of public health perspectives.

I’d like to start with a couple of slides which portray the theme that you have already heard described, and that is the quite extraordinary increase in longevity in the world’s population. And I would begin with this, which is a plot of the life expectancy of whatever national population at that year had the longest life expectancy for women, from the year 1840 - as we will see – through the present.

And what you see first is the plot from 1840 through 1920. So in 1840 it was the Swedish women who had the longest longevity, a little over 45 years of age. By 1920, 80 years later, that had increased to 65 - increased by 20 years - and it was New Zealand who for that period of time was holding the record.

Now, if we could place ourselves in 1920 and had seen this graph, and we were asked to predict whether this remarkably linear plot would continue for another 80 years, I think many, including myself, would have been quite skeptical; but, as all of you appreciate, this is what has been seen now over the course of 160 years - actually, quite extraordinary in this linearity. Now the Japanese women in recent years are having the longest longevity, about 85 years. There are different reasons for this increase: in the first 80 years it was largely an increase in survival around birth and in infectious diseases early in life; in the most recent decades it has been an extension of life after 65. I don’t know how many of us would like to predict what happens if we project this for another 80 years, but any of you in the audience who might be there at that time, please let me know how it turns out. The projection, of course, would be that we will be at age 105 average life expectancy by that time if the linear trend continues. Notably, the maximum life expectancy may not be increasing (there is still an area of very active investigation), or maybe approaching something of a maximum - although we will see that in terms of research, many would argue that that maximum life span is really elusive, if in fact it exists at all.

So this is one way of portraying the extraordinary increased longevity that has occurred over the years. Just one more would illustrate the impact it has had on the demographic distribution by age in the world’s population. This is what you can see on the left of the plot, from 1950 through a projection to 2050, and what you see in 1950 is that the population aged under 5, young children, was about 14% of the population, while there were about 5% aged 65 and older.

Some time this decade, for the very first time, those lines are going to cross: we are going to have more people over 65 than under 5, and as soon as 2050 we are going to have a complete reversal of what it has undoubtedly been the history of our species since its evolution, so that there will be some 15% or 17% of individuals over 65, while the percentage under age 5 will decrease to about 7 or 8 percent, with profound implications for societal structure, health among them.
Now, what is it that determines longevity? This is a picture that was shared by Nir Barzilai: it shows, the picture taken on the right, some 80 or 90 years previously, and then that same family of long-lived siblings as they reached old age, around the age of a hundred or so - and it points out what we have heard anecdotally, that is, the extraordinary familiar clustering, or geographic clustering, of longevity in some areas.

In a study of centenarians, to see how much family has to do with the likelihood of reaching the age of 100 - I show you this plot. It shows the numbers of individuals surviving, as a proportion of the population, to age 100 plus. As you see, it shows, of course, that women live longer than men, as we have heard, but it also shows that if one had a centenarian as a sibling, one’s probability of survival increases substantially over the same birth cohort if one’s sibling did not reach age 100. Translating numbers from men, if you had a sibling who lived to 100 or over, there’s a 17-fold increase in your probability of living to 100: it’s about an 8-fold difference for women. So the message is clear here, to carefully select your parents and your siblings as a strategy for achieving longevity.

But the familial clustering, of course, can be a composite of genetics and of environmental influences; there are genetic studies ongoing that are suggesting that specific genes may play an important role in survival, but I just want to illustrate the importance of behaviors, which of course can have a genetic compound as well.

This is one which illustrates the survival curve for individuals who were sorted by their physical activities translated into kilocalories expended of free-living activities, or your energy expenditure. And you can see that the curve that falls off most rapidly - that is, the most rapid death - is that whose individuals had energy expenditure of less than 521 kilocalories per day, compared to those who expend more calories, that top line being those greater than 761 kilocalories - not a huge difference in calories, but obviously a very important one in terms of this correlation. The group with higher level of physical activity had something like a 65% lower risk of death.

Interactions between genetic effects and behavior undoubtedly play a role in determining longevity. Results from basic science, including animal models that have ranged from yeast, to worms, to flies, to mice, have taught us a great deal about potential basis for longevity and health survival as it affects humans as well. This is one illustration: on the right, a curve that shows one of the earlier descriptions of a gene which had an enormous impact on aging, in this case a nematode or C. elegans. And the mutation (when one discovers a gene one can name it; in this case it was named Age-1) increased the survival of worms, as you can see from the normal curve to the left, where the worms are all dead essentially by 20 days, to a two-or three-fold increase in longevity, with the mutation of that single gene. Since that time, compound mutations have increased survival in some species such as this by up to tenfold. The plot on the left illustrates that the importance or the interest of some of these discoveries lies in the analogy between the genes which have an effect on aging in lower organisms such as the nematodes here and their impact or their existence in humans. And you can see the Age-1 gene, for example, has its counterpart in PL3-kinase, a gene encoding a product that plays an important role in glucose metabolism.
Similarly, this figure indicates the complexity of genetic effects: this is the plot of many of the genes which in lower species have been shown to have profound effects on longevity and their distribution along pathways known to play a role in response to insulin, glucose, or insulin-like hormones. If one, again, identifies a gene, one has the privilege of naming it. You see some very interesting names here; “Indy” is one of our favorites, it means an abbreviation of “I’m not dead yet”, a particularly effective longevity gene.

So, that’s genetics. What have we learned from animal studies about environmental impact? What you will hear and what we have alluded to as probably the most studied and the best documented environmental intervention in effect on survival is caloric restriction. The shift from the curve on the left to that on the right shows an extension of survival, in this case in rodents: typically a decrease in caloric intake by 30 or 40 percent results in increased longevity by about that same amount. But it has to be stressed that, first, this is not true in all species, and that the outcome of course has a lot to do with what the starting point is, and the definition of that “ad lib” control group is bound to be critically important.

We have no trouble in translating to humans and appreciating that in the case of severe overweight or obesity caloric restriction would be a good thing. On the other hand, there will be some individuals who are already malnourished and for whom a decrease in caloric intake would not be good. Trying to judge the translation of this to human behavior is therefore challenging and not a simple matter.

Let me just turn to a slide which illustrates that the distinction between environment and genetics these days is complicated in the most intriguing way by the field of epigenetics. So, in addition to the DNA code, the sequence which you know determines our genes, there are what are called epigenetic changes, which basically refer to modifications of either the DNA, or the histone proteins which are associated with this DNA, and the epigenome, that is the collection of all the epigenetic changes in the genome, can now be studied quite categorically. What this slide illustrates is the epigenomes of sets of genetically identical twins who have the same genetic code – first the twins on the left, three-year old twins, have very similar epigenetic changes. In contrast, the set of twins to the right, 50 years olds also with identical genetic codes, have markedly more different epigenetic changes, that is the DNA has been modified in the course of age, some of these changes heritable from cell to cell and, potentially, even across generations, which illustrates then the interaction between genes and environment.

Now, longevity, as we have heard, is not the only important variable. Clearly, if individuals are going to live longer, we have to have enormous concern and respect for the quality of life. This is an illustration of trends in disability in Americans over age 65 and shows the number of individuals disabled at points in time: in 1982, when the National Long Term Care Survey began its studies, up through an estimate of the present. And there are two lines illustrated, the top line in blue is the number of Americans disabled as projected from the rates seen in 1982 if there had been no change in the risk of disability and one simply had a population that was increasing with age and therefore had increased numbers of individuals at risk for disability. What has in fact been
observed over time is the curve on the bottom in red showing substantially fewer people
disabled than would have been predicted, so rather than the 10 million disabled
Americans in 2005 predicted by early rates, there were some 7.4 million, reflecting a very
substantial decrease in rate or risk of disability over time, clearly very encouraging news,
showing that there is mutability in the risk of disability; but one has to couple this
optimistic picture with real caution. In studies carried out through the same time period
including most recently, if one looks at the population under 65, the baby boomers - the
population coming into aging - in fact the rates of disability are not decreasing, and in
some studies they are increasing, with trends such as that tied to obesity playing a
substantial role. So we have reason to be optimistic, but with enormous caution.
Something needs to be done, but this is quite encouraging, the fact that steps can be taken
to modify disability even as we extend longevity.

You heard reference to the kinds of diseases which are going to be more and more
prevalent. This illustrates the burden of chronic non-communicable diseases and its
increase from the present through projected 2030.

So on the top you see figures for low and middle-income countries showing some
44% of disease is non-communicable diseases, whereas in the same year 2002 below, the
high-income countries showing some 85%, a real predominance. Those trends are going
to continue so that the low and middle-income countries are going to have fewer cases of
communicable diseases, and more and more they are going to look like the continuing
trend in high income countries, where chronic, non-communicable diseases will be
predominant will need to be attacked in order to sustain not only longevity, but quality of
life without disability. As some examples of what can in fact be done to modify the
course of non-communicable chronic diseases, I will show you just this one slide which
is the result of a diabetes prevention trial that was carried out jointly by NIH Institutes,
the Diabetes Institute and the Aging Institute. It took individuals who did not have
diabetes but were at a high risk and followed them either in placebo groups who received
good health education but no other intervention, or received Metformin (an oral
antihyperglycemic agent), or received a lifestyle intervention which reflected a relatively
modest increase in physical activity and decrease in body weight. This study was stopped
before its due date not because of any risks of complications – because sometimes this is
the case – but because it was so effective it was in fact deemed to be unethical to continue
the study.

What’s illustrated here is interesting, in particular because of the age differences
in results seen, so in the 25 to 44 year-old group you can see that either Metformin, the
drug, or lifestyle had a very substantial effect in decreasing by some 40% the risk of
diabetes, a very substantial decrease. But if you turn to the group over 60, first – for
reasons not yet clear – Metformin, the drug, had no effect, but the lifestyle intervention
actually had a dramatic effect, with 71% decrease in the risk of diabetes in individuals at
risk at that age. Quite unanticipated - I think, to many – first, that in the older age group a
lifestyle intervention could be sustained and that even at that later stage in life it still had
a dramatic effect. The potential, of course, for translating findings such as these into
decreasing diabetes and its consequent morbidities is enormous, and an encouraging
example of ways in which we can -with current information already and with more information to come- intervene to prevent a chronic disease and its consequences.

Another alluded to, and enormous, threat to us all -emotional, psychological, financial- is that of Alzheimer’s disease. As noted, the incidence of Alzheimer’s is enormously age-dependent, so in the bar graph on the right you can see, in one of the earliest studies carried out, a prevalence -some 3% of individuals in the 65 to 74 year-old age group had Alzheimer’s disease, increasing to 19% in the 75-84 group, and by 85+ to some nearly 47% of individuals. And, as a result of that, the curve on the left shows the projected increase in the numbers of individuals with Alzheimer’s from some 2.5 to 5 million adults currently affected, depending upon the criteria used for identifying that diagnosis, to a tripling by the year 2050 if there is no successful intervention.

This slide is an illustration of some of the discoveries over the past years of the genetics underlying Alzheimer’s disease, which is enormously important, in that it provides an idea of what the disease process may be and potential targets for intervention. So, you can see, in 1991 there was the discovery of APOEε4 as a risk factor for the disease; also, a mutation in the gene encoding the amyloid protein actually causes Alzheimer’s disease in very rare but also very tragic heritable early onset in families with that disease. By 1995, two additional genes, presenilin 1 and 2, were described as risk factors, identifying three genes which are actually causative of Alzheimer’s in rare families who inherited these mutations.

This allowed, by 1996, for example, the construction for the first time of mouse models which had many of the features of Alzheimer’s disease, and provided an opportunity to study interventions in a mouse model. These models were created by actually taking the human causative mutant genes and introducing them into mice. In 2005, the technologies that came with mapping the genome and the publication of GWA studies, that is, the Genome-Wide Association Studies, allowed the identification of additional genes which are risk factors in large populations, and so in 2009 and 2010 we have seen the discovery of multiple genes –important because they again provide potential targets in which intervention is directed at the underlying pathogenesis that may occur. So, there’s a long way to go translating genetic discoveries -as in all fields, we are learning- to actual intervention, but the hope here presents itself for interventions that may affect Alzheimer’s disease.

At the same time, focus on biotechnology that includes imaging and the search for biomarkers is aimed at developing measures to understand and identify the earliest changes which occur in Alzheimer’s disease years, or even decades, before symptoms. This is an example of PET Imaging, in this case using a probe, so-called Pittsburgh Compound-B, which can identify amyloid protein plaques, the plaques which are diagnostic of Alzheimer’s disease in the brains of living individuals. You can see the difference between the control individual and someone with Alzheimer’s disease, with very high binding of PIB. This allows, potentially, the identification of these deposits early in life and, even more importantly, potentially the tracking of effective interventions -that is, preventive or therapeutic- using this marker, providing ideas about the
effectiveness or not of intervention far more rapidly than can be achieved by studying the clinical course of the disease.

I will point out a specific initiative that has important aspects both in terms of public-private partnership and international collaboration. This is the ADNI, the Alzheimer’s Disease Neuroimaging Initiative, which is a public-private partnership put together to study biomarkers and imaging markers over populations either of normal individuals, individuals with early cognitive change, or individuals with Alzheimer’s disease. A truly amazing, I think, groundsetting partnership of NIH Institutes, private foundations (you can see the list of pharma, biotech and imaging companies which have contributed both technologic input as well as finances). All of these participants contributed without preferential or promise of a competitive gain, because all of these partners share the common interest in finding ways to monitor the course of disease, identify a diagnosis early and use that as a step towards moving to interventions that work. The success has now been reflected in a European ADNI, a Japanese ADNI, an Australian ADNI, and many others in planning, which are going to have enormous power for pulling data, making these data available to all investigators, and so accelerating the course of discovery and translation.

Let me finally conclude with a couple of slides which are directed at some of the policy issues alluded to in the discussion we’ve heard, and which we’ll address later in today’s events: the economics and the health economics related to public policies, an important aspect of international comparisons.

What’s illustrated here is the effect of retirement policies, that is, the financial incentives or disincentives, on retirement, and the consequent behavior of individuals in their retirement decisions. So it is not surprising that policies will influence retirement: what you can see here is that, at the right, for example, countries - which include Italy - which have had policies which are encouraging early retirement, have a higher proportion of individuals (shown here) who have retired -this is men between ages 55 and 65- so somewhere in the range of 60%.

Now, along this curve, over countries - you can see Japan, US, and Sweden down towards the end –that is, their financial policies do not encourage early retirement. As a consequence, there are substantially fewer individuals retiring. This is important to the consequences for an aging population, where many retirement policies were designed decades ago, when life expectancy was quite different from what it is, and the importance of at least considering policy implications to produce the work life span as well as retirement life span of individuals.

And one very last and very provocative slide, I think, that looked at the effect of retirement, or the correlation, to be precise, between retirement and cognitive function. Now, there has always been an interest in what happens at the time of retirement, that is, with loss of employment and one level of intellectual activity, would there be any effect on cognitive behavior? There have been many studies showing that cognitive function is poorer post-retirement, but it’s been very hard -and, of course, still is- to detect the cause and effect, that is, someone may retire early because they are having known or unknown, but nonetheless significant, cognitive decline. But, recently, an interesting study looked at
international comparisons, so, as I showed you on the previous slide, nations differ in their retirement behavior based -it appears- largely on retirement policies. This is a curve which looked at the amount of decline in cognitive function in men from age 50-54 to age 60-64 as a function of early retirement, or retirement history, of those nations. And you can see the correlation -only a correlation but intriguing- that suggests that nations whose policies tend to encourage maintained workforce participation, that is, discourage retirement, have less cognitive decline than countries that encourage retirement, therefore have early retirement, where cognitive decline is greater.

So the provocative proposal, of course, by the authors of this study is that retirement, and perhaps consequent change in physical and cognitive stimulus, may actually have an impact on cognitive decline.

It's only a correlation, made the more powerful by the international comparison, but a provocative example of the ways in which the policies which we must be discussing, debating and implementing are going to affect health, retirement, in ways some of which we understand, some of which we don’t, but in which the spirit of this meeting and international comparisons will play, hopefully, an important discovery role.

So I thank you for your patience through these slides, and look forward to sharing with you what proves to be, I’m sure, a very exciting day’s agenda.

Thank you.
Healthy Aging Globally: The Lifecycle Perspective

Embassy of Italy in Washington, D.C.

October 12, 2010

Richard J. Hodes, M.D.
Director
National Institute on Aging

Female life expectancy in the record-holding country

Life expectancy in years

Year

Norway
New Zealand
Iceland
Sweden
Japan
The Netherlands
Switzerland
Australia
Female life expectancy in the record-holding country from 1840 to 2000

Oeppen & Vaupel, 2002

YOUNG CHILDREN AND OLDER PEOPLE AS A PERCENTAGE OF GLOBAL POPULATION

PROJECTED INCREASE IN GLOBAL POPULATION BETWEEN 2005 AND 2030, BY AGE

Familial Determinants of Human Longevity

Familial Factors in Exceptional Longevity: Survival of Centenarians’ Sibs

Perls TY et al. Proc Natl Acad Sci U S A 2002;99(12):8442-7

Courtesy: Dr. Nir Barzilai
Health ABC: Low daily free-living activity energy expenditure increases risk of death

Logrank: \( p = 0.017 \)  
Trend: \( p = 0.005 \)

highest activity level about 65% less risk  
Manini et al. JAMA 2006

Longevity Genes Across Species

<table>
<thead>
<tr>
<th>Nematode</th>
<th>Human</th>
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<tbody>
<tr>
<td>catalase</td>
<td>catalase</td>
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<tr>
<td>age-1</td>
<td>PI3-kinase (glucose metabolism)</td>
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<tr>
<td>daf-2</td>
<td>Insulin-like receptor (glucose metabolism)</td>
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<tr>
<td>daf-16</td>
<td>HNF3 (transcription factor)</td>
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<tr>
<td>WRN</td>
<td>WRN (Werner Syndrome)</td>
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Known effect on aging
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Effect of Caloric Restriction on Longevity in Rodents

[Graph showing survival curves for control and calorie-restricted groups over age]
Differences in DNA Methylation Patterns between Identical Twins Increase with Aging

Genetically Identical Twins Show Increasing Differences in Gene Expression with Aging

Fraga et al. PNAS 102:10604, 2005
Number of Chronically Disabled Americans
Age 65+

(in millions)


6.4 7.0 7.1 7.0 7.1

7.5 8.3 9.2 9.5 10.0

If disability rate did not change since 1982

Based on declining disability rate since 1982

Source: National Long Term Care Survey 1982-1999 (Kenneth Manton, Ph.D.)

The Increasing Burden of Chronic Non-Communicable Diseases: 2002-2030

Source: P01 AG 017625 (Pl Murray)
The Increasing Burden of Chronic Non-Communicable Diseases: 2002-2030

Source: P01 AG 017625 (PI Murray)

Diabetes Incidence Rates by Age

Diabetes Prevention Program, 2001
**Prevalence of Probable Alzheimer’s Disease**

**Number of Persons with AD in Millions**

**Percent of Persons with AD by Age**


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### Alzheimer’s Disease Gene Discovery Timeline

- **1991**: APOE4, APP*
- **1995**: PS1*, PS2*
- **1996**: First published GWAS
- **2005**: PICALM*, CLU*, CR1*, GWAS
- **2009**: BIN 1
- **2010**: Five additional genes* discovered by GWAS to be confirmed

* Early onset Alzheimer’s Disease- family based studies
* Late onset Alzheimer’s Disease- case control studies

Range needed to identify genes: 3,000 – 27,000 cases and 11,000 – 41,000 controls
PET Imaging of Amyloid Deposits in Alzheimer’s Disease vs Normal Controls

PET imaging with a novel tracer, Pittsburgh Compound-B (PIB), can provide quantitative information on amyloid deposits in living subjects.


ADNI Public-Private Partnership

57 Clinical Sites: ADNI PIs and Cores
PUBLIC PENSION INCENTIVES TO LEAVE THE LABOR FORCE FOR MEN IN 11 COUNTRIES

Percent of men age between 55 and 65 not working

Cross-Country Correlation of Retirement and Cognitive Performance

Decreasing Cognition

Earlier retirement


Figure 7: Drop in Cognitive Performance as a Function of Drop in Employment Rate between Men 50–54 and 60–64 Years Old
Opening Remarks

Prof. Enrico Garaci,
President, Istituto Superiore di Sanità
Authorities, dear Colleagues, Ladies and Gentlemen, let me start by thanking Ambassador Terzi and Susan Blumenthal for having invited me in this very important meeting as the President of the Istituto Superiore di Sanità’, I am very pleased to briefly show you the vision of our Institute according to the guidelines of the Ministry of Health in this very relevant issue of aging.

Referring to the slides, from 1840 we assisted to a homogenous trend in the increase of life expectancy until 2007. This trend is homogenous for all the industrialized countries except for the periods during which World War I and II took place.

The life expectancy at birth in Italy is 78 years for males and 83 years for females, but what is important to stress, in my opinion, is the new parameter that we have to consider: the healthy life expectancy, without disability and without a constant use of drug. This latter is for male and female, about 54 and 51 years respectively.

Of course there is a very big gap between life expectancy and healthy life and this is true for all the industrialized countries. Since population is aging we have to face important challenges ahead.

If we consider from the demographic point of view which is the age distribution projected in Italy until 2050, as it has been stressed by Minister Fazio, we can observe that the population over 65 years is dramatically increasing.

As a consequence we can see, in the first place, that in relation to the age of people, there is an increase of consumption of drugs starting from the age of 65. In particular there is a trend in cardiovascular medication use which increases very much.

Recalling the famous painting of Botero showing an obese family, we can observe how dramatically adiposity has increased in some States of the Union since 1985.

We observe that we have a 20-25 % adiposity with lethal consequences in this regions. But also in Italy we are facing the same problem. In a population between 35-74 years of age, adding overweight to obese, we have a percentage in some cases above 50%.

There is a strong relationship between body mass index and cardiovascular disease mortality. Assuming 25 as the border between normal weight and overweight, we can observe, starting from 25 as body mass index, how cardiovascular mortality has increased and also the strong relationship between body mass index and cancer mortality in women.

The leading causes of death in the United Stated, according to CDC are heart disease, cancer and stroke. But this is true in all the industrialized countries.

The question is: “is aging preventable?” We cannot prevent or reverse aging but it is possible to slow aging and, most importantly, prevent chronic diseases associated with aging: cardiovascular diseases, cancer, diabetes, hypertension, inflammation.

This is a statement of Word Health Organization about a pessimistic attitude by some people who believe that there is not much that can be done anyway. But in reality the major causes of chronic diseases are known and if these risk factors were eliminated, at least 80% of all heart diseases, stroke and type 2 diabetes would be prevented. The causes of main chronic diseases are established. There are important modifiable risk
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Factors like unhealthy diet, excessive energy intake, caloric intake, physical inactivity, tobacco use. Of course a non-modifiable age risk factor is genetic.

There are very important studies which are performed worldwide on caloric restrictions. In our Institute these studies are performed by Doctor Fontana who will speak later.

We can observe in rodents that, in relation to a decrease of caloric intake, there is an increase of healthspan and lifespan up to 50%. These studies have been performed also in non-human primates and we can see how caloric restriction reduces cardiovascular and cancer mortality.

The long-term cardiometabolic effects of caloric restrictions in humans are represented by prevention of obesity and type 2 diabetes, improved lipid profile, powerful anti-hypertensive and anti-inflammatory effects, prevention of atherosclerosis, improvement of left ventricular diastolic function.

Long-term caloric restrictions reduce metabolic factors associated with cancer in humans, in terms of reducing adiposity, reducing insulin, reducing growth factors such as IGF-1, reducing sex hormones, reducing inflammation, reducing oxidative stress.

Conclusions and future directions: There is another statement of World Health Organization we are showing here. Of course everyone has to die of something, but death does not need to be slow, painful, or premature. Death is inevitable, but a life of protracted ill-health is not. Chronic disease prevention and control helps people to live longer and healthier lives.

Extraordinary people like Aristotle, Dante Alighieri, Christopher Columbus, Leonardo da Vinci, William Shakespeare really died too young. Just think on how much they would have been able to give to the society if they performed a correct style of life. Of course, this consideration applies also to our times.

Our goal is to study and implement strategies for the promotion of successful aging. We can define the ‘successful aging’ as the ability of human beings to avoid disease and disability and remain physically and cognitively healthy, happy and creative, empowered, contributing to social and productive activities, active and independent for as long as possible.

We can overcome the gap existing between expectancy of life and expectancy of healthy life. The healthy lifespan has to be coincident with the lifespan. 30% of animals with caloric restrictions die without any pathological lesion. This is a very important political issue, as Minister Fazio and Dr. Susan Blumenthal have mentioned.

Does increased lifespan mean increased healthcare expenditures? Certainly, it does mean increased expenditure, but some contributions to face this problem come from studies on centenarians. Centenarians will be able to postpone critical disease into their later years of life. Centenarians experience a fairly rapid decline in health before death in a very old age, that is they have a very short period of unhealthy lifespan. Centenarians are hospitalized, substantially, less and for less days than their shorter-lived contemporaries who died in their early 80s.

There is a famous study on heritability of human longevity. The study which was performed on about 3000 Danish twins, shows that the heritability of human longevity
was estimated to be 25%, while the remaining 75% is attributable to environment and lifestyle. Here we have what we might call the “longevity” puzzle: from one side genetics, from other side many components which integrate each other, caloric intake, phytochemicals intake, exercise, protein intake.

The balance of these components induces an outcome. In these years we have a good risk factor for cardiovascular diseases, stroke, type 2 diabetes. As Doctor Hodes mentioned earlier, risk factors for cancer, Alzheimer’s and autoimmune diseases are still missing, markers of aging are still missing. The research should go in this direction for the next years.

As a conclusion, I would like to show this slide that explains how in our Institute, under the direction of Doctor Fontana, we are seeking to establish a prototype research unit for healthy aging and prevention of age-associated chronic diseases. This unit will serve as a nidus that stimulates cost-effective and high-quality research, educational and health promotion activities, collaborations with food, fitness, and health industries to improve healthy options available for children and adults, community outreach, career development and training.

Thank you very much.
PANEL 1:
The science of aging and longevity
Panel 1: The Science of Aging and Longevity

**Rafael de Cabo, Ph.D.,**
Head, Aging, Metabolism, and Nutrition Unit;
National Institute on Aging, NIH

*Nutrition and Aging*
First, I want to start by thanking the organizers for giving me the opportunity to present some of the work that we have been doing in my laboratory at the National Institute on Aging (NIA). I have been at the NIA since 2000, when I came as a postdoctoral fellow; now I am a tenured investigator. The focus of my research has been to look at how dietary manipulations can alter aging processes.

Since I joined the NIA, I have always been asking myself the question “What is aging, what are the mechanisms behind aging, and is there any way that we can manipulate the aging process?”

I always use this picture [slide 1]—it is a picture of my family (here is my grandmother, my mom, my sister, and my niece)—to explain that there are many factors that are involved in the aging process. None of these people are going to age exactly at the same rate; they are not going to manifest the same type of diseases; and the time of the onset of disease is most likely going to be different. They share an environment, a culture; some genes, but most definitely they have not been fed the same things throughout their life; their environment is continuously changing; they have been exposed to numerous and very different challenges throughout their life. It is important then, to understand that during the aging process there are a number of factors that converge and interact, and all of them share importance in these processes.

One of these factors is the genetic makeup. We heard earlier from Dr. Hodes that you can do manipulations to single cells, or simple organisms, onto one simple gene, and have a tremendous impact either extending or decreasing lifespan. We see that the environment plays a tremendous role—manipulating the environment has been shown to have a deep impact both on health and disease. And then, there are a number of metabolic and nutritional interventions that you can use to alter these effects on health and longevity.

This curve [slide 2] here, shows that in the last century we have been able to basically eliminate the early mortality in our population, and we have been able to push the mean lifespan from 52 to about 80 years, and you can also see that we have not been very successful at changing the maximum lifespan. The increase in mean lifespan is typically a reflection of how healthy your population is. In the laboratory it is quite easy to replicate these curves, by altering the genes, diet and environment.

One of the things that we are very interested in understanding is why aging is the major risk factor for every single chronic disease. [slide 3] And what we are trying to do in my laboratory, by understanding these processes and these changes, is how can we manipulate this process to move the population curves to the right: if we just are able to postpone the onset of all diseases and perhaps compress mortality and/or morbidity, could we make our healthy years, and the productive years of our life, longer?

If we go back to the longevity curve [slide 4], what we are trying to do in my lab - using mouse models- is to have a normal lifespan where you can measure the changes in the shape of the curve as health span increases, and then you move the curve to the right—that would results in increased lifespan. What we are trying to do is to implement interventions that will decrease both the health and the life span of the animals, to then intervene to see if we can obtain a normal lifespan; and, also, an ultimate goal will be to
push this curve as far to the right as possible, so every organism that we have lives very healthy to the very last minute, and then one day just drops dead with little incidence of long term disease.

This idea is in fact possible: we can put animals on a high-fat diet, and we make them have shorter mean and maximum lifespan. If we feed them the standard diet, they show the normal standard curve; if we put them on caloric restriction (that Luigi Fontana will talk about later), we can make these animals live healthier and longer.

How do we go about this in my lab, what are the mechanisms and hypothesis behind this?

These factors—we are calling them metabolic inputs—are signals that come from the outside, from the environment (it could be nutrients, it could be hormones, it could be any type of intervention). These are read by the organism, by what are called the bioenergetic sensors: so if you start exercising, immediately your body responds, “Hey, we need energy to make the muscles run”. These bioenergetic sensors, in turn, go to master regulators, or metabolism, that is an intermediate level, to turn on transcription regulatory factors that will be the executioners of changing and adapting the organism to the new environment. If the adaption that we are able to induce increases metabolic homeostasis, and increases stress resistance, perhaps we can increase the healthspan, increase the regular healthy aging, leading to increases in longevity.

In my laboratory we have been looking, and screening, for compounds that are able to target some of these molecules: in particular we have been looking at molecules target a protein called SIRT1 (and I am going to talk about Resveratrol). Recently, there was a very interesting paper published by the National Institute on Aging Intervention Program, on another compound, rapamycin that targets mTOR. In the past decade, we have been able to achieve in the laboratory, with very simple interventions, tremendous increases in health and longevity of rodents.

The compound that I will be talking about is Resveratrol. It is a very interesting compound; it is a molecule that is produced by plants in response to stress. It is found in red wine; it has shown to have cancer protection, inflammation and antioxidant protection; it is an activator of SIRT1, at least in vitro (there is a huge controversy in the field if it is or not in vivo). The specific is the mechanism of action of Resveratrol remains highly controversial. Since the early forties, when it was first published, to now, there are about 3500 publications, most of them happening in the last 10 years, indicating that regardless of all the controversies Resveratrol is a very active area of research.

When we test any intervention in my laboratory, which is different from other laboratories, we put the animals in to longitudinal studies in which a number of tests and clinical assessments are performed and repeated throughout the lifespan. This provides a wealth of information about the healthspan throughout the lifespan of these animals.

What we did in this study, we have fed two doses of Resveratrol to mice that were one year of age (so middle-age mice), and we had about 11 groups: we incorporated a high-fat group, a control group, and a caloric restriction group. The results are published, but basically: the high-fat group lived shorter; when we put the animals on the high-fat group on Resveratrol, we made them live as long as the standard-diet animals; when we
had the animals on the caloric restriction plus the Resveratrol, they lived longer. There was no effect of the Resveratrol in the standard diet, which is an ideal diet for the animals.

One thing that we noticed by studying these animals progressively was that we saw a tremendous effect in the protection against fatty liver induced by the high-fat diet; we saw an increase in insulin sensitivity; gene expression pattern that resembled a normal diet for the high-fat fed animals, and caloric restriction for the standard-fed animals; we measured an increased performance in the rotarod (a measure of physical activity and physical performance); there was an increase in mean and maximum lifespan in three groups; and we saw a reduction in cataracts, improvement of bone health parameters, and reduced damage and stress in the cardiovascular system. This being one of the main diseases that increase with age, we wanted to focus on this. As I said, this work has been published in these two papers [Nature and Cell Metabolism].

The next thing we wanted to do, as a true translational approach, was to ask the question, “Can we see similar effects of Resveratrol in non-human primates?” So, with the funding of the Office of Dietary Supplements, and also the Office of the Scientific Director, we were able to start a small trial in the non-human primates. And this was done in collaboration with Julie Mattison and Kevin Pearson. We took 24 rhesus monkeys: they were full adults, average body weight, and they were 24 months in the study. We are now looking at the mechanisms behind the Resveratrol effects, and we are in the planning stages, in collaboration with Dr. Luigi Ferrucci, of a human study using Resveratrol.

And I have to thank all the people that participated in this study.

Thank you so much for your time.
What is Aging?
What are the mechanisms behind aging?
Can we manipulate the aging process?
Aging is the major risk factor for ALL chronic diseases
Manipulating Lifespan/Healthspan

Lifespan Manipulation C57Bl6/NIA
Resveratrol

- Resveratrol is a phytoalexin produced in response to stress (e.g., infection, heat, UV).
- Found in wine (0.2-5.8 mg/L wine).
- Cancer protection, inflammation, and antioxidant.
- Resveratrol activates SIRT1 in vitro.
- It is similar to caloric restriction in that there is much debate about its mechanism(s).
Aging Intervention Mouse Program

Resveratrol 100 and 400 mg/kg

1 year old male C57Bl6/J

11 Groups, n≥50 mice/group

Food Intake Body Temperature NMR Body Comp Serum/Urinoine Analysis Glucose Homeostasis Tissue Analysis Behavior Immune/Stress test Metabolic assessment

Healthspan Lifespan

Lifespan data

Survival proportion

Time (weeks)

1.0

0.8

0.6

0.4

0.2

0.0

Standard diet control
SD high resv
EOD low resv
High calorie control
HC high resv

C57Bl6/J
- Males
- Aged (1y)
- n≥ 50/group
- Microchipped (ID+Temp transponders)
Health and Lifespan Summary

- Protection against fatty liver induced by HF
- Increased insulin sensitivity
- Gene expression pattern similar to standard diet for HF mice and to CR for SD mice
- Increased performance on a rotarod
- Mean and maximum lifespan extension in 3 groups (HF+HR, HF+LR and EOD+LR)
- Reduction in cataracts
- Improve bone health parameters
- Reduced damage/stress in cardiovascular system
Preliminary Conclusions/Future Directions

- Resveratrol had a strong cardiovascular protective effect in NHP
- Improvement on PWV, an age related clinical marker of atherosclerosis
- Reversal of the gene transcription profiles in multiple tissues
- Overlap of genes/pathways in both species
- Studying mechanisms behind resveratrol’s effects
- Human Intervention study with Luigi Ferrucci at CRB

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“See, the problem with doing things to prolong your life is that all the extra years come at the end, when you’re old.”
2010 GLOBAL HEALTH FORUM
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Panel 1: The Science of Aging and Longevity

Lewis Lipsitz, M.D.,
Chief, Division of Gerontology, Beth Israel Deaconess Med. Ctr.
Professor of Medicine, Harvard Medical School

80 is the new 60: Why and How to Make it Happen
Thanks Dr. Hodes.

I’d like to start by thanking the organizers and particularly Admiral Susan Blumenthal and Ambassador Terzi for the opportunity to be here today. This is really quite a wonderful event.

I am going to hopefully paint a more optimistic view of aging in the 21st century and tell you some of the new advances in clinical research and in clinical medicine that I think will have a major impact in the way we experience aging in the years to come.

I am not going to dwell on the demographics but I do want to point out that 80 year olds are now experiencing what 60 year olds used to experience many years ago. In 1960 people over the age of 62 could expect to live anywhere from 15 years in men or 20 years in women. That’s beyond the age of 62. Now we’re seeing that actually people over 80 can experience those same increases in life beyond the age of 80. So now it’s the 80 year olds that are experiencing anywhere from 15 to perhaps even 20 years of life expectancy. So life expectancy is increasing and the older you get the older you can expect to live. The hope is that the duration of disability is decreasing and shown here on this slide are the number of different scenarios that indicate what we might expect in the future. The present morbidity shows here that most people live to about 55 in relatively healthy conditions until morbidity begins to develop, and morbidity might have a period of approximately 20 years before the onset of death. One scenario is that there’s life extension and there are the people who now live beyond 76, the 80 and above, but with that we do not know anything about morbidity, and therefore people experience a longer period of morbidity toward the end of life. We’re seeing data that suggest that we are actually shifting both morbidity and life expectancy to the right, and the hope is that we will ultimately compress morbidity and not experience the onset of disease or disability until very late in life and then having a very short period between the onset of morbidity and death. This is a trend that we are beginning to be see demographically and we hope continues into the future. One of the reasons for the increase in life expectancy and perhaps the decrease in morbidity at the end of life is the decline in stroke rate, and this is true across many different ethnic and racial groups and has been a relatively steady progression since 1985. This slide represents large vessel disease in the brain. Large vessel disease is often due to risk factors for cardiovascular disease. But we are also recognizing the role of small vessel disease in the brain. It’s curious that when we think about aging we think of what is illustrated by this man here on the left: slow gait, cognitive impairment, particularly executive dysfunction, which is the ability to plan, organize, sequence and multi-tasking become impaired with aging. Many older people develop depressive symptoms, and in recent large scale population studies, we have actually shown that these three characteristic of aging (slow gait, cognitive impairment, and depressive symptoms) aggregate together in about 17% of the elderly population. Recently, it’s also been recognized that this aggregation of symptoms is strongly associated with the development of what is shown here and sometimes is called white matter hyperintensities. These represent small vessel disease of the brain, it’s highlighted here on the right in the red color. These areas of the brain are watershed areas represented here on this angiogram by areas in which is reduced blood supply in these particular
regions around the ventricles of the brain. This reduction in blood supply makes these regions very vulnerable to low blood pressure or decrease perfusion and as a result the very small vessels in this region can break down and cause, what I’ve shown on the MRI previously, to be the small vessels, white matter abnormalities. The white matter in these regions carry information from the frontal lobes to the rest of the body and that information is what is responsible for the executive dysfunction, the slow gait and some of the depressive symptoms that we often see in other patients. So there’s a very strong connection between risk factors that affect the heart and factors that affect the brain. And we now recognize that the same risk factors that affect the heart, particularly hypertension, diabetes, hyperlipidemia, also cause the small vessel disease of the brain that I’ve just demonstrated to you. High blood pressure, in particular can cause cognitive loss and functional decline and one of the optimistic hopes of all geriatricians is that the treatment of hypertension in mid-life and the treatment of risk factors in mid-life might actually prevent some of these manifestations of aging that I’ve shown to you.

There’s a strong relationship shown here between cardiovascular risk factors and executive dysfunction. Here on the X axis is a cardiovascular risk scores that counts up the number of risk factors for heart and vessel vascular disease, and you can see that with the increase in the risks score there is an increased percentage of individuals who have executive dysfunctions. This illustrates the relationship between blood pressure and executive dysfunction and you can see again on the X-axis with increasing blood pressures, systolic blood pressure in this case, there’s a greater risk of executive function measured by the trail B test. And similarly, diabetes can affect cognitive function, particularly executive function. Here we have divided the patients in the high performance on two tests and low performance of those same tests, and you can see those with the poor performance are those with the higher HBA1c, representing poor glucose tolerance or diabetes. So hypertension and diabetes as well as hyperlipidemia and other risk factors for cardiovascular disease are also risk factors for brain disease, particularly diseases that affect cognitive function, gait and depressive symptoms. The good news is that the treatment of hypertension may improve cognition.

There are two very large scale studies, one called the Syst-Eur Trial and the other the Progress Study that suggested among thousands of older people that the aggressive treatment of hypertension might actually reduce cognitive impairment and slow cognitive loss. However, a recent Cochrane analysis, which actually did an analysis of many different studies, has not yet been able to show among numerous studies that this effect is true, so we still have much work to do to determine whether the aggressive treatment of hypertension, particularly in midlife, prevents cognitive impairments in late life. But the treatment of hypertension does apparently prevent functional decline, and that is illustrated here in a study that we did a number of years ago. This study examined function using three different functional assessment measures. The KATS, RBS and the NAGI scale, between the years of 1984 and 1993. We have three time points in which each of these scale was measured, and as you can see in people with normal blood pressure shown in black, there is a decline overtime in these different functional measures. However those people with uncontrolled hypertension shown in red have a
much more dramatic in function over those 9 years, and those people that are treated and have their body pressure controlled have a curve that is somewhere intermediate, with a reduced decline in their functional abilities over that period of time. So we do think that the treatment of hypertension can prevent some of the functional decline that we see in older age, and most of this dysfunctional decline is in the area of gait and mobility.

There are many challenges but also many opportunities in the field of aging right now. I think when all of us think of what we fear most about aging it is the loss of memory, the loss of mobility, the onset of disease, particularly heart disease and cancer, mortality, disability and pain. However there are opportunities in each of these areas because many of these conditions are preventable. And let me just give you a few illustrations of that. The first is memory loss; we’ve heard a bit about Alzheimer disease from Doctor Hodes and these are just the pathological hallmarks of Alzheimer disease that is the Amyloid plaque which is filled with Beta Almyloid protein, that is toxic to neurons, and neurofibrillary tangles filled with a protein, that is also quite toxic.

PET scans are now able to actually to demonstrate almyloid in the brain, and here as you’ve seen before is the Pittsburg aging B which can light up deposits of almyloid in the brain of older people without Alzheimer’s disease. You can see that these deposits are rare or absent in controls without Alzheimer’s disease. And similarly we can look at glucose metabolism in the brain using a fluorinating glucose compound and here Alzheimer’s disease particularly in the highlighted area here, is less glucose metabolism. These scans now enable us to identify people earlier in life and intervene with interventions that we hope to prevent Alzheimer’s disease later in life. There have been several therapeutic advances although not yet any cure for Alzheimer disease and they are listed here; we are now able to restore acetylcholine in the brain with three different drugs that block the metabolism of acetylcholine and increase its level in the brain. We can prevent damage to neuron through Memantine. As I mentioned we can reduce cardiovascular risk factors and hopefully prevent vascular dementia and Alzheimer disease by treating hypertension, hyperlepidemia and diabetes. There are studies now looking at the reduction of oxidative stress with vitamins and prevention of inflammations with NSAIDS that hopefully will have effects in the future. And also studies are looking at ways to reduce amyloid deposition by inhibiting beta-secretase and even using vaccines to sop up amyloid deposits in the brain. But I’d like to highlight the things that are not necessarily in the basic laboratory but in the clinical laboratory also have promise with regard to preventive cognitive decline; and these are mental and physical exercises. In fact the old adage “use it or lose it” may well be true. If we don’t use our brain we will lose cognitive abilities. The ACTIVE trial was one of the most important trials that recently demonstrated that advanced cognitive training can actually preserve cognitive function. This was a random eyes control trial over 2800 normal adults over age 65 who underwent 10 sessions of cognitive training. These sessions were 60 to 75 minutes, conducted over 5 to 6 weeks and about two thirds of the population had a booster training session later. This study showed that training in memory, reasoning and speed of processing actually was able to improve these cognitive abilities. There was an immediate improvement in the speed of processing in 87% of people, reasoning in 74%
and memory in 26%. But, more importantly, 5 years later the better performance persisted in those areas they were trained and the speed of processing and reasoning groups who receive the booster effect did even better at 5 years. So training our brains, and this is what led to the marketing of the variety across with puzzles and brain exercises, but it does seems to have promise in term of preventing cognitive decline.

Another study I’d like to point out was done in Baltimore, not far from here at Johns Hopkins, and this showed that older retirees who participated in a voluntary program to go into the public schools and teach young students actually improved their brain activity. This is called the “experience corps”, which is now a national program that takes these volunteers into the schools, and when they participated in this voluntary but mentally stimulating work, PET scans were actually able to show increase in cognitive activity in the selected areas shown here, and when compared to controls had a dramatic improvement in some of the functional activity of the brain in these particular areas. So there is really a promise, I think, that many of these cognitive activities and, in fact, physical activities may prevent some of the cognitive loss associated with aging. The mobility problems also are of major concern because 30 to 50 percent of older people fall each year. There’s obviously a higher rate of injury, mortality and use of services. This results in over 300,000 hip fractures in our country each year, and of these people half of them need assistance later after the hip fractures, and 25% of them die. Falls cost us 20 billion dollars in 1995 and is expected to cost 32 billion in 2020. So this is an important problem to try to resolve. One of the causes of falls is muscle loss. This is the cross section of a thigh in a healthy 25 year old and as you can see in the yellow area, most of this thigh is composed of muscles, the red is fat. But here’s the same cross section of a thigh in a healthy 80 year old. The muscle is lost and replaced by fat. We used to think that muscle loss was an inevitable consequence of aging, but in fact we also know that aging is associated with a decline in activity level, and it is now recognized that some of the muscle loss associated with aging is actually due to the sedentary lifestyle that we all assume sitting in conferences like this causes us to lose muscle.

But the good news, again an optimistic picture, is that people at any age can improve muscle strength and increase muscle mass. A number of years ago we studied 100 frail nursing home residents who were between the ages of 72 and 98 years of age, average was 87. They were randomized to a 10 weeks of progressive quadriceps muscle training or placebo, just educational sessions. This means they did leg lifts to improve the strength of their quadriceps muscles and after just 10 weeks of leg lifts there was a 113% increase in muscles strength, a 12% increase in gait speed, a 28% increase in stair climbing power and only a small increase, but a significant one, in thigh muscle area.

So these people got a lot of bang for their buck: they were able to have a 113% increase in strength for only a relatively small increase in muscle size.

Another recent finding that also has implications in terms of falls and mobility is the importance of vitamin D. Recent studies, a variety of studies now, have shown that higher doses of vitamin D are actually associated with a reduction in the risk of falls. So not only osteoporosis but also falls seemed to be reduced by the use of vitamin D. Another simple intervention that can go a long way toward preventing mobility decline.
Finally, I think much of the public wants to know is whether there is medicine to slow the aging process. It’s funny about humans wanting medicines. In fact, over a hundred years ago William Osler said that “the desire to take medicine is perhaps the greatest feature which distinguishes man from animals”. Well, we are on the paths toward identifying an anti-aging pill and you’ve heard a little bit about this from Doctor de Cabo. In the past, there were estrogens and growth hormones and now one of the very exiting opportunities is the drug Resveratrol, which is found in red wine, but also possibilities for Rapomycin, and people are even looking to develop a Polypill that might be one pill with all the good things wrapped inside, including medications to reduce blood pressure and cholesterol and perhaps an aspirin, vitamin D, and others. I think this may not be the right approach but it’s certainly in the horizon.

It’s curious that some of the people with the longest recorded lifespan like Jeanne Calment who lived to 122 and Antonio Todde who lived to 113, attributed their long lifespan to red wine. Jeanne Calment said the key to long life are olive oil and port wine and Antonio Todde said a sense of humor and a good glass of red wine everyday was his secret. And in fact 500 years ago a Spanish explorer, Ponce the Leon, drank his way around Florida during his expedition to find the legendary fountain of youth. So maybe there’s something there after all.

And finally I want to emphasize the importance of social networks. This again is a rather low tech intervention that can prolong healthy lifespan. Social scientist are finding that social connectedness through marriage, family, religion and housing facilities can improve health, reduce mortality and enhance recovery from myocardial infarction, stroke and other disabling illnesses.

So, I again leave you with an optimistic note. I think that in the 21st century there are many approaches to healthy aging that might turn out to be able to shorten the period of morbidity and perhaps expand the life expectancy even further. They include physical activity, mental activity, social engagement, reduction of cardiovascular risk factors, particularly hypertension, hyperlepidemia and stopping smoking and proper nutrition, from calcium to vitamin D, low fat and perhaps modest alcohol.

So, remember you’re never too old. This is a woman who, for her 92nd birthday, strapped herself onto her instructor and took her first skydive. And I understand she landed successfully.

Thank you very much.
80 is the new 60: Successful Aging in the 21st Century

Italian Embassy, October 12, 2010

Lewis A. Lipsitz, MD
Director, Institute for Aging Research, Hebrew SeniorLife
Chief of Gerontology, Beth Israel Deaconess Med Ctr
Professor of Medicine, Harvard Medical School

The World is Rapidly Aging
Life Expectancy is Increasing

Survival Rates in U.S. (vs. Age)

Years of Life Expectancy at Birth by Sex, 1900-2000

The Duration of Disability is Decreasing

Declining Stroke Rates

- Slow Gait
- Cognitive (Executive) Dysfunction
- Depressive Symptoms
- Co-occur in 17% of elderly populations

Increasing Recognition of the Role of Micro-Vascular Disease in the Aging Phenotype
Watershed Areas of the Brain

Wong, HH et al, Stroke 2001; ooo = watershed

The Heart-Brain Connection

- The same risk factors that affect the heart also affect the brain.
- High blood pressure, in particular, can cause cognitive loss and functional decline.
- The treatment of hypertension may be preventative.
Relation between CV Risk and Executive Dysfunction

![Graph showing the relation between CV Risk Score and percentage of impaired executive function.](image1)

Pugh, JAGS 2003; 51:1439

Relation Between SBP and Executive Impairment

![Graph showing the relation between Supine Systolic Blood Pressure Quartile and extent of executive impairment.](image2)

Kuo, J Geront 2004; 59A: 1191
Poor Diabetes Control and Cognitive Dysfunction

Treatment of Hypertension May Improve Cognition

- **Syst-Eur Trial** (Lancet, 1998, Arch Int Med 2002): In 2902 elderly people with Syst HTN, Rx w/nitrendipine for 3.9 yrs reduced the incidence of dementia by 62%.
- **PROGRESS Study** (Arch Intern Med 2003): Among 6105 elderly people with CVD, Perindopril/Indapamide reduced cog decline assoc’d w/recurrent stroke by 34%.
- **Cochrane analysis** of Sx w/o CVD in SCOPE, SHEP, & Syst-Eur showed no combined effect.

Current Challenges and Opportunities

- Major Challenges. Preventing
  – Loss of Memory (Dementia)
  – Loss of Mobility (Falls and Fractures)
  – Onset of Disease (Heart Disease and Cancer)
  – Mortality, disability and pain.
- Opportunity:
  – Many of these conditions are preventable.
Memory Loss

Hallmarks of AD in the Brain

The Amyloid Plaque

Neurofibrillary Tangles
Healthy Aging Globally: A Life Cycle Approach

Hallmarks of AD in the Brain

- The Amyloid Plaque
- Neurofibrillary Tangles

PET Scans in AD
Therapeutic Advances for AD

- Restore Acetylcholine: Aricept, Exelon, Reminyl.
- Prevent damage: Memantine
- Reduce CV risk: Treat HTN, cholesterol, diabetes
- Reduce oxidative stress: Vitamin E, Vitamin C
- Prevent inflammation: NSAIDS
- Reduce amyloid deposition: beta-secretase inhibitors, vaccine
- Mental and physical exercise.

“Use it or Lose it”
ACTIVE Trial - Advanced Cognitive Training for Independent and Vital Elderly*

- RCT of 2802 normal adults > 65 years of age.
- 10 sessions, 60-75 minutes, over 5-6 weeks, 60% had 75 min. booster sessions.
- Training in Memory, Reasoning, and Speed of Processing improved these cognitive abilities.
- Immediate improvements in speed of processing (87%), reasoning (74%), & memory (26%).
- 5 years later, better performance persisted in trained areas.
- Speed of processing and reasoning groups receiving booster did best at 5 years.


Volunteer Teaching Increases Brain Activity

Carlson, Experience Corps, JG 2009
Mobility Problems

- 30% of community-dwelling elderly, 50% of NH residents fall/year.
- High injury rate, mortality, & service use.
- 300,000 hip fx/yr, 50% need assist, 25% die
Muscle Loss and Aging

- Age
- Muscle Mass
- Activity Level

HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH
Resistance Training Improves Muscle Strength at Any Age

100 frail nursing home residents aged 72-98 years (mean 87) randomized to 10 weeks of progressive quadriceps resistance training or placebo.

RESULTS:
• 113% increase in muscle strength
• 12% increase in gait velocity
• 28% increase in stair climbing power
• 3% increase in thigh muscle area

Bischoff-Ferrari, H A et al.
BMJ 2009;339:b3692

Vitamin D Prevents Falls

Bischoff-Ferrari, H A et al.
BMJ 2009;339:b3692
Is There a Medicine to Slow the Aging Process?

“The desire to take medicine is perhaps the greatest feature which distinguishes man from animals.”

-- William Osler

Anti-Aging Pills?

- Estrogen
- Growth Hormone
- Resveratrol
- Rapamycin
- Polypill: BP, Cholest, Aspirin, Vit D, etc, etc.
Longest Recorded Lifespans

Jeanne Calment (122)

“The keys to long life are olive oil and port wine.”

Antonio Todde (113)

“...a sense of humor and a good glass of red wine every day.”

Figure 1. A quest for longevity. Five hundred years ago, the Spanish explorer Ponce de Leon drank his way around the Florida coast during his expedition to find the legendary fountain of youth.
Social Networks

• Social connectedness through marriage, family, religion, housing
• Improves health, reduces mortality, enhances recovery.

21st Century Approaches to Healthy Aging

• Physical activity
• Mental activity
• Social engagement
• Reduce cardiovascular risk factors
  – Hypertension, High Cholesterol, Smoking
• Proper nutrition:
  – Calcium, Vit D, low fat, modest alcohol
For her 92nd birthday, Jane Bockstruck, strapped onto her instructor, took her first skydive (P.J. Jackson/AP).
PANEL 2:
Behavioral, Environmental and Quality of Life Issues
Panel 2: Behavioral, Environmental and Quality of Life Issues

Luigi Ferrucci, M.D., Ph.D.
Chief, Longitudinal Studies Section, National Institute on Aging, NIH

Walking for Healthy Aging
Thank you first to all the organizers for inviting me to this interesting and challenging symposium.

I would like to talk to you about walking for healthy aging. I have been working at the National Institute of Aging (NIA) for 7 years and I participated in a number of studies which tried to understand the complexity of the multiple dimensions that affect the aging process.

Today I will talk to you about a component of our studies that is becoming particularly interesting, that is how the discrepancy between energy production and energy utilization may contribute to age-associated frailty and aging. This is an approach that we believe may have important applications in clinical geriatric practice.

Everybody believes that if they see an older person on the street they can easily recognize whether this person is old or not. What we call ‘old’ is actually a re-characterization of the ageing phenotypes in our imagination, and is strongly influenced by our previous experiences and the cultural phenotypes. In reality, if we were to compare the criteria that each of us uses to define “old” there will be very little agreement and homogeneity. What I am showing here a definition that for me fit the job today, namely a “highly variable age-associated changes in organs, tissues and cells that diminish functional reserve and confer vulnerability to stressors and/or disease”. The most interesting aspect of this definition is the focus on a reduction of functional reserve, a reduction of resilience. Resilience and compensation are not problematic early in life because there is a very large compensatory power in our body thank to a number a anti-entropic mechanisms that are a critical and unavoidable component of our physiology. Research of the last three decades have clearly shown that the ability to compensate stressful events, dysregulations and diseases declines with aging causing a progressive emergence of the aging phenotype, which to some extent is stereotyped. One of the concepts that the geriatric medicines has understood in the last twenty years and that to me is represents one of the most important clinical application of aging research, is the importance of studying mobility and disability. Understanding disability is important not only to quantify the needs for assistance. There are no doubts that older persons and their families need to be helped when progressively or because of a catastrophic event there is loss of autonomy in one or more of functional tasks of daily life. There is another reason that certainly not less important: in old age there is a strong connection between the ability to act into the environment, both at physical and mental level, and physical health. In other words, in old age physical and cognitive function are by far the most robust and comprehensive biomarker of disability. A number of studies have shown that mobility limitation and disability is the strongest prognostic factor both for disease evolution and mortality than any other medical parameter that we know in medicine.

The data shown in this slide are from a manuscript that my friend Jack Guralnik and I published in 1995. It was one of the first papers I published with him about the predictive effect of a very simple performance test of physical functions. It consists into walking 4 meters, rising from a chair 5 times, standing and maintaining the balance in progressively more challenging conditions. We administered this test in a large epidemiological study conducted in a large sample representative of the general population.
population. We found that this simple test that requires not expertise, not technicality, and 5 or 6 minutes to be administered was incredibly predictive of new disability. The predictive value was independent and more powerful than any other traditional biomedical marker, including cholesterol or hypertension. And in fact, just to show you how powerful this test is, I will show you some data from a NIA study that was performed in Tuscany, Italy.

In this slide I am comparing the quintiles of walking speed assessed at the study baseline in relationship to mortality over the following 6 years. The results show that walking slower than 0.8 meters per second, which is the lowest quintile of the distribution, had a worse prognostic implication than having the malign cancer at baseline.

Over the last 15 years, we have been working from multiple perspectives in understanding why this measure of energy expenditure, that is walking, has such a strong prognostic implication. I and others at NIA believe that understanding the mechanism that link mobility disability to rapid deterioration of health and mortality may shed light in the critical mechanisms that underlie the aging phenotype.

If we focus for a moment on body composition, I want to show you some data that truly reinforce the idea that aging and disease have a synergy and they provoke the same consequences. The data that your see here are from the Honolulu Heart Study, a study funded by NIA. As you can see, there is marked decline of handgrip strength, a simple but very effective measure of muscle strength with aging.

This study also shows that, even at the age of 45, individuals who died had a lower grip strength compared to the individuals who survived. So the body composition itself and the ability to develop muscle strength is not only important for physical function and mobility, but is also a strong prognostic factor. When you look at the 27 years follow-up, there is almost a linear decline in the grip strength, but in the older age group strength is higher than expected for a linear decline. This is because we selected the survivors that are only the individuals who had the highest strength.

The Baltimore Longitudinal Study of Aging studied people with Chronic Obstructive Pulmonary Disease (COPD), which has clearly an effect on muscle mass and muscle strength. The difference in the prevalence of sarcopenia between individuals with versus without COPD is minimal and not very evident up to the age of 60, but after 60, both age and COPD work together in causing very severe sarcopenia so that, in the oldest age group, 90 plus, the prevalence of sarcopenia is almost three times higher for individuals with COPD than controls.

Let’s move for a moment to the discrepancy between energy production and energy utilization because this is really the core point of this discussion. Now, what is energy? I want to make this very simple for you.

So let’s say that we had a certain amount of energy that we can use in 24 hours. The way I think about it is that in the morning the mailman comes to your house with a box and tells you: “this is the box of energy you have for the entire day, you do not have any more energy than that, you need to do everything with this”.
You use part of this energy to survive, just to survive, to do nothing else. This would be the resting metabolic rate; it is between 60% and 70%, somebody says 50%, but it is a really large component of the energy you have. You may be surprised that you need so much energy just to survive. Indeed, if you think carefully you should not be surprised. For example, energy is continuously required to pump the potassium in and the sodium out of cells, to produce red blood cells and substitute cells that are lost because of apoptosis, to do the protein synthesis, so this is a very large amount of energy. I would like to underline that this concept and percent estimate is only correct if we consider young healthy individuals and may not apply to old and unhealthy individuals. What we are finding now is that there is a resting metabolic rate that is appropriate for a certain age and body composition but also that the amount of energy required at baseline depends on the state of health. There is an extra amount of energy that you need to spend to deal with diseases. So you use a part of energy to live and a component to fight the disease. what is left is a lot at young age but tend to shrink substantially in old age. The box that arrives in the morning gets smaller and smaller because of the reduction on fitness that occur almost in everybody, even in those who maintain a good level of physical activity. You need to use more of that box because you also have to use the energy to fight the disease and to maintain the homeostatic equilibrium, so your window of opportunities, that is the energy you need to do everything else you want to do in your life, such as walking, dancing, listening to the music, shrinks more and more.

It seems to be bad enough, but it gets worse than that. One thing I did when I arrived to the NIA was looking at the old database and I found that, 30 years ago, somebody had measured resting metabolic rate, so I wanted to see whether resting metabolic rate was associated with mortality. In the following slide you can see that in the Baltimore Longitudinal Study of Aging those with highest resting metabolic rate tend to have a significantly higher mortality. The reason for this apparently surprising finding is now clear, individuals are doing a homeostatic effort and they are fighting diseases so that resting metabolic rate is high, they have more disease, so they tend to have more mortality.

Then I looked at walking speed. As I told you before, there is a strong correlation between age and walking speed. Walking speed declines with aging, old people walk slowly. Interestingly, if ask people how they recognize the elderly, walking slowly is one of the characteristics that is cited more often. When you looked at how much energy you need for walking there was a very surprising result. There are actually no effects of aging on oxygen consumption and on calculated energy consumption for walking at self-selected speed. This finding implies that to walk one meter people require more energy when they are older than when they are younger.

So not only you have a smaller box, your maximum oxygen consumption is reduced and your resting metabolic rate is increased by diseases but, of all the energy you have, you need more just to do the normal activities of your life. And that is why people are tired, because just very normal activities put the level of energy consumption very close to the top level of the energy available.
What is really happening is that the effort and duration of physical activity is an input going to the brain that perceives a signal of “danger”. The body is telling to the brain that you cannot do more than you are doing because if you do, there is no energy left. The only possible sparing energy strategy is to walk slower.

The problem is that with aging the body is tricking the brain and in fact, for example, if you have a high inflammation, you perceive that you are much more tired than you really are metabolically. For example, everybody had experienced that if you have the flu and you want to go to the bathroom, going to the bathroom is like running the marathon. You are extremely tired and you need to rest two hours after doing that.

I think that increasing fitness with exercise is the only way you have to enlarge the box and obtain a level of maximum energy consumption that is much farther from the one you need for your daily activities.

I want to finish with a comic that I really love:

“What frailty... isn’t? You’ve got a rare condition called good health. Frankly we’re not sure how to treat it.”

Thank you very much.
Walking for Healthy Aging

Luigi Ferrucci, MD, PhD
Longitudinal Studies Section
Clinical Research Branch
National Institute on Aging
Baltimore, MD, USA

Tenets of Geriatric Medicine

The Aging Phenotype
Highly variable age-associated changes in organs, tissues and cells that diminish functional reserve and confer vulnerability to stressors and/or disease.
Disability Status at Four Years According to Baseline Summary Performance Score Among Those Non-Disabled at Baseline (Iowa – EPESE)

ADL = activity of daily living
Sarcopenia is defined as lowest sex-specific tertile of the residuals of a regression predicting muscle area from height and fat mass.
Prevalence of Sarcopenia in Participants with COPD and Controls

The Baltimore Longitudinal Study of Aging

Age (years)

Percentage with Sarcopenia

"Age*COPD" p<0.001

Body Composition and Mortality in COPD

Fat Free Mass Index

Men < 16 Kg.m²
Women < 15 Kg.m²

Men ≥ 16 Kg.m²
Women ≥ 15 Kg.m²
An Extended Model of Energetic Frailty

Physical and Cognitive Activities
(Walking, Talking, Watching, Thinking, Digesting, etc.)

Theoretical Minimum Energy Requirement
For Homeostasis
(Age, Sex, Body Composition and Physical Activity)

Extra Energy for Unstable Homeostasis
(Homeostatic Effort)

Metabolic Cost Standard Task

How Close to MVO$_2$?

MVO$_{2\text{max}}$

RMR

Accelerated Longitudinal Decline of Aerobic Capacity in Healthy Older Adults
Jerome L. Fleg, Christopher H. Morrell, Angelo G. Bos, Larry J. Brant, Laura A. Talbot, Irmessie G. Wright and Edward G. Lukash
Circulation 2005;112:674-682; originally published online Jul 25, 2005;

Peak VO2 in ml / min (at age and gender adjusted means)
High Basal Metabolic Rate is a Risk Factor for Mortality: The Baltimore Longitudinal Study of Aging

Preferred Walking Speed (PWS) and Age In the BLSA
Energy Expenditure at Preferred Walking Speed and Age in the BLSA

Habitual Energy Expenditure per Meter at Preferred Walking Speed and Age in the BLSA

bandwidth = .8
Effort and Duration Of Cognitive Activity

Effort and Duration Of Physical Activity

Detraining
Inflammation
Homeostatic Dysregulation
Mood
Stress

Input Amplification And Modulation

What Frailty... Isn't

"You've got a rare condition called 'good health'. Frankly, we're not sure how to treat it."
Panel 2: Behavioral, Environmental and Quality of Life Issues

Prof. Luigi Fontana
Nutrition and Aging Division, Istituto Superiore di Sanità (ISS)
Washington University School of Medicine

Nutritional Modulation of Aging and Age-Associated Diseases by Caloric Restriction
Population aging is progressing rapidly in many industrialized and developing countries. The United States and Italian population aged 65 and over is expected to double in size within the next 25 years. In sedentary people eating Western diets aging is associated with the development of serious chronic diseases, including type 2 diabetes mellitus, cancer and cardiovascular diseases. Cardiovascular disease (CVD), cancer, stroke and diabetes account for nearly 70% of the deaths in the United States and Italy. About 80 percent of adults over 65 years of age have at least one chronic disease, and 50 percent have at least two chronic diseases. These chronic diseases are the most important cause of illness and mortality burden, and they have become the leading driver of healthcare costs, constituting an important burden for our society. Data from epidemiological studies and clinical trials indicate that many age-associated chronic diseases can be prevented, and even reversed, with the implementation of healthy lifestyle interventions. Several recent studies suggest that more drastic interventions (i.e. calorie restriction without malnutrition and moderate protein restriction with adequate nutrition) may have additional beneficial effects on several metabolic and hormonal factors that are implicated in the biology of aging itself.

Many age-associated chronic diseases, such as ischemic heart disease, cancer, stroke, and diabetes, share several metabolic and hormonal risk factors that can be largely prevented, especially if they are diagnosed early. For example, insulin resistance, hyperinsulinemia and inflammation play an important role in the pathogenesis of both cancer and CVD. Excessive calorie intake and a sedentary lifestyle cause abdominal obesity. Greater abdominal adiposity, and in particular accumulation of fat in the visceral adipose tissue depots, is strongly associated with insulin resistance, hyperinsulinemia, systemic inflammation, hypertension, dyslipidemia, low circulating levels of adiponectin and other metabolic and hormonal alterations which play essential roles in the pathogenesis of type 2 diabetes, stroke, ischemic heart disease and some types of cancer.

Intentional weight loss has important therapeutic effects in individuals with excessive abdominal adiposity because it simultaneously improves multiple metabolic risk factors for type 2 diabetes, CVD and cancer, and reduces morbidity and mortality. Many of these beneficial effects are already apparent after only modest weight losses of 5% to 10% of initial body weight in overweight and obese patients. Energy deficits induced by calorie restriction (CR) and endurance exercise (EX) in overweight and obese subjects are accompanied by similar improvements in glucose tolerance and insulin action, and similar reductions in several major CVD risk factors, including plasma LDL-cholesterol concentration, TChol:HDL-cholesterol ratio, and triglycerides. Moreover, data from observational studies have shown that CR improves metabolic profiles in normal weight subjects also.

Data from a series of studies conducted in members of the CR Society, which is a group that practices self-imposed CR with adequate nutrition (approximately 30% reduction in daily calories), show that long-term CR results in profound and sustained beneficial effects on the major atherosclerosis risk factors, such as serum total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, blood pressure, and carotid artery intima-media thickness, that usually increase with advancing age. They further show that CR
provides a powerful protective effect against obesity and insulin resistance, and provide evidence for a decrease in inflammation, as reflected in extremely low C-reactive protein, and tumor necrosis factor-α levels. Several studies have shown that CR improves diastolic function, a marker of cardiac aging, in mice, rats and humans. In particular, in one study transmitral Doppler flow diastolic function indexes in individuals practicing long-term CR were similar to those of individuals that were ~16 yr younger, and measures reflecting ventricular elasticity and efficiency were significantly higher than in controls.

However, caloric intake and adiposity are not the only determinants of health risk and longevity. There are several other important factors that play a crucial role in promoting or preventing age-associated diseases, independently of adiposity and energy intake. For example, it is well-known that the over-consumption of animal foods rich in saturated fatty acids and of processed foods packed with trans-fatty acids are responsible for the high levels of total cholesterol and LDL-cholesterol, which are major cardiovascular risk factors, even in lean and physically active individuals. Excessive consumption of salt and salt-preserved foods has been linked to hypertension, hemorrhagic stroke and gastric cancer independently of adiposity. Excessive protein intake, which results in a chronic positive nitrogen balance, is an emerging important risk factor for cancer and possibly aging, because it modulates serum IGF-1 concentration. Furthermore, cooking meat, starches and oils at high temperatures (i.e. frying, broiling, and grilling) produces heterocyclic amines, polycyclic aromatic hydrocarbons, acrylamide and 4-hydroxy-trans-2-nonenal, which are potent genotoxic carcinogens in rodents and humans.

Diets rich in nutrient-dense foods, such as vegetables, beans, whole grains, fruits, nuts, seeds and fish, may have additional health benefits in the prevention of a variety of age-associated chronic diseases. Plant foods, for example, contain a wide range of phytochemicals (i.e. polyphenols, terpenes, sterols, indoles, and isothiocyanates) and vitamins that have shown beneficial effects against inflammation, oxidative stress, cancer and CVD in experimental studies. Important dietary sources of phytochemicals are onions and garlic (organosulfur compounds and flavonols); tea, apples, and red wine (flavonols, catechins and stilbenes); citrus fruit (flavanones and cyclic monoterpenes); berries and cherries (anthocyanidins and flavonols); soy (isoflavones), cabbage family (isothiocyanates and indoles), carrots and celery (polycyclic aromatic hydrocarbons, acrylamide and 4-hydroxy-trans-2-nonenal, which are potent genotoxic carcinogens in rodents and humans.

More studies are needed to determine whether humans develop the full range of metabolic and functional adaptive responses to CR that occur in rodents, and whether vascular, pulmonary, kidney, brain and immune aging are slowed by CR in humans. Moreover, additional studies are needed to understand the complex interactions of factors that regulate aging and age-associated chronic disease. Both our health and quality of life in
the coming 50 years, as well as the sustainability of our healthcare system, depend on our ability to meet these challenges.
Panel 2: Behavioral, Environmental and Quality of Life Issues

Jeffrey Kaye, M.D.,
Director, Oregon Center for Aging and Technology,
Oregon Health and Science University

How can we measure aging?
The final talk is of Jeffrey Kaye, director of Oregon Center for Aging and Technology: we have heard a good deal about the importance of carrying on this study and gaining information that requires precise measurement, whether it is physical activity or diet, can these be more effectively done in a free and more natural environment than in a laboratory center. Since Kaye has dedicated time and efforts to moving forward on that front, we will talk about how we can measure aging and some of the determiners of aging.

Well while this is being set up, I want thank you the Ambassador and Doctor Blumenthal for organizing this great conference and inviting me, and I also note that I am being given the opportunity to apply a dietary restriction on the population here, so I will try not to make the treatment to severe.

Doctor Hodes gave me a great introduction to set up what I am going to focus on in my brief presentation. The topic of “How we measure aging” is obviously a very broad topic, so I anticipated that we would have to focus. So really, what I am going to talk about is how we can measure health in aging. I am not going to be focusing on molecular or cellular mechanisms or measurements. With this in mind let me make some comments to the frame of discussion that I think follows from what you heard this morning. So if you want to define or measure aging you really need a frame of reference and I think we have heard a lot about these frames this already this morning. So you can talk about populations, where obviously things such as life expectancy or mortality is very important; on a community basis, a narrower level, things such as hospitalization or doctor visits; on a personal level or the individual level I think the most important key features are things such as functional abilities, disability, frailty; and then we get down to the lower level of reduction or if you will organ systems where we might for example look at things like brain atrophy; finally one can consider the cellular or molecular perspective, and we heard about this this morning for example with regard to telomere status.

I think the common nominator is that we want to have a key reference frame for all these levels that may expand up or down this taxonomy that measures health most critically in the individual. And so I am going to focus on measuring health in the individual. The way we typically do this clinically is we tend to focus on specific phenotypes or we take specific phenotypes and we tend to accumulate or aggregate them and then develop scales of deficit or frailty for example. Some of these are embodied in collections of symptoms (change in sleep or memory), signs that we clinically identify (tremor, decreased pulses), laboratory values (clinically we call them laboratory values but when we do research we often call them biomarkers that many ways are the same such as glucose or oxygen tension). Then we get to more specific syndromes and diseases. We heard a lot about diabetes today for example. Then finally we consider disabilities which are really more the functional outcome of many of these deficits and vulnerabilities.
Now as an example, we have heard very powerfully today that when one focuses or measures the specific phenotypes of walking you can see the powerful predictive value of such measures. As an example I show dementia-free survival data from the Oregon Brain Aging study, which has been on-going for 20 years. This data shows that if you measure walking speed with a stop watch at the first study visit and you divide that group into those who are in the fastest walking quartile, and those that are in the slowest quartile, there is a very nice separation of the groups over time with regard to survival dementia free (faster walkers at baseline clearly do better). But I would point out that this is group data, it is not actually person-specific. It is very hard in an individual to predict what his or her trajectory would be and it takes a long time to show this; a decade in many instances.

On a population basis, looking at a collection of measures rather than a single measure such as walking speed, one also can predict group health outcomes. Here I show data from the Canadian Study of Health and Aging, that is using an index of frailty constructed by counting up over 70 various deficits, symptoms and signs, and using that metric to compare the upper quartile of this scale to the lower quartile and predicting institutionalization or institutional care. So these approaches are can be helpful on a population or a group basis to predict important measures of health, but they are very difficult to apply at the individual at a specific point of time. I think much of this limitation comes from our difficulty in the assessment methodology and the approach we have been using now for many decades.

Those of you who, I don’t know if Markus Wellby was a part of Italian television, but to people here who may not know him, he was a character depicted here by an actor playing this famous fictional doctor, whom I would argue to this day epitomizes the method that though over 30 years old (you can find show excerpts on YouTube), is still the standard for capturing health information. Clearly this methodology had limitations. What are those limitations? Well, first of all, assessments are typically performed only when symptoms are perceived, or if there is an annual visit or prevention visit, nevertheless it is still a very brief snapshot of time. These assessments are generally performed at the convenience of the clinicians. I would argue that we have no data that apply to holidays or weekends; maybe these times are important. We depend on the recall of individuals which is challenging. Can anybody here remember what you had three weeks ago for breakfast? And even if we record or recall the event very well the information is still prone to be unrepresentative of the other times it may have occurred. When we test people in a one-time visit setting we are generally applying an artificial measure or non-real-world measures. They are not fun and they are not even engaging and that may also contribute to why we don’t like to see clinicians.

We assume that the observations that we collect that are recorded during exams actually represent a person’s typical function. Many or most of the tests that we perform have very high test-retest or between rater variability. Finally, perhaps most underappreciated is the fact that when we record a measure on various aspect of health, we really have a limited knowledge about other temporarily related events that are very important. At the time we assess a blood pressure or a person reports feeling ill, we don’t
really know the critical circumstances surrounding that measure: what time the person has slept, how much socialization or physical activity might have occurred around the time of the assessment. This graphic emphasizes this point. We can measure a function, it does not matter - it could be blood pressure, weight, mood, memory - and how many people here would say this person is getting worse? We typically say this person is getting worse, but then if the individual actually reported a symptom that is hard to relate to all the other measurements you will say “oh well, that data point, I wonder what I can do with that, is that important or not? But it really puts us in a fog of knowing what is going on. Imagine if instead you can collect data all the time, very frequently, much denser data and you realize that in this model there is appears to be no change but, I will point out that there is actually a change and the change is a change in the variability or the variance. It is that variance change that often characterizes many systems that fail and precedes the obvious symptomatic failure you clinically see. This suggests a method for even earlier detection of clinical change. So this is a model and the question then becomes can we change how we collect information either clinically or in research studies that would improve the assessment paradigm? Can we go from brief, episodic, clinic-based assessments to a much more real time, real world, personalized and continuous assessment?

I am going to spend the rest of my time suggesting how that can be achieved. In our research in Oregon, we have been using some simple technology placed in homes because, after all, if the focus is the individual, we would want to focus on where people spend most of their time. In our study of healthy aging we find that seniors spend about 20-22 hours a day in their homes, and you can argue whether this is good or bad, but that is currently the place where older people spend most of their time. Most don’t spend their days in clinics and in hospitals although unfortunately some do. So in this model what we do is we use technology, very simple technology, cheap technology such as infra-red motion detectors strategically placed around the home. The pink triangles are locations where the sensors are placed; these are the same sensors used to activate a door to open when you walk into a store or supermarket. They have been around for a long time. We can take these sensors and field restrict them and put them in hallway, for example, and thus we can measure walking speed so that now every time the person passes the hallway a walking speed is recorded. Contact sensors can be placed on doors, exit doors, which give us an idea how long a person spend in his home; on refrigerator doors for obvious reasons.

The computer is an important kind of “sensor”. In our studies we spent a lot of time training seniors to use computers which are not yet commonly used by seniors, but they will become increasingly common as baby-boomers are now 70 -75 % online. Computer use or activity provides an incredible window of opportunity to measure things on basic a level, such as just keyboarding or mousing to assess basic motor functions. However, you can also conduct frequent queries online to provide more accurate point of event data or you can look at formal tests online such as opinion surveys or even cognitive testing. There are many other opportunities for assessment in-home facilitated by technology: phone recorded activities as a measure of social network engagement; a
medication taking can be much better assessed by looking at automatic medication tracking devices (in this case simply a plastic pill box records when medications have been removed from the device).

This kind of assessment model has been around in a form that is found in a “smart home”, small apartments in a biomedical research department in universities around the world. In fact, I would say that Europe in general is conceptually ahead of the US in this kind of approach, but the real advance we need to take and do (actually I forgot to mention that we also do physiologic modeling but that is another story), is to take this model and move it out into the community, place it in the real world; not simply test a graduate student for 2 nights in an artificial “home” laboratory, but actually in the community. Then using the power of the Internet collect this data continuously. And then of course, analyze the data. What kind of data do you get? Well we go from this example of walking speed of annually collected, sparse data at single time point to now having the measure multiple times in a day over many years as shown in this plot.

In the upper right is a photo of a sensor line in an individual’s home while the bottom right photo is what the sensor sees (keep in mind there are no cameras in these homes) and as I pointed out on the left there is just the plot of walking speed taken with the stopwatch and then if you record continuously with the sensor system. If you had the system in place at home you can easily realize that, in fact, people walk in incredibly different speeds over the course of the day, weeks, months and years. You can now look at populations of fast walks or slower walks, so for example fast walks might be much more naturalistic representing when you have to go to the bathroom urgently. Another quick example, and this is my last example: we have installed the system in over 300 homes and have been monitoring over time now for up to 4 years in some cases; what is shown here is the total activity in a day in two individuals who were living in a retirement community. This is a spiral plot and at the top of the clock is midnight and at the bottom is noon and the concentric circles moving outwards are two week periods. The colors indicate when and where the activities took place (pink is the kitchen, red is the bathroom, green is the bedroom and blue is the living room). What you see is that people tend to be in their bedroom at night, you see a lot of red dots at night, older people actually go to the bathroom in eye-opening amount during the night. Another thing you can notice is that there is quite a bit of difference in the two individuals’ activity. These plots are like personal fingerprints of activity of individuals.

What happened is in the community these folks shown in the plots lived in was that there was a viral epidemic. The community was placed on restricted movement to stem the infection. What subsequently happened is that their behavior clearly changed, they stayed inside their apartment much more compared to their prior activity and their sleep habits changed too, so that they got up much later. Now, this is just a small example how you can precisely discern activity and behavior patterns that could have a wide-ranging application for healthy behaviors if you think about this kind of data being collected over a long period of time and connected to various other aspects of health and wellbeing.
And I will close by with a study that was modeling the influence of an epidemic on population movements to predict future development of H1N1 flu. This is a study that was an US-Italian collaboration. The data shown in these graphics you see here were used to model the spread of influenza based on large databases that are known with regard to census areas, commuting patterns and airline travel patterns. Consider that you could go back and actually begin to map health changes at the individual level using real time data? This suggests the power of the home-assessment approach.

If you could look at these patterns, these real patterns shown in the spiral plots, and were to imagine using these to map health changes, I think you can see that one could discern early changes in individuals at individual level before one gets to the population level. So, what I think the future is going to hold for us is to be able to use these relatively inexpensive embedded sensing methodologies in the community and to fuse the data from multiple domains to make meaningful predictions about health and aging. This concept goes back to a question that was posed earlier today suggesting that everybody may be looking at a little bit of the elephant – diet, a biomarker, weight, report of fatigue, etc. - when what we really need to do is to use the power of all these multiple data streams together in real time to achieve better predictions and to actually be able to improve health. I will close by arguing that what we may need is to take a page from the human genome project that was completed and has been an incredible success. By analogy, we need a new comprehensive database of real time naturalistic human activity and biomarker phenotypes that might be called the human activity project. We don’t know in real time and in the real world much of what people actually are doing and how to relate that information to all this wonderful biological information that we now have.

So I will end on that note. I just want to acknowledge the people that I worked with, it takes an enormity of talented and dedicated people to do this and also the funders and particularly, of course, the National Institute on Aging.

Thank you very much.
How Can We Measure Aging?

Jeffrey Kaye
Neurology and Biomedical Engineering
Oregon Center for Aging & Technology
NIA – Layton Aging & Alzheimer’s Disease Center

Measuring health in aging requires defining a frame of reference for healthy aging

• Population basis: ... life expectancy
• Community basis: ... hospitalizations
• Personal basis: ... functional ability, degree of frailty
• Organ system basis: ... brain atrophy
• Cellular/Molecular basis: ... telomere status
Measuring individual health: specific phenotypes or accumulation of “deficits” and vulnerabilities

PHENOTYPES, DEFICITS & VULNERABILITIES:
- Symptoms (e.g., changes in sleep, memory complaints, low mood)
- Signs (e.g., tremor, decreased peripheral pulses)
- Laboratory values (e.g., urea, creatinine, calcium)
- Disease classifications (e.g., diabetes mellitus, Parkinson’s disease)
- Disabilities (e.g., dependence in bathing or dressing)

Specific Phenotype: Walking Speed Predicts Dementia-Free Survival
Oregon Brain Aging Study

Quartile Comparisons: Fastest - Slowest

Surviving

Time to Event (yrs)

Log-Rank = 0.0067

Collections of deficits as measures of health: frailty as predictor of institutionalization

- Health state based on probability of surviving to a particular end point
- Difficult to apply to an individual at a specific point in time
- Much of this limitation comes from our assessment methodology itself

Limitations of assessing aging health indicators in practice

- Assessments performed only when symptoms perceived.
- Tend to rely on sparsely spaced queries – questionnaires, phone or brief in-person exams.
- Performed at the convenience of the clinician.
- Depend on recall of events or brief snap-shots of function.
- Artificial or non-real world tests; not “fun” or engaging for the patient
- Assumes observations recorded during the exam represent typical function.
- High inter-rater or test to test variability
- Limited knowledge of other events that can significantly effect outcomes (e.g., sleep, socialization, physical activity)
Early detection

The Challenge of Detecting
Meaningful Change

Baseline

3 years

6 years

Baseline 3 years 6 years

Symptoms Reported

Measure

Overcoming these limitations – involves a change in the assessment paradigm

Brief, episodic, clinic-based, obtrusive & inconvenient assessments

Real-time, real-world, personalized, unobtrusive & continuous assessment
Oregon Center for Aging & Technology: Home-based Research Platform

Community-wide home-based assessment: “ORCATECH Living Laboratory”
Specific Phenotype: Walking Speed Predicts Dementia-Free Survival
Oregon Brain Aging Study

Quartile Comparisons:

- Fastest
- Slowest

Surviving vs. Time to Event (yrs)

Log-Rank = 0.0067


Walks: From 2 to 7000 per year

Hayes et al. 2009; Hagler et al. 2010

Changes in individual behaviors characterizing an epidemic

Seasonal transmission potential and activity peaks of the new influenza A(H1N1): a Monte Carlo likelihood analysis based on human mobility
Real-Time, Continuous, Unobtrusive, Multi-domain, Personalized Assessments

Data Fusion

Improved Assessment & Health Outcomes Over the Life-span

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Community Partners
- Willamette View
- Rose Villa
- Holladay Park Plaza
- Terwilliger Plaza
- Mary's Woods
- Alberta Simmons Plaza

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GLOBAL HEALTH FORUM 2010
**Time of day relationships**

Within-subject mean of median daytime speeds (6AM-3PM) are significantly faster than mean evening/nighttime speeds (3PM-6AM), p < 0.001

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**Unobtrusive Assessment of Activity Patterns Associated with MCI**

Variance in walking speed and total activity measured differentiates MCI from cognitively normal seniors

- Mean age = 88 years
- Mean in-home motion-activity sensing 315 ± 82 days
- N = 14

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Walking Speed & MCI

**p < 0.01**

MCI subjects more likely to be in the “high variability at baseline and increasing over time” group (Top trajectory; OR = 3.91; p =0.03).
Healthy Aging Globally: A Life Cycle Approach

OHSU plans senior tower as ‘living lab’

Research Platform

- Actigraphy devices
- Bed mats
- Localization sensors
- Walking sensors
- Cell phone as prompting device and for location tracking
- Physiological sensors
- Phone sensors
- Activity sensors
- Home PC: EMA; cognitive testing; social engagement; coaching
- Door sensors
- Medication tracking device
Remarks

The Hon. Ferruccio Fazio,
Minister of Health
Thank you, Admiral, and thank you, Ambassador, for having organized this meeting, which has been of remarkable high level. I know personally some of the speakers, but I knew by name most of the other speakers having read their names in the open literature. It has been a really great pleasure that the Italian Embassy managed to put together such a distinguished group of scientists.

I’m sorry I won’t be able to attend the whole meeting. I have to leave now, but this is for a common interest because I’m going to the Department of Health to sign with Deputy Secretary William Corr a Memorandum of Understanding between Italy and the United States to further develop our cooperation on oncology, cancer stem cells, system biology and molecular diagnosis and biomarkers, regenerative medicine, aging and research innovative therapies.

There are a number of issues which are of interest to this audience and maybe some of you could have an interest in developing a cooperation. We will define a small Committee in order to put it into practice. We don’t want top-down activities not to be reflected by actual active research exchanges. For anyone who is interested, I ask to talk to the Ambassador or to Professor Garaci who is coordinating this committee and see what we can do in this field.

As far as aging is concerned, my interest, as I told you before, is not just personal, because I’m clearly over 65 years old, and I have not any chronic disease which characterizes me, maybe because I practiced physical activity all my life; but I understand we don’t have to exaggerate. One thing I experienced is that, at a certain age, people cannot do much aerobic activity, for example cycling too much, because then you have the problem of free radicals. Aside from avoiding smoking and drinking, another element is diet, both in terms of quality and quantity. Simple rules, such moderate diet and physical activity seem to help.

We have been talking about sustainability of the health system, which is what the Italian Government is concerned about.

I am convinced that it is not important to live long. After all, if you look at the Universe, if we live 80 or 90 or a hundred years, that doesn’t make a big difference. What is important is to live well, that is, the quality of life. A picture of someone following dietary restrictions was shown earlier today. He was looking better afterwards. Aside for the fact that he was slimmer, he was tanned too. The fact that you are having diet restrictions convince you to do physical activities as well, so you enter into a positive loop.

What happens to elderly people is that they tend to lose interest in life, in a way. But if you take care of your physical shape, then you will have *mens sana in corpore sano*. That is very important, because you are truly working to make people feel better.

I will be shortly flying back to Europe. Thank you again, and I wish you a very successful meeting.

*The Hon. Ferruccio Fazio,*  
*Minister of Health of Italy*
PANEL 3:
Information Technology
Revolutionizing Health Care
Panel 3: Information Technology Revolutionizing Health Care

David Blumenthal, M.D.
National Coordinator for Health Information Technology,
US Department of Health and Human Services

The U.S. Health Information Technology Agenda
Thank you, Susan, and thank you all for having me. Thank you to the 
Ambassador and to the Minister of Health for enabling this forum to take place.

These are incredibly important issues that are on your agenda today. I think that 
health information technology is a vital resource to support all the other goals of a health 
system. The analogy that I use is that information is the lifeblood of health and medicine 
and health information technology in the 21st century is destined to be its circulatory 
system that will provide the nourishment that clinicians and health institutions need to 
tend to the needs of their patients.

In the United States, we have a problem that is widely shared, though I think that, as in 
every part of our health system, our problem is probably worse than anywhere else in the 
modern world.

We have appallingly low rates of use of electronic health information systems on 
the part of our doctors and hospitals. Only about a quarter of our physicians use 
computers on a regular basis to record health information about their patients and only 
about 10% of hospitals do so.

This compares to virtually universal use of electronic health systems in Denmark 
and Norway and Sweden and in Australia and New Zealand and in many other modern 
health systems.

That’s not to say that these systems have conquered all the problems they have. 
The biggest problem they still have is usually the ability to move information around the health system to take care of people who become ill away from where they live. Exchange is still a big challenge in place like Denmark and UK where there is broader availability of electronic health records.

Because of the health system problems in this country, and because of the critical role that information plays and electronic systems in particular, the Congress in 2009 passed a far reaching piece of legislation to bring the United States into the 21st century in terms of the information systems. I like to say that we, in this country, still use the health information system that Hippocrates used 2400 years ago, and that is paper, then perhaps pen and some recording instrument.

It is my role—and it is a humbling one—to implement the HITECH legislation. This legislation envisions a nationwide interoperable, private and secure electronic health information system. One that is available to all physicians, all hospitals, provides care, enhance care to all patients in the United States. Starting from where we are it’s a very long journey.

Fortunately, the Congress gave us some very important tools. They created a 
concept, which I think is a powerful one, for other countries to reflect on as well. This is 
the concept of the “meaningful use of an electronic health record.”

In effect they said, we are willing to pay a substantial amount of money, up to 30 billion dollars, for physicians and hospitals and nurses and other health professionals, to buy and implement electronic health records, but we are not willing to pay for them just sitting on a desk.
We want them to be used and we want them to be used to improve health and to improve efficiency. They turned to the Secretary of Health and Human Services, our equivalent of the Minister of Health, and said to her: “you define meaningful use and then you can pay extra for doctors and hospitals that have qualified as meaningful users”.

They also said “we’ll pay extra, but only if it is related to a health goal, if it is related to the use of digitized information to improve the care of patients”. I know that your focus is on the elderly today, and no group of patients stands to benefit more from this intervention than elderly patients with chronic illnesses because they are likely to have more than ten physicians treating them, often more than one hospital, often more than one facility, maybe a nursing home, maybe a home health care agency, so getting that information collected and coordinated is very important for them.

There are some other things that the Congress authorized us to do and we have begun to implement: first of all, a nationwide system of assistance to clinicians and hospitals in the process of learning to use electronic health records.

I’m a physician myself, and, while I was in active practice I used an electronic health record. I know from personal experience that it can be a difficult thing to learn to do. It is not like stepping into a car, turning the ignition, and driving away.

It involves changes in the work. It takes time. It reduces the number of patients you can see in a given period of time. Learning to use it effectively is not something that the average individual practitioner will find easy, especially if they are my age rather than a young person. So we have set up a nationwide system of technical assistance to clinicians.

They’re called Regional Extension Centers (RECs) and they exist in all the States and territories in the United States. We’ve spent close to $700 million to get them started and they are beginning to provide service to doctors and hospitals as we speak.

We have done a series of other things. For example, we know that there is a shortage of trained health information technology professionals in the United States; that, if everyone needed to install and use an electronic health system today, there would not be enough technically trained professionals to help them in the way they need help. So we are going to train over 40000 health information technology professionals mostly in what we call community colleges, which are usually two-year colleges that are based at the community. They are less expensive. They are often more oriented towards trades and producing trainees who can work in local communities.

We’ve also begun investing in the infrastructure to enable information to flow within and across communities. Exchange of health information is a very important objective for us.

And finally we are trying to develop policies that will assure the American people that the information that is kept in digital form will be private and secure. That is probably the most important public and political challenge that we face in succeeding in this very large agenda.

I want to say that, in many ways, my goal is to put myself out of a job. I believe that this is not a movement, a program that the government should lead.
The information that physicians, nurses and others use and their ability to find it and organize it and bring it to the best use for patients are a core professional technical competence. Over the long term, the Government should have no greater role in the United States in promoting this technology than it does in any other technology that is critical to professional competence.

The stethoscope, the X-Ray machine, the MRI machine and operating room in the United States are all private investments. I hope electronic health systems will soon be viewed this way. But for now we clearly know that the private sector is not able to accomplish this transition, so there is a need, at least on a temporary basis, for federal leadership.

I’m delighted to have the chance to present here today. Thank you.

**Question 1:**

S. BLUMENTHAL:

Thank you so much Doctor Blumenthal. Do you have a few moments to take a few questions?

First I want to ask you: how we are going to insure that there is uninterruptable ability between systems, because people buy one system and another and so forth. How is that going to work?

D. BLUMENTHAL:

The United States is setting standards that all electronic health records will have to meet in order to be eligible for this extra federal money that the Government is making available to clinicians and hospitals. So, in order to qualify for the federal program - the 30 billion dollars that I mentioned - all providers have to use a federally certified electronic health record.

In order to be certified they have to meet certain standards, and the standards that the Secretary has adopted include standards that determine the way information is stored and how terms are defined and how information is organized to be moved from one record to another. Now, this would make it technically possible for information to be exchanged. There’s still has to be a human wish to exchange information and as systems there may be times when hospitals or clinicians say “this won’t work” when in fact they just don’t want it to work. But I’m confident that we will be able to create standards that will make this ability possible if the will to make it work is there.

**Question 2:**

FROM THE AUDIENCE: [audio not understandable]

D. BLUMENTHAL:

That’s a very good question. The paper record is a convention; it’s organized according to a convention. It governs how I learned to record information and the way
actually current medical students are still learning to record information. And that is often not very functional. Now, you can record information in that way and still add enormous value if you use additionally decisions support systems. So, if you can find a way to take the information that is recorded in the traditional way and locate key pieces of that information, and then attach to this information clinical logic, that is based on science, or external guidelines, you can add a great deal of value on top of the paper record and that I think is where we are heading in the short term.

In the longer term, I think that the profession of medicine and the profession of nursing and the other critical professions have to examine the way they have, by convention, collected patient information and ask themselves whether there is a most functional way to do so in the electronic age.

I don’t think it’s a government function, and certainly not my office’s function, to dictate a new way for clinicians to collect and organize their information. That is something they have to decide on and request of the manufacture of the system to change.

**Question 3**

AMB. TERZI:

A very simple question. I realized that in many research centers, in many hospitals individually in the United States now there is a collection of data and anyway an attempt to coordinate technology as far as we understand as an embassy, but now I understand the main problem is connecting the dots. That is to say to have uniform rules and procedures which assure that the data collected are reliable and speak the same language.

So, we know that your important job has just started few months ago, recently, but how far are we? What is the road map in a way? What are the steps in the process and the time you were mentioning, 18 months time process. How reachable is this objective in terms of amount of work that has to be done? Thank you.

D. BLUMENTHAL

We have started with standards and definitions that are accepted. We had a very tight timeframe to develop the first set of standards. Actually, we had to do so within a year of the enactment of the legislation, that was last December. So we looked around and said: how does this technology currently work? What can we implement now? And we adopted a whole set of standards that reflects, actually, in many cases, international ways of defining information and organizing information in electronic form.

**Question 4**

S. BLUMENTHAL:

Dr Blumenthal, just to follow up on that question, you know the i-Pad has a lot of apps on it. Is that something that you will envision building onto this health information system? Clinical decision tools seem so important to help to reduce medical errors to give
you evidence based guidelines, that you could pick from. Why not build that in to some other systems that have been supported, because information alone, as you said many times is really not enough.

D. BLUMENTHAL:

We required some of that in the first stage of meaningful use, we will require more as it goes on.

Question 5

FROM THE AUDIENCE:

Thank you very much for your interesting presentation; I’m the science counselor of the German Embassy. I just would like to come back to the very important issue you mentioned: the protection of individual health data. I would be very interested to learn from you how you safeguard, what instruments you put in place in order to make sure that personal data are not misused as far as self is concerned. Thank you very much.

D. BLUMENTHAL:

Well, there are two key elements to that. The first is what we call privacy which is really making sure that patients have control over their health information. We are committed to that. The structure for doing that is something we are working on right now. We have a federal law that mandates certain protections for patients as their control of and access to their information, but that law really was created in a paper world. So we think that some of the protections have to be updated, and the Congress instructed us to look at that topic and think about additional protections. So, that’s the privacy side, making sure that information is only used in ways that patients wish it to be used.

There’s a second problem which is unauthorized access, the so called hacking problem. We studied this issue in the United States and we found that actually the great majority of unauthorized accesses of information, the so called breach or loss of information, comes not from some 21 year old in a different country trying to break into your system, but comes from very simple human errors: someone who takes a laptop home with patients data on it and loses it or has it stolen, someone who misplaces a flash drive with personal health information on it; and those are the first thing we need to deal with. A lot of that can be managed simply by encrypting the data that is stored on any electronic device used by a clinician or a nurse of any type. So, I think that there are some simple and some then more complicated problems that we will be dealing with.

Thank you all for your attention.
Panel 3: Information Technology Revolutionizing Health

Prof. Sergio Pecorelli,
President, Agenzia Italiana del Farmaco (AIFA),
Chancellor, University of Brescia

Aging and Pharma: New Perspectives
While the Italian Ministry of Health and the US Secretary for HHS were signing an important agreement regarding research in the biomedical field in Washington, AIFA and Dr. Margaret Hamburg, Commissioner of the U.S. Food and Drug Administration were meeting in Rome after signing an important agreement last December. Moreover, the two Agencies agreed on a very important principle: always bring science into the regulatory world, in order to provide best chances for drugs’ efficacy and safety for the patients. This is relevant to the topic I was assigned today.

Life expectancy in Europe has been increasing in recent years, especially in women, showing a striking difference between females and males. However, this difference decreases when we consider the healthy life expectancy. Comparing the disability-free life at age 65, among European countries, Italy ranks first, with females still living longer than males, but with a difference reduced to approximately 2 years. As you see in Table 1 the disability-free life expectancy at 65 for males is about 12 years, while for females is about 14 years. These years of life expectancy with disability mean poor quality of life and all the social related problems.

This issue has to do with pharma. Looking at utilization and expenditure of reimbursed medicines by age classes in Italy in 2009, the total expenditure and the defined daily dose (DDD) per 1000 inhabitants, for patients between 65 and 75 years, represent more than one fourth of the whole expenditure. Moreover the total expenditure, for patients at 75 years and over, is 31%, making a total of about 57% in the elderly age (> 65). (Table 2)

The same figures apply to total DDD of reimbursed medicines: for patients over 65 years is 62%. It is undoubtedly interesting to take a look at the issue of polypharmacy. The percentage of patients under age 45 with more than five prescriptions a year is only 7%, while 45% of the people over age 65 have more than five prescriptions a year. (Table 3)

The relationship between polypharmacy and underprescribing is another very important issue. First of all, polypharmacy, that is utilization of many medicines, is common among the elderly. Underprescribing is also frequent in later age. It has been demonstrated that there is underprescription whenever people - usually elderly patients - use many drugs. This may reflect the psychology of the doctor and especially of the general practitioner. Therefore optimizing polypharmacy includes avoiding underprescription.

In a paper published in the British Journal of Clinical Pharmacology in 2007 it was shown that 43% of patients who used five or more medicines are undertreated and in undertreated patients there is a mean of 1.4 medicines lacking. The probability of underprescription increases with the number of drugs used.

The elderly patients are prone to develop iatrogenesis and often they are affected by co-morbidity, disability and polypharmacy. Sometimes also the best specialist forgets the holistic concept of medicine, extremely important in this type of patients. These individuals are excluded from clinical trials and therefore the findings cannot be extended to this category of patients. Eminent geriatricians have called for the conduction of appropriately designed trials involving real geriatric patients.
In a paper by Spinewine et al. 6 appeared in The Lancet, a question was raised: “Appropriate prescribing in elderly people: how well can it be measured and optimized?” The article claims that information technology has the potential to improve and rationalize drugs prescription.

According to the authors, prescribing “in the future could use three crosslinked databases - the patient’s drug history, a scientific drug information reference and guideline database, and clinical information that is patient-specific.” 6

The conduction of properly designed trials involving real geriatric patients is probably the only feasible strategy to accrue the relevant information that can help in difficult decision about optimizing drug treatment in frail older patients, while minimizing the risk of iatrogenesis. This new approach to pharmaco-epidemiological research does require innovative methodology, interdisciplinary integration of multiple experts. AIFA has set up a working group, called “Geriatric Working Group”, for redesigning the pharmacological research in older individuals. 7

Doctor Margaret Hamburg and Doctor Francis Collins, the leaders of the Food and Drug Administration (FDA) and the National Institutes of Health (NIH) wrote a remarkable paper in the New England Journal in July 2010: “A Shared Vision of Personalized Medicine” 8. It claims that the success of personalized medicine depends on having accurate diagnostic tests that do identify patients who can benefit from the target therapies. The old system of the blockbuster is disappearing. The scientific regulatory structure does need to support this growth and understands that science has to come into the regulatory world.

FDA is developing the regulatory science standards and evidence needed to use genetic information, in drugs, in device development and in clinical decision-making. The goal is giving to the agencies and companies “a better understanding in applying pharmacogenomic information to drug development” 8.

What’s the perspective? It is the collaboration between regulators, third party payers and scientists, in order to define and design clinical trials based on knowledge, on technology, integrated development of new biomarkers, new medicines, new rules and guidelines.

The percentage of patient population for which a drug class is ineffective, is 38% in the antidepressant category and even 75% in the cancer drug. Therefore “One size does not fit all” 9.

The future is really “future which is running so fast”. Only a few years ago, in order to know the sequence of 3.5 billion bases, we would need 13.5 years to sequence. Today, only six years after, we need only one week.

The target therapies introduce a lot of advantages: discriminating potential responders from non-responders, identifying which patients are likely to benefit earlier in the disease pathway, ensuring appropriate dosing, reducing incidence of adverse events and in particular improving overall health gain.

Hopefully in the future, healthy life expectancy is going to increase and overtake life expectancy with disability.
References

3. AIFA, OsMed-HTA Unit.

* The Italian Medicines Agency, AIFA, is the National competent Authority responsible for all the activities related to the drug regulatory process in Italy: from drugs registration and commercialization, to the check of production sites and manufacturing quality; from the verification of drug safety and appropriateness of use, to pricing and reimbursement. The Agency also supports the Italian Government as high scientific and technical advisor on drug policy.

More specifically, the Agency:

- guarantees access to medicines and their safe and appropriate use as means to protect public health;
- ensures unity of the national pharmaceutical system in agreement with the regional authorities;
- ensures innovation, efficiency and simplification of the marketing authorization procedures, in order to grant rapid access to innovative drugs and to drugs used for rare diseases;
- provides drug expenditure governance in the framework of economic and financial viability and competitiveness of the pharmaceutical industry.
• cooperates with the Regional Authorities in order to maintain the pharmaceutical expenditure in balance with the cost cap annually established by the Government
• encourages investments in research & development in Italy.

AIFA’s aim is to set fair pharmaceutical policies and to assure their consistent application nationwide, at the same time promoting public health and a new pharmaceutical culture and knowledge.
Disability Free Life Expectancy and Life Expectancy with Disability at 65 by country and gender.


Utilisation and expenditure of reimbursed medicines by age classes.

Italy - 2009

Source: AIFA. OsMed-HTA Unit
Utilisation and expenditure of reimbursed medicines by age classes.
Italy 2009

Source: AIFA. OsMed-HTA Unit
Panel 3: Information Technology Revolutionizing Health

Prof. Roberto Bernabei,
Professor of Gerontology, Università Cattolica del Sacro Cuore, Roma

Standardized assessment instrument as the technology of health services for the elderly
Thanks to the moderators and to the chairman, good afternoon to everybody. My talk is based on how information technology can help our daily life. Our daily life is rather complicated because if you go to our patients in the clinical world you find this novelty: the comorbidity, which means that the chronic diseases do not occur independently. So we don’t have a diabetic patient, we don’t have an heart failure patient, we have patient with chronic diseases clustering, they have hypertension, they have heart failure, atrial fibrillation and cerebrovascular disease. Why we studied separately hypertension, heart failure, atrial fibrillation and cerebrovascular diseases? This is the way that medical students are continuing to follow every day, so we don’t have any clue on this fruit salad of the modern patient, who is not an heart failure patient, because he/she is a patient with heart failure plus COPD plus coronaries dysfunctions or coronaries heart diseases.

The new thing is the comorbidity or, as someone says, multimorbidity. We have a patient with three, four, five diseases that interact between them. Not only because, as you heard by the previous speakers, these patients with multimorbidity –usually females over 75 – take a lot of drugs, but also because (and you can make a choice), they have one, two or three out of these: incontinence, falls, nutritional problems, osteoporosis, anemia, sarcopenia. They do not function in terms of cognitive problems; they do not function in terms of physical functions, they have mood status problems, they have peculiar socio-economic condition.

We have the physical exam, the lab tests and the machines in the radiology department, but all of these tools do not answer the daily questions that these patients give us. What do we have besides the physical exam, the lab test and the radiology department? We have the guidelines. But if you have a hypothetical - but typical - patient with diabetes, hypertension, osteoarthritis, osteoporosis and COPD, and you go to specific recommendations in the guideline for patients with diabetes and several comorbidity conditions, you have a lot of “no” and some sporadic “yes”. So we are not helped by guidelines and if we try to apply the guidelines to these patients, look what this lady should afford every day: these are the medications she has to take twelve, nineteen for five times a day, and these are the procedures that she has to follow, according to the guidelines. This is a full-time job, it is not a therapy. It’s very complicated and as someone already said, we have to roll on the disease-based perspective to an individual-based perspective.

The new and only tool that is available, the only available methodology is the geriatric assessment, and this is the technology that we have in our hands. Everything started in this country in 1987 with the Omnibus Budget Reconciliation Act. In this country, like in many countries, nursing home world had many problems: bad treatments and a lot of troubles to the patients, to the families, because malpractices. So, the government said: “You must have a uniform recent assessment instrument”!. This was the first information technology assessment tool that was used in the world. This was the electronic chart for the patient in nursing home. I will show you very rapidly how it works. For this complex patient you have to add this kind of information to the traditional physical exam. You need to have information on cognition, on mood and behavior, on
communication and vision, on psychosocial wellbeing, on functional status (ADL and physical performance, as you heard this morning by Luigi).

You need to know the continence, the health conditions, falls, balance, the most common diagnosis, the oral and nutritional status, the pain, the skin, the drugs, the activities, the various treatments and procedures that this person has daily, the types of different therapies or rehabilitation he or she is on. These are more than 300 items that complete the picture and provide the first electronic chart for these patients. And what happened when this type of working was introduced, implemented in the U.S. nursing homes? As you see, restraints use dropped, catheter use dropped, preventive skin programs increased, fewer residents were not involved in activities, functional decline decreased; prevalence of pressure ulcers, dehydration and poor nutrition declined, hospitalization rate declined by 25%. So, we are obliged to work in a different way with these patients, these complex patients need a comprehensive assessment. And when you have this approach, you can provide information.

Now we have the third generation of this approach to these patients, thanks to an international group (with scientists from over 30 countries) that built up comprehensive assessment instruments for various areas, various settings in which the elderly is treated: long-term care, acute care, home care, palliative care, post-acute care. When you work in this way, with this suite of instruments, with these electronics charts in your hands, you start to provide relevant information. Few examples: you can finally understand more the outcomes, for instance you understand if ace inhibitors are better than digoxin in heart failure patients with a mean age of 83 years old, never tested, as doctor Pecorelli said, in the randomized clinical trials. And you understand that ace inhibitors are better in terms of decreasing the risk of death and decreasing the decline in physical function. You can understand the quality of your care. It was rather surprising that patients with cancer and daily pain do not receive in the US nursing home, up to 40%, any kind of treatment, any kind of pain killer, and if you are 85 plus, you never receive opioid agents which are the drugs of choice. This was so impressive, that even Doonesbury referred, and talked about how the baby-boomers were very alerted about that, because it would be very difficult for them to will have this kind of treatment, so it’s better for them to prepare themselves. Finally, you may have some comparisons.

We know very few things about what happens in the elderly world in terms of comparisons, who does the best. These are two examples made by two UE funded studies on homecare, where we found that we call homecare something that is totally different according to different countries. You have here Italy, France, United States, Deutschland, United Kingdom, Canada, Iceland, Denmark, Netherlands, Czech Republic, Norway, Sweden and Finland. According to these scales – these scale measure physical functions – you understand that these patients in Italy and France and partly in the United States are completely different from the patients in homecare in the Nordic countries. These are tremendously disabled patients, these are very light patients. But, we call that homecare for Italy and homecare for Finland, it’s a different homecare. And even according to the cognition, you understand that you have cognitively impaired people in France, Italy and the United States, while they are not so in the Nordic regions. And finally, the same
happens for nursing home, where mean ages are of course is over 80, but you understand that you have a totally different picture of the patients in nursing homes in France or Israel compared to the Netherlands. They have different patients. When you have information technology and proper instruments, you start to understand what you are doing daily.

Thank you.
Standardized assessment instruments as the technology of health services for the elderly

Roberto Bernabei

Dipartimento di Scienze Gerontologiche, Geriatriche e Fisiatriche

Università Cattolica del Sacro Cuore

Figure 1. Prevalence per 100 of most frequent chronic diseases occurring independently of comorbidity (gray+black) or without any comorbidity (black).

Marengoni et al. JAGS 2009
Cluster analysis testing the distribution of chronic diseases

The “modern” patient

FRAILTY

- Multimorbidity > 75
- Polypharmacy
- Incontinence
- Falls = Functional loss
- Nutritional problems
- Osteoporosis
- Anemia
- Sarcopenia

Cognition
- Physical function
- Mood status
- Socio-economic condition

Marengoni A., JAGS, 2009
Clinical Practice Guidelines and Quality of Care for Older Patients With Multiple Comorbid Diseases

Hypothetical 79 yrs old woman  
12 meds, 19 doses/day, 5 times/day

<table>
<thead>
<tr>
<th>Time</th>
<th>Medication</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM</td>
<td>Ipratropium metered dose inhaler 50 mg aerosol of albuterol</td>
<td>Check falls  60 upright for 20 min on day when albuterol is taken. Check blood sugar</td>
</tr>
<tr>
<td>8:00 AM</td>
<td>500 mg of calcium and 200 IU of vitamin D 10.5 mg of hydrochlorothiazide 40 mg of felodipine 10 mg of atorvastatin 81 mg of aspirin 250 mg of nitrates 50 mg of aspirin</td>
<td>Eat breakfast  2.4 g/d of sodium  90 mEq/d of potassium  Low intake of dietary saturated fat and cholesterol  Adequate intake of magnesium and calcium  Medical nutrition therapy for diabetes  DASH</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Eat lunch  2.4 g/d of sodium  90 mEq/d of potassium  Low intake of dietary saturated fat and cholesterol  Adequate intake of magnesium and calcium  Medical nutrition therapy for diabetes  DASH</td>
<td></td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Ipratropium metered dose inhaler 500 mg of calcium and 200 IU of vitamin D</td>
<td></td>
</tr>
<tr>
<td>7:00 PM</td>
<td>Ipratropium metered dose inhaler 650 mg of nifedipine 500 mg of calcium and 200 IU of vitamin D 47 mg of losartan 200 mg of nitrates</td>
<td>Eat dinner  2.4 g/d of sodium  90 mEq/d of potassium  Low intake of dietary saturated fat and cholesterol  Adequate intake of magnesium and calcium  Medical nutrition therapy for diabetes  DASH</td>
</tr>
<tr>
<td>11:00 PM</td>
<td>Ipratropium metered dose inhaler As needed</td>
<td>Albuterol metered dose inhaler</td>
</tr>
</tbody>
</table>

JAMA, August 10, 2005—Vol 294, No. 6
Patterns of Chronic Multimorbidity in the Elderly Population

**Comorbidity:** combination of additional diseases beyond an index disorder.

**Multimorbidity:** any co-occurrence of two or more chronic or acute diseases and medical conditions within one person, whether coincidental or not, indicating a shift of interest from a given index condition to individuals who suffer from multiple disorders.

![Disease based perspective vs Individual based perspective](image_url)

Assessment has many purposes

- For the individual: it can lead to improved outcomes and human dignity

- For care professionals: it can improve sensitivity to patient individuality, while focusing their attention on care indicators

- For providers of care: it can target services, organize care, and benchmark performance

- For whole populations: it can help to optimize care through improved resource allocation, organization, regulation, and financing

National Nursing Home Resident Assessment Instrument (RAI)

Background:

• Federal response to quality of care problems

• Omnibus Budget Reconciliation Act of 1987 (OBRA ’87)
  * Many federal reforms of nursing homes
  * Mandated a uniform resident assessment instrument
Did the RAI improve the processes of care in the U.S.?

- Rates of advanced directives increased 60%
- Restraints use dropped 40% particularly among cognitively intact residents
- Indwelling catheter use dropped
- Increased use of preventive skin programs
- Fewer residents not involved in activities

V Mor et al. JAGS 1997

What was the impact of RAI/MDS on resident outcomes?

- Functional decline decreased significantly in ADL, Cognition, Continence and Psychosocial problems
- Prevalence of Pressure Ulcers, Dehydration and poor Nutrition declined
- Hospitalization rate declined by 25% with no increase in mortality

V Mor et al. JAGS 1997
Second and third generation assessment instruments: the birth of standardization in geriatric care


The systematic adoption of "second-generation" comprehensive geriatric assessment instruments, initiated with the Minimum Data Set (MDS) implementation in U.S. nursing homes, and continued with the uptake of related MDS instruments internationally, has contributed to the creation of large patient-level data sets. In the present special article, we illustrate the potential of analyses using the MDS data to: (a) identify novel prognostic factors; (b) explore outcomes of interventions in relatively unselected clinical populations; (c) monitor quality of care; and (d) conduct comparisons of case mix, outcomes, and quality of care. To illustrate these applications, we use a sample of elderly patients admitted to home care in 11 European Home Health Agencies that participated in the AgeD in HOMe Care (AD-HOC) project, sponsored by the European Union. The participants were assessed by trained staff using the MDS for Home Care, 2.0 version. We argue that the harmonization by interRAI of the MDS forms for different health settings, referred to as "the third generation of assessment," has produced the first scientific, standardized methodology in the approach to effective geriatric care.


interRAI Members and Activities

Europe
Iceland, Norway, Sweden, Denmark, Finland
Netherlands, Germany, UK, Switzerland,
France, Poland, Italy, Spain, Belgium,
Estonia, Czech Republic,
Austria, Portugal,
Lithuania

North America
Canada, USA,
Mexico, Belize, Cuba

South America
Chile,
Brazil, Peru

Middle East/Asia
Israel, India

Far East/Pacific Rim
Japan, South Korea, Taiwan, China,
Hong Kong, Australia, New Zealand

www.interrai.org
Healthy Aging Globally: A Life Cycle Approach

Development Time Line for interRAI Instrument Suite

interRAI suite

Patient level
- Make the physical exam complete
- Better care plan

Population level
- Database

Prognostic factors
Outcome measurements
Quality control indicators
Comparisons

www.interrai.org

©interRAI 2008 – Do not duplicate
Effects of ACE Inhibitors and Digoxin on Health Outcomes of Very Old Patients with Heart Failure

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. of Events</th>
<th>Digoxin (n=14890)</th>
<th>ACE Inhibitors (n=4911)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>4845</td>
<td>1504</td>
<td></td>
<td>0.89 (0.83-0.95)</td>
</tr>
<tr>
<td>CV Hospitalization</td>
<td>5699</td>
<td>1973</td>
<td></td>
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<td>Any Hospitalization</td>
<td>6328</td>
<td>2132</td>
<td></td>
<td>0.96 (0.91-1.01)</td>
</tr>
<tr>
<td>Death or Hospitalization</td>
<td>8295</td>
<td>2725</td>
<td></td>
<td>0.95 (0.92-1.00)</td>
</tr>
<tr>
<td>Decline in physical function</td>
<td>3985</td>
<td>1208</td>
<td></td>
<td>0.74 (0.69-0.80)</td>
</tr>
</tbody>
</table>


interRAI suite

Patient level

- Make the physical exam complete
- Better care plan

Population level

- Database

- Prognostic factors
- Outcome measurements
- Quality control indicators
- Comparisons
Pharmacological treatment of pain in cancer patients

Level 1 No narcotics  Level 2 Weak opioids  Level 3 Morphine or like

Bernabei et al. JAMA 1998; 279: 1877-1882
interRAI suite

Patient level

Make the physical exam complete
Better care plan

Population level

Database

Prognostic factors
Outcome measurements
Quality control indicators
Comparisons

Developing an evidence-base for community care services in Europe
The Aged Home Care project
ADHOCC

J Gindin  Haifa  
E Topinkova  Praque  
T Nikolaus  Ulm  
D Frijters  Amsterdam  
H Finne-Soveni  Helsinki  
R Bernabei  Rome (Principal Investigator)
HEALTHY AGING GLOBALY: A LIFE CYCLE APPROACH

### Table

<table>
<thead>
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<th>Country</th>
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<th>Media</th>
<th>Deviazione std.</th>
<th>Error std.</th>
<th>Limite inferiore</th>
<th>Limite superiore</th>
<th>Minimo</th>
<th>Massimo</th>
</tr>
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For CPS:

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<th>Massimo</th>
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<td>6</td>
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<th>Error std.</th>
<th>Limite inferiore</th>
<th>Limite superiore</th>
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<th>Massimo</th>
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Preliminary data Shelter project

Preliminary data Shelter project
Part One

interRAI and the interRAI Suite of Instruments
Cross-National Comparisons

- Practical experience from use in multiple nations/cultures
- Cross-national comparisons provide more accurate standards
  - Only possible with standardized assessment
Institutionalisation (hospital + nh)

Landi et al. J Clin Epidemiol 2001 Sep;54(9):968-70

Landi F., Onder G., Russo A., Tabaccanti S., Rollo R., Federici S., Tua E., Cesari M., Bernabei R
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Case Management and Risk of Nursing Home Admission for Older Adults in Home Care: Results of the AgeD in HOme Care Study

US States Using interRAI Instruments

RAI 2.0 mandated in all states

RAI 2.0 mandated in all nursing homes

Statewide Programs:
- RAI-IC
- interRAI-IC
- interRAI-MH
- Local Program
- Collage (CHC)
Implementation and Testing of interRAI Instruments in Canada

- RAI 2.0
- RAI-HC
- RAI-MH
- interRAI CMH
- interRAI ESP
- interRAI PC
- interRAI ID
- interRAI ED/AC
- interRAI CA
- interRAI CHA
- interRAI AL

Solid symbols = mandated or recommended by govt;
Hollow symbols = research/evaluation underway.

Implementation and Testing of interRAI Instruments in Europe

- RAI 2.0
- RAI-HC
- interRAI LTCF
- interRAI MH
- interRAI PAC
- interRAI PC
- interRAI CHA
- interRAI AC
- interRAI CA
- interRAI HC
- interRAI AL

Solid symbols = mandated or recommended by govt;
Hollow symbols = research/evaluation underway.
Prevalence of Potentially Inappropriate Medication Use Considering All Explicit Criteria Combined

Fialova, D. et al. JAMA 2005
**Norton Scale for Assessing Risk of Pressure Ulcers**

<table>
<thead>
<tr>
<th>Physical Condition</th>
<th>Mental Condition</th>
<th>Activity</th>
<th>Mobility</th>
<th>Incontinent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Alert</td>
<td>Ambulant</td>
<td>Full</td>
<td>Not</td>
</tr>
<tr>
<td>Fair</td>
<td>Apathetic</td>
<td>Walk/Help?</td>
<td>Slightly Limited</td>
<td>Occasionally</td>
</tr>
<tr>
<td>Poor</td>
<td>Confused</td>
<td>Chair-bound</td>
<td>Very Limited</td>
<td>Usually/Times</td>
</tr>
<tr>
<td>Very Bad</td>
<td>Stupor</td>
<td>Bed</td>
<td>Limited</td>
<td>Doubly</td>
</tr>
</tbody>
</table>

The Norton Scale uses five criteria to assess patients’ risk for pressure ulcers. Scores of 14 or less indicate liability to ulcers; scores of <12 indicate very high risk.
### GEMU Sepulveda

<table>
<thead>
<tr>
<th>Location</th>
<th>GEMU</th>
<th>Control</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Home/board and care</td>
<td>73%</td>
<td>53.3%</td>
<td>&lt;0.05</td>
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<tr>
<td>Nursing home</td>
<td>12.7%</td>
<td>30%</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Hospital (Re)Admission (at 12 months)</td>
<td>34.9%</td>
<td>50%</td>
<td>n.s.</td>
</tr>
<tr>
<td>Died (at 12 months)</td>
<td>23.8%</td>
<td>48.3%</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Costs (USD)</td>
<td>22’597</td>
<td>27’823</td>
<td></td>
</tr>
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</table>

Rubenstein et al. *NEJM* 1984; 311: 1664

### CGA Meta-analysis

<table>
<thead>
<tr>
<th></th>
<th>Mortality</th>
<th>New admissions</th>
<th>Home discharge</th>
<th>Functional status</th>
<th>Cognitive performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hospital</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>GEMU</td>
<td>-35%</td>
<td>n.s.</td>
<td>+80%</td>
<td>+72%</td>
<td>+100%</td>
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<td>IGCS</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>+71%</td>
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<tr>
<td><strong>Community</strong></td>
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<tr>
<td>HAS</td>
<td>-14%</td>
<td>-16%</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
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<tr>
<td>HHAS</td>
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<td>n.s.</td>
<td>+49%</td>
<td>n.s.</td>
<td>n.s.</td>
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<tr>
<td>OAS</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-18%</td>
<td>-12%</td>
<td>+26%</td>
<td>n.s.</td>
<td>+41%</td>
</tr>
</tbody>
</table>

**Limits of the traditional assessment instruments**

- Descriptive
- No etiology available
- Assessment of a single area
- “Individual” assembly
- Difficulties in comparisons
Second generation instruments

• Omnicomprehensive
• Underly causes and (make possible) etiological diagnosis
• Care planning oriented
• Comparisons

**interRAI Mission Statement**

*interRAI* believes that standardized assessment provides crucial information about the needs of the elderly population which is rapidly growing worldwide. Comprehensive evaluation, including functional, psychosocial and environmental needs, is the key to care planning decisions resulting in quality care for the individual and information for wider policy issues.
Panel 3: Information Technology Revolutionizing Health

Jay Bernhardt, Ph.D., M.D.
Dept. of Health Education,
University of Florida School of Medicine, Gainesville, Florida

Healthy Aging 2.0: The Power of Digital Health and Wellness
Thank you Mr. Ambassador, Admiral Blumenthal, and Dr. Hodes for the opportunity to be here. I am pleased and honored to be able to speak to you from a social scientist’s perspective on Healthy Aging 2.0. Today I am going to talk about the potentially powerful impact that new digital health technology can have on healthy aging.

Please raise your hand if you currently use social networks like Facebook, LinkedIn or other similar tools like these? Ok, about half of you. How many use Twitter? Very few. How many of you have a Smartphone and have paid for downloaded apps? Just a few. So, on a scale of 1.0 to 2.0, with 1.0 being barely using the web, to 2.0 being sophisticated interactive web users, I declare this room to be about 1.2.

Many of the ideas and topics that I will be discussing today, especially on new technology, are not new and have been debated and explored in various settings, including the European Commission (a special issue on health care and aging) where they talked about how ICT (Information and Communication Technology) has become an important driver in medicine. Specifically, they discussed the use of telemedicine and tele-monitoring technologies to assist older adults in monitoring their health status, allowing them to live longer in their own home and more independently while reducing the costs of inpatient care.

Related to health information and consumers or patients, I think many people believe right now we are entering an era we call E-Patient era. Many people go on line to seek health information. About 75% of internet users have looked online for health information. About 60% of e-patients have used online health information for asking clinical questions or getting a second opinion. About 75% of e-patients with a chronic condition say their last health search affected a treatment decision. In this era of e-patients, we are talking about people being engaged, educated and empowered, actively involved in their care more than ever before.

In terms of internet use by age when you begin to speak about new media, internet, technology and older Americans or older adults in general, those 65 years of age and older are not on-line, or using the internet often, but if you look at people between 50 and 64 the number of internet users rises sharply.

New research begins to look at what the barriers are that prevent seniors (65 years of age or older) from using the internet. Work from a group called CREATE (Center for
Research and Education on Aging and Technology Enhancement) suggested that training programs can impact efficacy and reduce the anxiety of getting on-line.

[Slide 6]
This leads to the concept of Web 2.0. The difference between Web 1.0 and Web 2.0 is that Web 1.0 is just going on-line for information and reading it. Web 2.0 is highly interactive and participatory. The idea is that people are sharing information within a network. This is a significant change from other tools in the past. Web applications like Wikipedia, Facebook, Flickr, YouTube, Blogger and Twitter, facilitate interactive information sharing, interoperability, user-centered design, and collaboration. Users can interact or collaborate with each other in a social media dialogue as creators of users-generated content in a virtual community, in contrast to websites where users are limited to the passive viewing of content that was created for them. If you think about social media, which is the most popular area in Web 2.0, any tools that have more than 500 million users alter society.

[Slide 7]
In terms of older adults and social media use, from April 2009 to May 2010, social media use more than doubled. Older adults are now the fastest growing group engaged in social media.

[Slide 8]
In the 2010 survey done by the Pew Internet on adults age 50+ who use the internet, found that half of internet users ages 50 to 64 and a quarter of users age 65 and older, use social media. One in ten aged 50 to 64 and one in twenty, who are over 65, read or share personal updates. So when you think about social networking and health, we are talking about the idea of sharing information to make more informed health decisions, not just based on clinical expert advice but from all people in a social media network.

[Slide 9]
This leads to the definition of Health 2.0, which is the use of a specific set of Web 2.0 tools by professionals in health care including doctors, patients, and scientists, using principles of open source and generation of content by users, and the power of networks in order to personalize health care, collaborate, and promote health education. Examples include PatientsLikeMe, Sermo, CaringBridge, HealthVault and Google Health.

[Slide 10]
There are many tools existing now. AARP offers a pill identifier tool. If you have a pill but you can’t remember what it is for, you can enter the shape, the color, any sort of mark on it, and it will tell you specific information about that particular medication. Another great tool is provided by Kaiser Permanente. It gives you the opportunity to have a personal health record. Patients can go on-line and have access to their health data, test
results, prescriptions and other active tools. The CDC also offers many tools including active participation in Facebook. *I Move U* is a pretty new application that uses tools like Twitter and Facebook to promote behavioral changes. So if you make a pledge on Twitter (for example I am going to run 5 miles) your network appears to give you support and encourage you to perform this behavior. *PatientsLikeMe* offer some really novel tools. It provides data aggregation. You are able to see people describing aspects of their conditions and giving back information. For example, you can see the frequency of other people taking medications.

[Slide 11] However, if you think about the main barriers to web based tools, the biggest challenge in the US is access. Date from Pew shoe that although about 60% of all adults have home broadband access, for people over 65 the percentage is just 26%. This is a problem. Mobile devices like cell phones and smart phones have the potential to help close this digital divide.

[Slide 12] So about the concept of *mHealthy Aging* (mobile healthy aging) there are many tools already that exist and many under development. For example, *The Gary and Mary West Wireless Health Institute* in San Diego are developing wireless tools including smart pills that are able to be monitored as you swallow them and can send data back. They are also developing a patch, a smart instrument that you can put on your body that monitors various functions. So, for example, patients who have been discharged from heart surgery, if there are indications of problems, they can be detected early. The *iShoe* looks at how people walk, and shares this data back which then can help reinforce and recommend strategies for reducing falls. About the idea of exercising your brain as you age, to remain mentally active, the Apple Store has dozens of these tools and applications. *Trumpia* is a cell phone reminder tool for medication and other types of treatments. Through a text or a call, the phone gives you a simple reminder about taking medications. There are many cross platform tools like *MyNetDiary*, a tool for diet and exercise that helps in behavior modifications.

[Slide 13] In summary, when you think about all these different tools, the potential power of *Healthy Aging 2.0* is the effective use of participatory and collective technologies and applications to develop and maintain optimal mental, social and physical well-being and function in older adults and their social networks.

[Slide 14] Thank you very much.
Healthy Aging 2.0: The Power of Digital Health and Wellness

Jay M. Bernhardt, PhD, MPH
Director, Center for Digital Health and Wellness
Professor and Chair, Health Education and Behavior

Amanda K. Hall, MHSE, MS
Doctoral Research Associate

Embassy of Italy - Global Health Forum
Healthy Aging Globally: A Life Cycle Approach
October 12, 2010

Healthy Aging and New Technology

• EUROPEAN COMMISSION

*Special issue on healthcare: Healthy ageing and the future of public healthcare systems*

“ICT (Information and communication technology) has become an important driver in medicine ... Telemedicine and the telemonitoring of health status might also meet special needs of an elderly population... allowing the elderly to live longer in their own home and more independently ...while reducing the costs for inpatient care.”

The Age of the “E-Patient”

- ≈ 75% of internet users look online for health information
- ≈ 60% of e-patients used online health information for asking clinical questions or getting a second opinion
- ≈ 75% of e-patients with a chronic condition say their last health search affected a treatment decision

E-Patient = Engaged, Educated, Empowered

Change in Internet Use by Age, 2000-2010
Older Adults and Technology Adoption

Center for Research and Education on Aging and Technology Enhancement (CREATE)  
www.ncbi.nlm.nih.gov/pmc/articles/PMC1524856/

- Training programs can impact efficacy & anxiety

“Web 2.0”

- Web applications that facilitate interactive information sharing, interoperability, user-centered design, and collaboration.

- Users can interact or collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community, in contrast to websites where users are limited to the passive viewing of content that was created for them.

Source: http://en.wikipedia.org/wiki/Web_2.0
Older Adults and Social Media

- 2010 survey of adults age 50+ who use the internet by Pew Internet in American Life
  - Half (47%) of internet users ages 50-64 & quarter (26%) of users age 65 and older use social media
  - One in ten (11%) aged 50-64 and one in twenty (5%) who are 65+ read/share personal updates

- Social networking = Informed decisions + Community engagement + Social support
“Health 2.0”

• “The use of a specific set of (Web 2.0) tools by actors in health care including doctors, patients, and scientists, using principles of open source and generation of content by users, and the power of networks in order to personalize health care, collaborate, and promote health education.”

Hughes B, Joshi I, Wareham J. Health 2.0 and Medicine 2.0: Tensions and Controversies in the Field, Journal of Medical Internet Research, 10(3): e23

Health 2.0 Applications
Older Adults and “mHealth”

- Home broadband access in US
  - All Adults: 60%  
    - 50-64: 56%  
    - 65+: 26%

- % of Adults Own Cellphone Wireless Internet
  - 18-29 90% 84%
  - 30-49 88% 64%
  - 50-64 82% 49%
  - 65+ 57% 20%

"mHealthy Aging"

![Image of mHealthy Aging applications](https://example.com/mhealthyaging)
“Healthy Aging 2.0”

The effective use of participatory and collective technologies and applications to develop and maintain optimal mental, social and physical well-being and function in older adults and their social networks.

Grazie &
Thank you

jaybernhardt@ufl.edu
twitter.com/jaybernhardt
jaybernhardt.com
Panel 3: Information Technology Revolutionizing Health

Prof. Niccolò Marchionni
Professor of Gerontology and Geriatrics, Università di Firenze

*Impact of ageism in acute care settings*
Thanks to the Moderator and, in particular, thanks to the Ambassador Giulio Terzi for the perfect organization and the kind invitation to participate in this 2010 Global Health Forum dedicated to healthy aging.

My presentation will focus on the impact of ageism in acute care setting (slide 1, title).

The first slide (slide 2) reminds of Robert Butler, an extraordinary gerontologist and geriatrician who died on July 4, 2010. The reason for mentioning him was not only because he was the founder and first director of the National Institute of Aging, but also because he was the coiner of the word ageism, which he described originally in his article cited by PubMed-Medline in 1969 as another form of bigotry (slide 2).

Since then, the word ageism entered into the current medical language and if you look at a modern and updated medical dictionary (slide 3), ageism is defined as an attitude that discriminates, separates, stigmatizes, or otherwise disadvantages older adults on the basis of chronological age.

The questions I will try to answer in my presentation are (slide 4):
- Are older persons with acute cardiac conditions discriminated (i.e. not offered the best available treatment)?
- Is the denial (if any) of best treatment to older persons justifiable because of the principle of therapeutic futility?

The reason to take into particular consideration acute care cardiac settings is represented by the fact in this area application of new technologies recommended by guidelines pose alternative choices with potentially relevant consequences on global health.

The basis to start in our analysis is provided by the American Hearth Association/American College of Cardiology Guidelines for the Management of Patients with Myocardial Infarction (slide 5).

As you can see, there is no age limitation in application of coronary reperfusion therapy by either thrombolysis or primary percutaneous coronary intervention (PCI), except for the extension of primary PCI up to 36 hours from onset of symptoms, which is recommended only for patients under the age of 75.

In the Florence health district, we set up an electronic chart with the aim of recording the clinical characteristics of all patients with ST-segment elevation myocardial infarction (STE-MI) from March, 2000 to February, 2001 (slide 6).

Here I will present initially the 1st year follow-up analysis.

We enrolled 930 cases of STE-MI patients with an average age of 71 years. They were admitted to a set of 6 possible hospitals. The hospital where I work, which is a teaching hospital at university of Florence provided with facilities for primary PCI, and other 5 hospitals in the district area that were not provided with those facilities.

45.6% of the patients were treated with conservative therapy and 54.4% were treated with coronary reperfusion therapies, either thrombolysis (in less then 10% of cases) or PCI. Now, we will check whether there was an age-associated change in the use of coronary reperfusion therapy.
As you can see from our analysis (slide 7), older patients had a greater burden of chronic cardiovascular and non-cardiovascular comorbidity prior to STE-MI, and had more complicated infarctions, as indicated by greater Killip classification. Moreover, they were obviously discriminated, as they were less likely admitted directly to the hospital provided with PCI facilities, and less likely transferred to that hospital for eventual PCI once they had been admitted to one of the 5 district, low-technology hospitals.

We also found (slide 8) that while direct admission to the hospital with PCI was a significant positive predictor, and a non-Q waves infarction a significant negative predictor, of coronary reperfusion therapy utilization irrespectively of age, having chronic comorbidities prior to index infarction, or a more complicated infarction as indicated by higher Killip class, was a negative predictor of coronary reperfusion use only among older patients, whereas those younger than 65 years were treated with coronary reperfusion independently of previous comorbidity of infarct severity. A further evident sign of age-based discrimination.

We moved then to a further analysis, in which we constructed a chronic comorbidity score using the clinical information of previous comorbidity (slide 9). As you can see, patients with the greater chronic comorbidity were significantly older and, again, they similarly were discriminated. Indeed they were less frequently admitted directly to the hospitals with PCI facilities, and more frequently they were treated with conservative therapy.

In the next slide (slide 10) we present the results in terms of one-year survival stratified by 2 criteria: the chronic comorbidity score and use of coronary reperfusion therapy. Patients with the lowest chronic comorbidity – who were those most frequently treated – had less benefit from coronary reperfusion therapy in terms of protection against one-year mortality, while the benefit was progressively increasing in those with increasing comorbidity, who had less intensively been treated.

A further analysis was made quite recently after 8 years of follow up. The first result I want to show you (slide 11) is that even in patients older than 75 years there is an average 25% reduction in mortality after 8 years.

We then calculated the number needed to treat (NNT; slide 12) for coronary reperfusion therapy in the two age groups, at different lengths of follow-up: interestingly, the NNT was constantly lower in older patients at any time of follow-up, except 8 years. This means that the number of patients to be treated to save one life long-term was smaller in those older than 75 years across almost the whole long-term follow-up. Therefore, in a public health perspective, coronary reperfusion therapy might be regarded as more convenient at older ages.

In conclusion, about the first question: are older persons with acute cardiac conditions discriminated (i.e. not offered the best available treatment)?, we can answer that older, comorbid cardiac patients frequently are denied the best available treatment, and that discrimination occurs across all steps of emergency care (slide 13).

About the second question: is the denial (if any) of best treatment to older persons justifiable because of the principle of therapeutic futility?, the answer is that therapeutic
discrimination of older cardiac patients is not only questionable in terms of equity, but also clinically not justifiable, as benefits from best available treatment are in fact greater in older, comorbid patients (slide 14).

Finally, the future actions against age discrimination consist of funding international registries with the aim of assessing across different countries whether the best therapeutic strategies are equally offered to middle aged and older individuals, and of measuring the negative consequences of ageism (slide 15).
Impact of ageism in acute care settings

Niccolò Marchionni, MD
Professor of Geriatrics
Head, Department of Geriatric Cardiology and Medicine
University of Florence, Italy
President, Italian Society of Gerontology and Geriatrics

Robert Butler obituary
Doctor who worked to change perceptions of ageing and the aged
Sunday 18 July 2010

Robert Butler, Aging Expert, Is Dead at 83
By DOUGLAS MARTIN Published: July 7, 2010

... Dr. Butler’s influence was apparent in the widely used word he coined to describe discrimination against the elderly: “ageism” ...

Age-ism: another form of bigotry
PMID: 5366225 PubMed-MEDLINE
AGEISM

An attitude that discriminates, separates, stigmatizes, or otherwise disadvantages older adults on the basis of chronologic age.


AGEISM in acute care settings

- Are older persons with acute cardiac conditions discriminated (i.e. not offered the best available treatment)?
- Is the denial (if any) of best treatment to older persons justifiable because of the principle of therapeutic futility?
Thrombolysis

- **Class I**
  1. ST \( \uparrow \) >0.1 mV in \( \geq 2 \) contiguous leads), within 12 hours, age \(<75 \text{ years} \).
  2. New LBBB ... and history suggesting AMI.

Primary PCI

- **Class I**
  1. ... in patients with ST \( \uparrow \) AMI or new LBBB ... within 12 hours of onset of symptoms or beyond 12 hours if ischemic symptoms persist ...
  2. In patients who are within 36 hours of an acute ST-elevation/Q-wave or new LBBB MI who develop cardiogenic shock, are \(<75 \text{ years old} \) ...

---

**THE AMI-FLORENCE REGISTRY (analysis #1)**

*March 2000 – February 2001*

**STE-MI: enrollment & treatment**

<table>
<thead>
<tr>
<th>Enrolled 930 cases (#)</th>
<th>Admitted to Hospital with PCI 390 (42.0%)</th>
<th>Admitted to Hospital without PCI 540 (58.0%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative therapy</td>
<td>298 (32.0%)</td>
<td>163 (17.5%)</td>
</tr>
<tr>
<td>Thrombolysis</td>
<td>461 (49.6%)</td>
<td>306 (32.0%)</td>
</tr>
<tr>
<td>Primary PCI</td>
<td>461 (49.6%)</td>
<td>306 (32.0%)</td>
</tr>
</tbody>
</table>

**Conservative therapy** 424 (45.6%)

**Thrombolysis** 2 (0.2%)

**Primary PCI** 298 (32.0%)

**Transfer to Hospital with PCI** 163 (17.5%)

**Reperfusion Therapy** 506 (54.4%)

THE AMI-FLORENCE REGISTRY (analysis #2)

Demographic & clinical characteristics, by age group

<table>
<thead>
<tr>
<th>Variable</th>
<th>&lt; 65 (n: 290)</th>
<th>65-74 (n: 246)</th>
<th>75-84 (n: 246)</th>
<th>&gt;85 (n: 148)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (males %)</td>
<td>85.9</td>
<td>71.5</td>
<td>58.1</td>
<td>43.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Comorbidities (n)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cardiovascular</td>
<td>0.37</td>
<td>0.58</td>
<td>0.88</td>
<td>0.93</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>non-cardiovascular</td>
<td>0.60</td>
<td>1.04</td>
<td>1.35</td>
<td>1.33</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>AMI Characteristics (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Killip class 1</td>
<td>90.0</td>
<td>74.4</td>
<td>54.1</td>
<td>43.9</td>
<td></td>
</tr>
<tr>
<td>Killip class 2</td>
<td>4.5</td>
<td>14.2</td>
<td>18.7</td>
<td>30.4</td>
<td>0.036</td>
</tr>
<tr>
<td>Killip class 3-4</td>
<td>5.6</td>
<td>11.4</td>
<td>27.3</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td>non anterior, Q waves</td>
<td>54.5</td>
<td>44.3</td>
<td>40.2</td>
<td>25.2</td>
<td>0.008</td>
</tr>
<tr>
<td>non-Q</td>
<td>14.8</td>
<td>19.9</td>
<td>25.2</td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td>Hospital admission (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directly to hosp. with PCI</td>
<td>52.8</td>
<td>43.1</td>
<td>34.6</td>
<td>31.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Transf. to hosp. with PCI</td>
<td>56.2</td>
<td>47.9</td>
<td>33.5</td>
<td>17.7</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>


THE AMI-FLORENCE REGISTRY (analysis #2)

Multivariate predictors of coronary reperfusion therapy utilization, by age group

<table>
<thead>
<tr>
<th>Variable</th>
<th>&lt;65 OR</th>
<th>p</th>
<th>65-74 OR</th>
<th>p</th>
<th>75-84 OR</th>
<th>p</th>
<th>&gt;85 OR</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital with PCI *</td>
<td>5.10</td>
<td>&lt;0.001</td>
<td>5.14</td>
<td>&lt;0.001</td>
<td>3.18</td>
<td>0.001</td>
<td>3.23</td>
<td>0.009</td>
</tr>
<tr>
<td>Comorbidity ‡</td>
<td>0.76</td>
<td>0.21</td>
<td>0.67</td>
<td>0.02</td>
<td>0.63</td>
<td>0.004</td>
<td>0.46</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Killip class &gt;1 #</td>
<td>0.19</td>
<td>0.10</td>
<td>0.18</td>
<td>&lt;0.001</td>
<td>0.30</td>
<td>0.02</td>
<td>0.28</td>
<td>0.01</td>
</tr>
<tr>
<td>Non-Q waves AMI °</td>
<td>0.06</td>
<td>&lt;0.001</td>
<td>0.03</td>
<td>&lt;0.001</td>
<td>0.08</td>
<td>&lt;0.001</td>
<td>0.05</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*: Yes vs. No; ‡ N° of chronic diseases; #: vs. Killip class 1; °: vs. anterior location

THE AMI-FLORENCE REGISTRY (analysis #3)

Clinical characteristics and management, by Chronic Comorbidity Score (CCS)

<table>
<thead>
<tr>
<th>CCS 1 n: 423</th>
<th>CCS 2 n: 229</th>
<th>CCS 3 n: 268</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>65.9 ± 13.0</td>
<td>71.9 ± 12.6</td>
<td>76.5 ± 9.5</td>
</tr>
<tr>
<td>Killip class, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>343 (81.1)</td>
<td>162 (70.7)</td>
<td>132 (49.3)</td>
</tr>
<tr>
<td>2</td>
<td>62 (14.7)</td>
<td>57 (24.9)</td>
<td>111 (41.0)</td>
</tr>
<tr>
<td>3-4</td>
<td>18 (4.3)</td>
<td>10 (4.4)</td>
<td>27 (9.3)</td>
</tr>
<tr>
<td>Hosp. admission, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directly to hosp. with PCI</td>
<td>205 (48.5)</td>
<td>99 (43.2)</td>
<td>82 (30.6)</td>
</tr>
<tr>
<td>Transf. to hosp. with PCI</td>
<td>186 (44.5)</td>
<td>49 (21.5)</td>
<td>55 (20.4)</td>
</tr>
<tr>
<td>Therapy, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservative</td>
<td>122 (28.8)</td>
<td>112 (48.9)</td>
<td>182 (67.9)</td>
</tr>
<tr>
<td>Coronary reperfusion</td>
<td>301 (71.2)</td>
<td>117 (51.1)</td>
<td>86 (32.1)</td>
</tr>
</tbody>
</table>


THE AMI-FLORENCE REGISTRY (analysis #3)

1-year survival, by Chronic Comorbidity Score (CCS) & treatment

THE AMI-FLORENCE REGISTRY

8-year follow-up analysis

Cox multivariable adjusted 8-year survival analysis, by age group and coronary reperfusion status

Age < 75 yrs.

Age ≥ 75 yrs.

Number needed to treat (NNT) for coronary reperfusion therapy at various time of follow-up, by age at STE-MI onset

<table>
<thead>
<tr>
<th>Time from treatment</th>
<th>Age &lt; 75 years</th>
<th></th>
<th>Age ≥ 75 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NNT 95% CI</td>
<td>N° of pts. still at risk</td>
<td>NNT 95% CI</td>
</tr>
<tr>
<td>1 year</td>
<td>9.9 6.2-23.6</td>
<td>482</td>
<td>7.4 4.4-25.1</td>
</tr>
<tr>
<td>3 years</td>
<td>6.8 4.6-12.5</td>
<td>460</td>
<td>5.1 3.4-10.6</td>
</tr>
<tr>
<td>5 years</td>
<td>5.7 4.0-9.8</td>
<td>436</td>
<td>4.1 2.9-6.8</td>
</tr>
<tr>
<td>8 years</td>
<td>5.5 3.8-9.9</td>
<td>400</td>
<td>5.6 3.8-10.6</td>
</tr>
</tbody>
</table>

Barchielli A, et al. submitted 2010
AGEISM in acute care settings

Conclusions (1/2):

• Are older persons with acute cardiac conditions discriminated (i.e. not offered the best available treatment)?

✓ older, comorbid cardiac patients frequently are denied the best available treatment
✓ discrimination occurs across all steps of emergency care

AGEISM in acute care settings

Conclusions (2/2):

• Is the denial (if any) of best treatment to older persons justifiable because of therapeutic futility?

✓ Beyond being questionable in terms of equity, therapeutic discrimination of older individuals is not clinically justifiable, as benefits from best treatment are in fact greater in older, comorbid patients
AGEISM

in acute care settings

Future actions... against age discrimination (?)

• To fund international registries with the aim of assessing across different countries whether the best therapeutic strategies are equally offered to middle-aged and older individuals, and of measuring the [negative] consequences of AGEISM ...

... in memory of Robert N. Butler...
PANEL 4: Health Policies to Promote Healthy Aging Globally
Panel 4: Health Policies to Promote Healthy Aging Globally

Prof. Francesco Bove
Professor in Orthopedics and Traumatology, University “La Sapienza”, President of the Foundation for the Fight Against Arthritis and Osteoporosis (AILA)

Investing in Health: Aging and Awareness
Osteoporosis is a pathology with a high social and economic impact and is, at the same time, important for the public health, as it causes severe inabilities, greater than or comparable even to some common forms of cancer, to metabolic diseases, hypertension and vascular pathologies such as stroke.

The silent killer acts causing fractures, when the pathological process is already advanced and therefore, in order to fight it, is important to know how to recognize it.

The pathology, which affects without distinction all European, Asian and American countries is linked to the increased aging of the population, typical of countries with advanced economies.

The demographic trend is the combination between the decrease of births, the mortality index and the migration fluxes.

Currently in Italy, 19.2% of the Italian population is over 65 years of age, but the provisional estimates, in the most optimistic cases, forecast that in next 20-30 years, 30% of the population will be over 65 years of age, with more than 10% of ultra-octogenarians.

The elderly population has the highest sanitary consumption and the policies of stabilization in our Country – according to a study made by the State Accounting service - expect that, in order to maintain a constant ratio between sanitary expense and GDP, the consumption should decrease in 2045 to 66.8%, that would mean a 30% reduction of the sanitary consumption, with an unavoidable decrease in the health well-being.

In our Country osteoporosis hits approximately 3,5 million women and approximately 1 million men and, in relation to the above, an increase of the incidence, is expected not only in our Country, but throughout the world, with consequential deterioration in requirements and costs increasing.

Currently, according to the latest Italian governmental data of the Healthcare Commission of the Senate (2008), fractures have an incidence of 78,000 cases per year, while for the Ministry of Health they amount to approximately 100,000 cases per year.

The days of stay in hospital are more numerous than those of the infarct and of chronic pulmonary pathologies and the current costs announced on 30th September last, from the President of AIFA, Italian Drug Agency, amount to a billion of Euro per year for the single primary sanitary costs, to which are added the costs for the attendance and the home rehabilitation and the discomfort valued in economic terms, of the nearer relatives.
Osteoporosis is therefore in the foreground, but not only in Italy or Europe, where there are more than 500,000 hip fractures per year, but obviously also in the United States and, in relation to the increase of the elderly population and the need for well-being.

The figures are destined to increase and we must necessarily gain the interest of political authorities in order to plan, in the mean-short term, containing measures.

The AILA Foundation, since its birth in the 90’s, has focused on developing citizens awareness in order to prevent the killer of osteoporosis.

In particular by translating scientific data, making them reach everyone, but, at the same time, involving politicians from different sectors to take appropriate measures to contain the phenomenon.

For this strategy it was fundamental to give clear, simple, but effective messages, that everyone could understand, trying not to burden them too much and making them interesting, spreading them in political centers.

Therefore the AILA award was created - Project Woman – which during its 9 Italian editions and an international one, held in Washington, right in this center, has rewarded numerous people of several fields (medical, scientific, artistic, cultural) in order to involve several areas of the society in wide reflection about women’s health, carrying out the Prize in the most important political forums such as the Chamber, the Senate, the Capitol in Rome and, last but not least, the Italian Embassy in Washington.

This has been done by promoting personages who have become testimonials, an important factor for communication, in order to catch up various levels of awareness through information and sensitization, necessary conditions for that purpose - otherwise difficult to reach - that is the prevention.

This has been made also for sensitizing governments, which not always perceive the importance of these processes, and remain in office for periods too short to play an ongoing work about the phenomenon.

AILA, therefore, has concentrated its own efforts of communication on the importance of healthy lifestyles, by publishing in 1998 “Osteoporosis: The Silent worm” (Gangemi ed.), which deals with healthy lifestyles, involving the highest political authorities at national and European level.

In particular, the importance of proper nutrition and intake of calcium and vitamin D in the early stages of growth - always in women - was highlighted, by fighting pathological thinness and anorexia, which affect the bone heritage useful to maintain, after menopause, a good quality for preventing fractures.

From this experience AILA also recommends:
- to promote educational campaigns in the schools
- to spread “pamphlets on risks”
- to not only focus on pharmacological policies, but to promote vitamin D and calcium, leaving medication only for secondary prevention.
- to promote the access to DEXA, which provide for the real prevention index, as done by the Italian Health Ministry.
- to promote physical activity, especially in cities where sedentariness is linked to environmental factors and to limited spaces for movement.
- to encourage exposure to sunlight, especially where the incidence for vitamin D development is higher.
- To promote the prevention of falls at home, which are the primary cause for triggering the fracture process and the development of a food culture which takes into consideration the need for calcium and, hence, the content of the latter in food.

In conclusion, investing in health is therefore the right premise to live long, but healthy. To reduce the impact of public spending based on demographic trends, a component that influences the use of health services, it is not sufficient to recover system efficiency. A program of investment in health is needed, based on the awareness to build a real program of prevention and to attain well-being.

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HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

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  2009 – Vol.61 – Suppl. X

- “Tendenze demografiche e spesa sanitaria”
  Monorchio A.
  Università Luiss – Roma (Italy)
Panel 4: Health Policies to Promote Healthy Aging Globally

Dr. Paola Pisanti
Direzione Generale Programmazione Sanitaria, Ministry of Health

*The Role of the Italian Health Care System to Promote Healthy Aging in Italy*
I am going to show you the report on “The Role of the Italian Health Care System in Promoting Healthy Aging in Italy” (Slide 1)

At the end of April 2010, the population amounted to 60,418,711 people. Living conditions have improved and there has been an increase of people aged 65 years and above, who now represent 20.2% of the population. The population of seniors might reach 20.3 million by 2051. In others words, in 2051 people aged over 64 will amount to 33% of the population.

Beyond that, the number of very old people might increase, in fact the “great elderly” (people aged 85 and above), might reach 7.8% of the overall population. (Slide 2)

In fact, the future structure of the population, represented by this slide by the figure of the pyramid, in 2031 will be characterized by a smaller base. The Italian population pyramid shows, during the time, a strong erosion at the base, becoming the shape of the top. Into the 2009 the age band of 30-40 years is the most numerous due to the
demographic boom of the sixties. The same age band of 30-40 years shows in the 1951 a low value due to the low number of births in the war period 1915-1918. The same pyramid of 1951 shows age band of 10-30 years which increases, due to the high number of births in the next 20 years, after the first world war. (Slide 3)

The data clearly shows that 30% of over-65 do not suffer from any severe disease, 20% have a chronic disease that significantly impacts on their physical and cognitive functions, and 50% have multiple chronic morbidity, which results in a mobility impairment for daily activities in 40% of this 50%. Among the over-70, 10% have unstable health conditions and complex morbidities. In specific language, those people are defined as “frail.” (Slide 4)

Frailty constitutes a limitation for the most important daily activities due to several diseases and a general deterioration of the health state and main functions. This slide shows the rates of frailty distributed by age and sex. (Slide 5)
Frailty is connected to increased disability, multi-morbidity and mortality. This slide gives you an idea of the rates of disability per cent of people 65 years and over by age and sex. (Slide 6)

The number of elderly disabled people will increase by 65 to 75% in the next 20 years. (Slide 7)
People aged 65 or above seem to use the health service more than other subjects. This is the reason why the Italian Health Care system has started an attentive analysis about this matter. This demographic change requires the end of a vision focused on the hospital more than territory that characterized the 20th century. Hence it gives rise to new issues in the health, social and economic fields, which led us to rethink health strategies, especially concerning the management of chronicity and prevention of disability. This change has also caused the transition from an organ approach to a holistic approach. Hence we are taking care of the person and not only of the disease. The elderly are not simply people who need care and assistance; they are also people who have specific needs. (Slide 8)
The function of patients is not connected only to their diseases; rather, it is the result of their relation with their economic, social, environmental and neuropsychological conditions. The health system has to promote integration between early treatment, care and socio-medical services.

A socio-health system has to face, in best way possible, these demographic changes and consider that ageing is not a disease. We cannot predict it or take care of it, so we either have regular ageing or a pathological one.

With the aged patient it is necessary to go beyond a traditional medical approach. Above all it is necessary to use a multi-dimensional evaluation that focuses on the person and the complexity of the patient.

The Italian health system puts effort into cure and prevention as well as slowing down the effects of ageing thus encouraging active ageing.

The creation of specific assistance and therapeutic pathways allows us to identify a frail aged person and after that to improve their quality of life by reducing disability, which is an approach that at the same time reduces hospitalization, promoting the employment of home health care, and saves money in the socio-health context.

The new approach toward the care provided to the elderly and the flexibility of assessment tools make it possible to face the concept of care continuity. Thus also making it easier to treat and follow patients in different locations of care. (Slide 9)

Slide 9

To go beyond a traditional medical approach; it is necessary to use a multidimensional evaluation of patients:

- Physical function
- Cognitive state
- Mental well-being
- Socio-economic Conditions

Italian Health Policy is moving on to the provision of continuous assistance based on a functional integration between hospital, territory and social services.

This is the reason why such services need to be organized with the help of different institutions and social figures to promote old age protection. The efficiency of the polices, is in its ability to organize services and integrated pathways that, firstly, have the promotion of aging going hand-in-hand with good health. And secondly, allow for the
containment and/or reduction of disabilities to promote prolonged self-sufficiency. In a nutshell: quality of life. (Slide 10)

In Italy, care provided to the elderly can be summarized as follows: Hospitalization, Health care at home, Nursing homes, and Day centers for the elderly. (Slide 11)

In short this slide shows how home services should base their actions. (Slide 12)
The main objectives of home care are:
- assistance to people with diseases treatable at home in order to avoid inappropriate use to hospitalization or other residential structure;
- continuity of care after discharge from health facilities;
- support for the family;
- recovery of residual capacities for autonomy and respect;
- improving quality of life even in the terminal phase.

Nursing homes are managed by the public health system and private organizations accredited by the health service.
Costs are divided between the Health System, the local authority and in part by the guest or by their family.
Today it is estimated that there are approximately 300,000 beds and the annual cost to the Health System is estimated to be approximately 6 billion Euro.
A classification of different levels of complexity has been proposed, as demonstrated on the slide. (Slide 13)

Box 3 sums up the services offered by Day Care Centers. (Slide 14)
A day centre is an intermediate, semi-residential structure, which has both a social and sanitary aim, and which is used when a senior has either severe disability and/or social discomfort.

**Social Assistance**
- Planned motor activity.
- Entertainment activities and socialisation, socio-cultural initiatives, social support.
- Educational-training activities, aimed at families and carers on how to help elderly.

**On health care:**
- Nursing.
- Rehabilitation (physiotherapy, occupational therapy).
- Medical care provided by general practitioners.
- Podologic service.
- Protocols involving the use of a physical restraint agreement between the players.

**Prevention Activities:**
- The Day Centre should not only have the purpose of treatment/care but also of prevention.

In conclusion we believe that it is important to maintain the following priorities:

1. To support the diffusion and development of tools, such as multidimensional assessment.
2. To guarantee continuous assistance to old and frail people.
3. To develop and qualify forms of integrated home assistance.
4. At every stage of care, to guarantee the elderly with a high level of disability welfare and rehabilitation pathways through the implementation of specific diagnostics.
5. To put effort into cure and prevention as well as slowing down the effects of ageing thus encouraging active ageing. (Slide 15)
But above all, it is very important to identify the family as the centre of the network in the double role of:
- Requester of Assistance
- A resource (Slide 16)

Finally it is necessary to involve the voluntary sector giving them the instruments to acquire an ethical and managerial culture that allows them to work with: Reliability, Clarity, Efficiency (Slide 17)

I’d like to conclude by highlighting the fact that for the elderly since 2009 the Italian Health System has included in its National Health Care Plan the following objects:
GLOBAL HEALTH FORUM 2010

- To encourage physical activity in the elderly by facilitating inexpensive and locally sited structures.
- To develop and support a health surveillance system on the lifestyle of the elderly.
- And to increase the strength and frequency of information/training messages. (Slide 18)

Slide 18

The 2009 National Health Care Plan

Objectives
- Encourage physical activity in the elderly by facilitating inexpensive and locally sited structures.
- Develop and support a health surveillance system on the lifestyle of the elderly.
- Increase the strength and frequency of information/training messages.
Panel 4: Health Policies to Promote Healthy Aging Globally

Enrique Vega Garcia
M.D., Regional Advisor on Aging and Health,
Pan American Health Organization

*Aging and Health in Latin America and the Caribbean.*
*Challenges and Opportunities*
Distinguished Colleagues, Ladies and Gentlemen,

The Pan American Health Organization and myself were honored with the invitation to this Global Health Forum, and we would like to congratulate the Embassy of Italy for dedicating this Forum to the Healthy Aging.

It’s a great opportunity to discuss in this important meeting about the condition of the health of older persons in the developing countries, specially about Latin America and the Caribbean situation.

The Latin America and the Caribbean are aging. That is the fact. But the countries are aging with marked differences between them.

Three main features characterize this process in the Region:
- Its speed
- Diversity
- the relation, or I must say the non relation with the Economic Development

The Americas have been aging rapidly but this aging process rate will increase exponentially in the coming years. Whereas in 1950 there were 5.5 million older adults in this area, half a century later that figure had increased to more than 50 million. From 2000 onward, the figures will double every twenty-five years—that mean 100 millions in 2025 and more than 200 millions in 2050.

In the meantime countries like Barbados, Cuba, Argentina, or Uruguay have more than 18% of the population over 60, others like Haiti, Bolivia or Guatemala have only 6% of the population aged 60 years and over. It is not a homogenous phenomenon.

In 2010 the Region has the same amount of people aged over 60 than people less than 5 years old.

Life expectancy at 60s, today has been calculated at 21 years, 81% of the people born in the Region will live to the age of 60, while 42% will live past 80. In 2025, there will be 15 million people aged 80 or over.

Greater longevity, however, has not been accompanied by comparable improvements in well-being, health, and the quality of life.

The transition has not been associated with a favorable economic situation as it has in the more economically developed regions. LAC is aging at a time when it still lacks sufficient economic resources:

- Almost 50% of the older persons interviewed for the SABE study said that they did not have the financial means to meet their daily needs, and one-third did not have a pension or a paying job.
- Their level of schooling is lower than that of the general population, and they have very high illiteracy rates.

Less than 50% of people over 60 describe their health as good and women say that they are in poorer health than men.
In Latin America and the Caribbean prevalence of disability in this group is high, basic functional capacity affects 20% of this population, with need of long-term care at home or in institutions.

Despite the tangible implications of this phenomenon for social security and public health, the Region still lacks a comprehensive vision of health for older persons. Knowledge about their health needs and care is not uniform, and most health systems lack indicators to permit the monitoring and analysis of the impact of health measures. Coverage, continuity of care, geographical, physical, economic, and cultural access to health services without discrimination is deficient, and the people who have access still do not receive services adequate to their needs.

According SABE data 40% of older persons with hypertension had not gone for a primary care consultation in the last 12 months; only 17% of elders with depression had had a treatment and 80% of seniors reported having unmet dental needs.

In Latin America and the Caribbean, it is families, and especially women in a 90% of cases who care for the elderly; however, their capacity to do so is changing. Some 60% of these caregivers say that “it’s too much” for them and over 80% indicate that they are having trouble covering the cost of the care involved.

In 2002, the countries of the Region adopted the International Plan of Action approved in the Word Aging Assembly in Madrid. Five years after when was evaluated its execution in the Region, was recognized some progress. Despite their commitment and the progress in the Health Agenda for the Americas 2008-2017, the Region’s Ministers of Health recognize that the importance of this issue, and the magnitude of its implications call for enormous additional efforts.

The rapid demographic transition and factors such as the transformation of the family, women’s participation in the labor market, migration, and urbanization support the affirmation that more and more older adults will not have the type of care available to them until now.

With the steady increase in life expectancy, unless disability declines and living conditions improve for this group, the growing demand for different types of home or institutional care, particularly long-term care, will steadily increase.

In October 2009, the 49th PAHO DIRECTING COUNCIL with the participation of the Ministers of health of the Americas Region decided to discuss the subject:

- They remark that the exponential shift toward a new demographic and epidemiological situation means not only that countries must rapidly adapt but they must anticipate new contexts, and that only adequate social and health investment can produce healthy and active longevity with benefits in all areas for individuals, families, and society as a whole;

- They take into account the importance of having a strategy and plan of action that will enable Member States to respond effectively and efficiently to the needs and demands that the aging population is already rapidly making on health and social security systems, society, and the family,
And finally they approved the PLAN OF ACTION ON THE HEALTH OF OLDER PERSONS, INCLUDING ACTIVE AND HEALTHY AGING for the period 2009 to 2018

This Plan of Action identifies four critical areas, represented in the Plan of Action as four interdependent strategic areas that link together commitments, values, resources, capacities, and opportunities to meet the compromises acquired. These areas are:

- Health of older persons in public policy.
- Suitability of health systems to meet the challenges of an aging population.
- Training of the human resources necessary to meet this challenge.
- Development of the capacity to generate the information needed to undertake and evaluate action to improve the health of the older population.

During the Directing Council there was a consensus that improving health conditions and reducing disability in the older population demands shared commitment and responsibility.

The Member States agreed that they should create an enabling environment for the formulation of policies and regulatory frameworks for their execution to meet the challenge of aging in their respective countries. And they asked PAHO to collaborate in supporting these activities. The Americas Region countries got a compromise to in the period 2009-2018:

- To formulate policies, laws, regulations, programs, and budgets consistent with the human rights instruments of the United Nations (UN) and Inter-American (OAS) systems.
- To work in develop legal frameworks and execution mechanisms to protect the health of older persons in long-term care services.
- And to promote cooperation to and among countries in the design of strategies and the sharing of skills and resources to execute their plans on health and aging.

At the same time, member state consider that adapt health systems to the challenges associated with the aging of the population and the health needs of older persons will be a special challenge for the Region,

They recognized the presence of many models, good experience and learning experience from developed regions and they considers very important evaluate these experiences in the Region but they recommend the carefully assessment and validation of these evidences, taking care about the huge difference among the social and economic scenarios among regions.

A primary care-based health system with programmatic life curse approaches helps provide an adequate framework for the execution of activities from in the early stages of life onward, which helps to ensure healthy and active aging. These interventions will require effective sustainability throughout the life cycle and the involvement of
groups of elderly people, as their positive impact on health and the quality of life has been demonstrated. The Region was agreed to:

- Formulate strategies that include healthy environments and personal behaviors throughout the life cycle to ensure active aging.
- Improve prevention and management of chronic diseases and other health problems of older persons.
- Establish quality services for older persons while strengthening health systems based on primary care.

The health workforce is the cornerstone of health systems and key to meeting the challenge. However, the availability and distribution of human resources to address this problem are unequal. Even in countries with a high percentage of older population, an comprehensive approach to the health of older persons is rarely included in health sciences research. Therefore health systems must meet the challenge of providing care for users with different characteristics and needs than the ordinary user. To this end, workers in the sector need to acquire new competencies that will enable them to meet the health care needs of this population group.

The Council defines as priorities:

- Develop the competencies of personnel for the delivery of health service to this population.
- And train other actors involved in the health of older persons making specially emphasis in the main actors the older persons.

Aging will demand efficiency, effectiveness, and quality in health systems and services. Tackling this challenge will also require to academic and research institutions to play an active role in the production of new knowledge and scientific evidence in health of older persons. Appropriate information mechanisms and products will facilitate monitoring, evaluation, and supervision, as well as the adaptation of plans and strategies.

Developing collaborative research that will yield better knowledge about the impact of aging on health systems and the modeling of future scenarios that will enhance national forecasting capacity in this area, the design of related strategies, and interventions based on the specific needs of the Region’s different contexts.

The Region agreed on:

- Strengthen the technical capacity of the health authority to monitor and evaluate health care for the older population.
- And promote acquisition and dissemination of the scientific evidence necessary for adapting health interventions to national situations.
The Pan American Health Organization consider the longevity and the aging of the population as one of the most important achievement in the Americas Region in the XX Century and at the same time one of the most important challenge for a public health in the present century.

During the last decade the Pan American Health Organization (PAHO) in partnerships with other actors has been served as a channel for mobilizing technical and financial resources to improve the health and well-being of older persons and their families.

PAHO technical support will center on the health sector’s response to the health needs of older persons, paying particular attention to the training and upgrading of human resources and the preparation and adaptation of standards, protocols, methodologies, and tools, in addition to the dissemination of the information gathered and wider application of successful evidence-based interventions.

These technical cooperation mechanisms will lend visibility to the health needs of older persons and help to mobilize the political, social, and economic backing necessary for the adoption of effective public policies and a care continuum, within the framework of health systems based on primary care.

However PAHO recognized that the plan of action approved, demands a major reorganization of international cooperation to tackle the new challenges of aging and the health of older persons.

Achieve the goals will requires the active participation of Member States and others partners countries with experience and human and technical resources. Partners and direct stakeholders from multilateral and bilateral organizations, donors, the private sector, scientific societies and academia, nongovernmental organizations, faith-based organizations, civil society, and the most important the leadership and participation of the Region’s older persons.

Thank you.
AGED POPULATION GROWTH IN LATIN AMERICA
Still the window of opportunity

http://new.paho.org/hq/index.php?option=com_content&task=view&id=2796&Itemid=191
HEALTH CONDITION OF OLDER PERSONS IN LATIN AMERICA AND THE CARIBBEAN

Our information about Seniors Health in the Region is limited, even so SABE gave us some data:

- 50% did not have the financial means to meet their daily needs
- Less than 50% describe their health as good
- Basic functional capacity has been affected in 20%
- 75% have limited physical activity on a regular basis
- 61% have risk factors for malnutrition

Source: PAHO SABE Study, 2002

PERSISTENT BARRIERS AND GROWING NEEDS

- Only 40% of older people with hypertension received a primary care consultation in the previous year
- In the 2 years previous, just 27% of women had had a mammogram
- 69% did not have influenza vaccine and 90% must pay out of pocket for essential medicines (full or partial)
- 60% caregivers say “it’s too much” and over 80% report having trouble covering cost of the care
- Health systems lack indicators to monitoring and analysis impact of health measures

Source: PAHO SABE Study, 2002
BUILDING A VISION OF HEALTH OF OLDER PERSON

- Regional Strategy for Implementation for Latin America and the Caribbean (2003)
- II Regional Intergovernmental Conference on Aging in Latin America and the Caribbean (2007)
- Primary Health Care Declaration (2006)

STRATEGIC APPROACH AND PLAN OF ACTION

Health sector’s response to the health needs of older persons

- Guided by the values of the UN Principles for Older Persons
- Country driven needs and appropriate responses
- Calling for a shift by the international community to tackle the new challenges
- Success of the Plan of Action depends on a sound internal strategy
STRATEGIC AREA 1
Health of older person in public policy and its adaptation to international instruments

- Every country with a policy, a legal framework, and a national plan on aging and health
- Countries with a legal and regulatory framework based on human rights protecting older persons who use long-term care services
- Every country will have at least one partnership for executing its national plan on health and aging

STRATEGIC AREA 2
Adapt health systems to the population aging challenges and the health needs of older persons

- Every country with a strategy in place to promote healthy behaviors and environments
- At least 75% of programs for the prevention and management of chronic diseases in the countries will meet specific evidence-based requirements for older persons
- At least 75% of the countries of the Region will have a strategy to optimize services for older adults in primary health care (PHC)
STRATEGIC AREA 3
Training of the human resources necessary for meeting the health needs of older persons

- Every country will have provided at least one training program for health workers on topics related to aging and the health of older persons.
- At least 75% of the countries of the Region will have a training program in health geared to older persons and their caregivers.

STRATEGIC AREA 4
Strengthen the capacity to generate the necessary information for executing and evaluating activities to improve the health of the elderly population

- At least 75% of countries will use a system surveillance and evaluation of the health of older persons.
- 75% of the countries will have conducted at least one national research study on the health and well-being of older persons.
IN THE NEXT 40 YEARS, THE DEMOGRAPHIC SITUATION WILL OFFER A WINDOW OF OPPORTUNITY.

BUT ONLY THROUGH ADEQUATE SOCIAL AND HEALTH INVESTMENT WILL IT BE POSSIBLE TO ACHIEVE HEALTHY AND ACTIVE LONGEVITY RESULTING IN A LOWER ECONOMIC BURDEN
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Panel 4: Health Policies to Promote Healthy Aging Globally

Edwin Walker
J.D., Deputy Assistant Secretary for Program Operations, Administration on Aging, U.S. Department of Health and Human Services

Translating research to create a healthy nation

THIS TEXT IS THE BASIS OF THE ORAL REMARKS OF THE DEPUTY ASSISTANT SECRETARY. IT SHOULD BE USED WITH THE UNDERSTANDING THAT SOME MATERIAL MAY BE ADDED OR OMITTED.
Thank you, Ambassador Terzi and the forum organizers.
Greetings on behalf of the Administration on Aging and Assistant Secretary for
Aging, Kathy Greenlee.
Thank you for acknowledging one of the great pioneers in the field of aging in
this country and throughout the world – Dr. Robert Butler.

Background:

The Administration on Aging is one of the social services agencies within the
Department of Health and Human Services. Rear Admiral Blumenthal spoke about the
importance of social supports. That’s what we provide as a complement to the health
system in this country. We are the Federal government agency that leads the
development of programs and policies, but also we “advocate” and speak on behalf of
older persons and their families and caregivers. Currently, we are focused on better
integrating the health and social service systems.
We have built a national home and community based network at the state and the
local levels. Our goal is to keep older individuals healthy and to enable them to live with
dignity and independence in their own homes and communities. We do this by offering a
broad array of social and health related services.
For a number of years we have focused on using lessons learned globally and here
in the U.S., and to translate evidence-based health and long-term care interventions into
community-based programs. The purpose is to improve quality of life, reduce costs, and
optimize the use of our health-care system.
This morning you heard from Dr. Richard Hodes of the National Institute on
Aging. We take the lessons learned from the research they conduct and translate those
interventions for broad application by our network of community based organizations
throughout the US. This National Aging Network is comprised of our agency, state,
tribal and regional agencies, thousands of local service providers and hundreds of
thousands of volunteers throughout the country. Many of the interventions related to
health promotion and disease prevention are implemented in partnership with State and
local public health departments.

Aging Network Capacity Building

One might ask, how do you implement interventions throughout the entire country?
We recognize that our Aging Network organizations across the country are in different
stages of development. So we are investing in the process of building their capacity to
play a lead role in the development and implementation of modernized systems of long-
term care -- including using scientific evidence as the basis for building robust home and
community-based programs. Our investments are in the areas of:
- enhancing management practices and methodologies,
- enhancing leadership,
- systems development,
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

• long-term strategic planning, and
• effectively translating research interventions into practice while maintaining the fidelity of the science.

All of these efforts are designed to broaden the role of our network in the delivery of community-based services and supports that transform our nation’s system of health and long-term care to better address the needs of older adults and their caregivers.

Stanford Program:

A very successful example is the implementation of interventions such as Stanford University’s Chronic Disease Self-Management Program or CDSMP. Research and practical experience in the U.S. and the U.K. show that today’s patients with chronic diseases need not be mere recipients of care. They can become key decision-makers in the treatment process.

- The program is based on more than 20 years of research supported by grants from the National Institutes of Health, the Agency for Healthcare Research and Quality, and the Centers for Disease Control and Prevention.
- Workshops are delivered in community-based settings such as senior centers, congregate meal programs, faith-based organizations, libraries, YMCAs, YWCAs, and senior housing programs.
- Goal-setting with a standardized curriculum and interactive process, is designed to help empower participants and maximize behavior change and positive health outcomes.
- Workshop topics are based on needs assessments and focus on building skills that are generic to anyone with a chronic condition, e.g. Exercise and Nutrition; Medication usage, Stress management, talking with health providers, dealing with emotions and depression.
- Statistically significant improvements have been reported in self-efficacy, health behaviors and health outcomes (including reduced health distress, improved self-reported health status, lower levels of fatigue). There is also some evidence of improved health care utilization and reduced health care costs.

Older Americans Act Title III Preventive Health Services

Since 1987 through the OAA, AoA has provided funding to States to support activities that educate older adults about the importance of healthy lifestyles and to promote healthy behaviors that can help prevent or delay chronic disease and disability, thereby reducing the need for more costly medical interventions. Many states use this funding to implement evidence-based disease and disability prevention models.
Since the early 1990’s Congress has required states to use a portion of this funding for activities designed to assist older Americans with Medication Management. A number of educational and medication monitoring activities have taken place across the country including use of evidence-based programs such as the Medication Management Improvement System:

- Which is a pharmacist-centered intervention designed to identify and resolve medication errors and unnecessary duplication. A consultant pharmacist assists care managers to assess and resolve potential medication problems in patients at high risk of complications.

Recovery Act:

The Obama administration made a major investment in prevention through the American Recovery & Reinvestment Act’s Communities Putting Prevention to Work Program. The AoA is leading this Initiative

- Launched March 31, 2010 by AoA in collaboration with CDC
- $27 million awarded to 45 states, District of Columbia and Puerto Rico
- Two year effort ending March 30, 2012 has two key objectives for the grantees:
  - Deliver CDSMPs to 50,000 individuals; and
  - Strengthen the capacity of states to systematically deliver this intervention and other evidence-based prevention programs through effective distribution and delivery systems, including building strong partnerships between state aging, public health, Medicaid and community level partners
- Also partnering with CMS and NCOA on two national studies to document participant outcomes and to track health care utilization and costs.

We also fund a variety of other community-based interventions:

Stepping On
- Multi-faceted, 7-week *community-based program effective in reducing falls in at-risk people.*
- *Focuses on improving self-efficacy and encouraging behavior change, in addition to reducing falls.* The class in the original study was facilitated by an occupational therapist, lasted 7 weeks with a follow-up home visit.

Tai Chi: Moving for Better Balance
- *Community based falls prevention intervention.* 1-hour tai chi class three times per week over 6 months.

EnhanceFitness
- *Community-based exercise program shown to improve health in older adults.* 3 times per week for 6 months. 60 minute exercise program consisting of warm-ups, *strength training, aerobic activity, flexibility,* and a cool-down. Participants experience
statistically significant improvements in seven out of eight health assessment scales and in the depression scale.

A Matter of Balance
- Reduces fear of falling while increasing activity levels among community-dwelling older adults. **Focuses on practical coping strategies to reduce both the fear of falling and the risk of falling by addressing physical, social, and cognitive factors.**

Alzheimer’s Disease
- ADSSP **funding to implement interventions designed to help people with Alzheimer’s disease and their caregivers live successfully in the community. Interventions include support, counseling and respite services.**

- **AoA and NIA are working together to encourage and hasten the process of translating research into practice. Our aim is to take the basic science and interventions that NIA has funded and translate those into tangible tools and programs that can be implemented in real-world settings.**

- [30 grants given out overall using Recovery Act funding, 5 of which were through NIA. The AoA –NIA partnership will build on that work, encouraging collaborations between the Aging Network and NIA research that is ready to be tested for translation, using the infrastructure that was put in place with the CI grants to wraparound and support those collaborations.]

Affordable Care Act
All of these programs and certain provisions of the **Affordable Care Act** have resulted in a number of improvements in the lives of older adults in the US. These include:

- Older persons learn techniques to improve their own health and quality of life by learning to set and achieve goals through the CDSMP, exercise programs, falls management and prevention programs, depression management, and related programs.

- The Affordable Care Act includes many new prevention benefits for Medicare beneficiaries including: a free, annual wellness visit and personalized prevention plan and elimination of cost-sharing for preventive services. Our Aging Network is working to make sure that older people know about and have access to these benefits.
Implications for Global Health:

- The Stanford Chronic Disease Self Management Program is available in at least 15 countries and across the US. The program is also available in English, Spanish and at least 20 other languages.

- AoA is actively sharing information about our health prevention programs with other countries.
  - Information available through our website – www.aoa.gov
  - International conferences
  - Reports to the United Nations
  - UNECE Work Group on Aging, of which the Italian Ministry of Labor and Health is a member. Provided information for Policy Brief on Health Promotion and Disease Prevention

Thank you again for the opportunity to participate in this important forum. We look forward to a continued collaboration with you to share best practices with the goal of improving the health, independence and dignity of our older citizens.
Panel 4: Health Policies to Promote Healthy Aging Globally

Jessica Frank López,
Chair, NGO Committee on Ageing, United Nations; Senior Advisor, AARP
Office of International Affairs

Translating Science into Action: NGO’s Perspectives
As we mark the 20th Anniversary of the United Nations International Day of Older Persons we celebrate the fact that people around the world are living longer and healthier lives.

As we have heard, this is the first time in history that there will be more older persons in the world than children in just a couple decades. This is certainly a reason to celebrate. Throughout the month of October older persons, their families and communities gather around the world to celebrate and call attention to the contributions that older persons make to society.

As we celebrate it is also important that we recognize that we are far from fulfilling the United Nations’ goal of “Building a society for all ages”. Just two weeks ago, President Obama and all world leaders gathered in New York for the United Nations General Assembly. Heads of State presented their agendas, priorities and concerns on the world stage and reaffirmed a renewed support for the Millennium Development Goals (MDGs), an ambitious agenda world leaders set 10 years ago to tackle global poverty.

There is no doubt that the MDGs have been influential in galvanizing international support and providing momentum to tackle poverty, hunger, disease, and discrimination against women. However, as a Committee of organizations representing older persons around the world, we are concerned about the continued exclusion of older women and men in international agreement and the Millennium Development Goals. There is significant lack of recognition of the critical contribution they make towards the achievement of the MDGs.

Older people remain invisible in efforts to achieve the MDGs

Poverty affects whole households and is transmitted across generations. Old age can be a period of extreme vulnerability to poverty and ill health and social exclusion. It has been estimated that currently less than 20% of older people in the world are covered by pensions which suggests that as many as 607 million people aged 60 and above lack income security.

Despite this, older people are not explicitly mentioned in any of the MDG targets or indicators to measure their progress. As a result most development policies and programs focus their efforts on children, young people and the working age poor, lacking any understanding of the critical social, economic and contributions of older people.

When older people’s rights are respected and their efforts supported, the contributions they make is even greater and significantly contributes to achieving the MDGs.

The NGO Committee on Ageing calls for a more inclusive, rights-based approach to ensure all those living in chronic poverty, including older women and men, be reached.

I would like to thank the Government of Italy for organizing this Global health Forum and for focusing the theme on such an important topic: Aging Globally: A Life Cycle Approach.

I would specifically like to express my appreciation to the Honorable Minister of Health of Italy, Ferruccio Fazio; His Excellency Giulio Terzi, Ambassador of Italy to the
United States; and Admiral Susan J. Blumenthal, MD, MPA Chair of the Global Health Program of the Meridan International Center, for their invitation to speak at this conference.

Thank you for your attention.
Panel 4: Health Policies to Promote Healthy Aging Globally

Armin Fidler,
MD, MPH, Lead Advisor for Health Policy, The World Bank

Country Preparedness for Demographic Growth
Thank you very much for the introduction, thank for inviting us, thank you Ambassador, thank you very much.

I will have mercy with you and I won’t go through the power point slides. I might just select a couple to illustrate some of my main points. Given the protracted time I decided to summarize the key points that I wanted to bring across this evening.

Aging has become a global phenomenon. We associate it still with higher-income countries, but certainly middle-income countries need to be woken up, in terms of policy makers, in order to introduce an appropriate policy, in terms of long term care preparedness, and certainly also low-income countries are very much concerned with the question of demographic change and aging.

The World Bank Report *From Red to Gray: Eastern Europe’s Aging Societies*, shows a dramatic demographic change in Europe and Central Asia with many countries having a double challenge: on one hand aging population, on the other hand negative population growth.

Just last week I was in Geneva at the World Health Organization and someone from the UN showed the slide of the demography of Burkina Faso. What you can see is simply amazing. In 2050 there will be a very high proportion of elderly people.

So even in poor countries in sub Saharan Africa there will be very serious aging problems, so rich countries and institutions need to be prepared.

Now, many times policy makers argue that aging is responsible for the drastic increase of health expenditures and quite frankly what we found in our analysis is the main drivers of health spending are not related to aging but to GDP per capita, quality and generosity of benefits, technological innovation.

Currently, in the old member states of the European Union, about 15% of total health spending is related to long term care. This is just as a benchmark that we should keep in mind.

Now there is a lot of empirical evidence that death proximity is a main cost driver: almost in every country most of the health spending comes in the few days, weeks or months before death; this is something we have to think about in terms of its impact, its usefulness.

The important part is that we need to succeed in having healthy aging. We have to focus not just on aging, but on the quality of aging and of course on the health status of the elderly.

Most countries have not even realized that something perhaps needs to be done in terms of financing, service revision, quality control; many relies just on very informal arrangement, when it comes to long term care.

I will not go on into details, of course mature economies have very formal systems, but in many of the middle and low-income countries the thinking of what to do with long term care has only started now.

There is also a quality issue when we look at what types of arrangements are in place for long term care. I am talking about lack of coordination between health services.
and social services, weak coordination between primary care, hospital care and long term care, lack of services.

In fact when we look at the new member states of the European Union, most of long term care is happening in hospitals, and that in most experts’ view is not the right place to be. The hospital is actually one of the most dangerous places you can be as an old person. Many of you might have experienced that a hospital is a pretty dangerous place to be.

So one of the challenges we have, especially in the new member states and in many of the countries of the former Soviet Union, is an overextended service network and the temptation to have too many beds to be used for long term care.

Another challenge that countries have is informal care. Many of the countries, maybe even my own country, in Austria, lots of informal care is given by illegal migrants. On one hand we heavily rely on illegal migrants because they provide a huge amount of informal care in the European Union, but at the same time this creates other problems in terms of quality, migrations and other kinds of areas.

The costs of informal care involve the labor market distortions and the payment for informal care. The labor market distortions do not affect employment, but seems to affect female work hours. Moreover there are indirect costs involving the loss in productivity. Regarding the payment for informal care, few countries fully compensate informal caregivers. There is an equity-efficiency trade-off: it is inefficient to pay for a service that would be offered anyway.

To bring back again the issue of healthy aging in terms of reframe of the cost and quality of life, one of the most important thing we can do is not only to establish an appropriate formal or informal setting for long term care, but to promote healthy lifestyle and healthy aging thorough preventive medicine, public health, clinical settings and policy in order to have population protected from a number of diseases and disabilities.

In summary, long term care may impose a financial burden on public spending on health and if it remains unchecked, it may be an important element of public finance. People prefer home settings which are certainly cheaper to provide. Also there are in some countries quite interesting experiences provided, based on disabilities categories, in terms of cash support for informal home care settings. It is very difficult to give a specific and omnibus policy advice.

Certainly the governments have to act considering the demographic settings of each country, the institutional capacity and the expectations, financial and economic powers that the countries have in their dispositions.

So thank you very much.
Global Policy Debate on Aging and Long-term Care

Armin Fidler
Lead Adviser, Health Policy and Strategy
Human Development Network
The World Bank

Aging a Global Phenomenon

- Rapidly shifting global trends in aging – elderly population increasing in most countries of the world, except SSA
- High-income countries have been experiencing this trend for a while
- LICs and MICs less prepared to deal with this emerging challenge
WB Report: From Red to Gray: Eastern Europe’s Aging Societies

Also Poor Countries Age Rapidly!

- Demography for Burkina Faso
  - Increasing population size
  - Changing age distribution (aging process)
  - Mixing pattern
Demographic Change in Europe and CA

Aging Impacts Health Expenses

- **But: Main drivers of health spending are not related to aging:**
  - GDP per capita
  - Quality; generosity of benefits
  - Technological innovation
- Nevertheless, elderly have higher demand for health services, depending on additional life years spent in good health or in illness
- 15% of total health spending devoted to LTC in EU15
Death Proximity is Main Cost Driver

- Zweifel, Felder, and Werblow (2004):
  - Empirical evidence points at proximity to death as main determinant for health expenditures, and hence limited impact of aging on health expenditures
  - Nevertheless, increase in health expenditures for “survivors” due to increased life expectancy
- Use of health services, in particular LTC, will increase with aging (and therefore will increase health spending)

Health Status of Additional Years

- Life-cycle health expenditures: actual (2003) and two projections for an increase of 10 years in life expectancy

Health expenditures increase with age; additional years are spent in increasingly bad health

Proximity to death main determinant of health expenditures; additional years are spent in relative good health
Is There Something Special to LTC?

- LTC “in its own right” is an emerging policy area;
- Many OECD countries have embarked on developing policies but “best-practice” models are lacking;
- Major challenge is to develop financing models given the institutional context and expected trends in disability and in the availability of informal care;
- Most countries rely on taxation for public financing of LTC, except Germany; Japan; Netherlands;
- Financial sustainability is under scrutiny due to upward pressures on workforce needs/quality/wages;
- Quality and responsiveness is poorly understood and measured.

LTC and Total Health Expenditures
Care Fragmented and Uncoordinated

- Lack of coordination and clear referral guidelines between health and social services
- Weak coordination between hospital and primary health care services
- Some services are missing (community-based care for the elderly).

LTC Spending Allocated Differently
EU-NMS Provide More LTC in Hospitals

Source: Eurostat

Informal Care Dominates EU NMS

Source: European Commission
Delivery Mechanism Affects Spending

Distribution of dependents and associated public expenditures for CZ, LT, LV, PL, SI, SV current scenario

Source: European Commission

Distribution of dependents and associated public expenditures for CZ, LT, LV, PL, SI, SK with an increase in formal rather than informal care: costs increase threefold

Source: European Commission
Areas of concern:

- Changing age structure will lead to higher demand;
- Medical and technical progress can lengthen time spent in disability;
- Transforming institutional care into ambulatory or home-care settings changes required skill mix.
- Workforce shortages exacerbated by increased participation of women in the formal labor force stimulate inflows/outflows of LTC workers;
- LTC delivery will have to be patient-centered and coordinated across care and social settings.
- Fragmented financing results in nonaligned incentives and “schizophrenic” buying agents for LTC.

Care Quality Needs Improvement

- **Survey results on access to nursing homes**
  - In EU NMS, less than 25 percent respond positively when asked about easy access to nursing homes
  - EU-27 average: 39 percent
  - Exception: Turkey (35 percent)

- **Survey results on quality of LTC**
  - In most EU NMS, less than 25 percent respond positively when asked about good quality of nursing homes
  - EU-27 average: 41 percent
  - Exception: CZ (60 percent), SI (49 percent)

Source: Eurobarometer 2007
Policy Choices for LTC

(i) Entitlements
- Eligibility
- Generosity of benefits
- Cash benefit or in-kind benefit
- Consumer-directed or agency-directed

(ii) Delivery
- Hospital care
- Formal institutional care
- Formal home-based care
- Informal home-based care
- Case management

(iii) Financing
- Insurance: mandatory or optional, public or private
- General taxes: on community, state, or federal level
- Households: cash or in-kind
- Voluntary/charity

Austria: Cash Benefits Based on Disability Categories
- Cash benefit puts buyer in driving seat
  - Shifts residual financial burden to family
  - Leads to more costs-conscious decisions
- In-kind benefit creates entitlement for service
  - Could lead to supply-induced demand for LTC
- Can reduce costs
  - lower administrative and overhead costs
- Could stimulate private-sector response to provide LTC services
- Could stimulate informal LTC
  - Substitution effect: subsidize informal care
  - Income effect: could also crowd out informal care
Austria: Financing of (formal) LTC

Financing LTC expenditures (2004-06):

<table>
<thead>
<tr>
<th></th>
<th>Total (million EUR)</th>
<th>General taxation (incl. SA)</th>
<th>LTC allowance</th>
<th>Other public sources</th>
<th>Out of pocket (w/o SA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>3,518</td>
<td>1,300</td>
<td>1,738</td>
<td>100</td>
<td>380</td>
</tr>
<tr>
<td>Percent</td>
<td>100.0%</td>
<td>37.0%</td>
<td>49.4%</td>
<td>2.8%</td>
<td>10.8%</td>
</tr>
</tbody>
</table>


- Tax-financed: 86.4% (General taxes, LTC allowance)
- Social security: at most 2.8% (SHI as part of other sources)
- Private, mandated risk pooling: 0%
- OOPP: 10.8% (but: how much of it are pensions?)
- Informal care: at least 1.2 Billion of LTC allowance; economic value of 2-3 Billion

People Prefer to be Taken Care at Home

Source: Eurobarometer 2007
Married females, under age 50, in Japan positively responding that care of elderly is a good custom, 1950-2004

Costs of Informal Care

- **Labor market distortions**
  - Mixed evidence. Does not affect employment but seems to affect female work hours
  - Indirect cost in lost productivity (hard to measure)

- **Pay for informal care**
  - Few countries fully compensate informal caregivers (some compensation exists often)
  - Equity-efficiency tradeoff: it is inefficient to pay for a service that would be offered anyway
  - May be efficient to compensate for labor market impact and in light of projected decrease of informal caregivers due to demographics and change in values
Promoting Healthy Aging

- Public policies to prevent NCDs
- Prepare for epidemiological + demographic transition
- Support development of integrated LTC systems for the elderly
- Care for elderly will increase costs... but not focusing on LTC and prevention will increase hospital spending (at higher costs and less cost-effectiveness)
- Develop evidence-based policies and perform evaluations using cost-effectiveness criteria
- Learn from mistakes of others....

Summary of Findings

- LTC may impose a heavy financial burden on public spending on health
- Institutional LTC is clinically superior and more cost-effective than LTC in acute health sector
- Home-based care is clinically superior and cheaper than institutional LTC
- Informal LTC is cheaper than formal LTC
- Cash benefit useful to stimulate informal LTC, private sector response, and employment

⇒ Which policy conclusions can we draw for which country?
⇒ Are cash benefits for home-based care best practice?
Panel 4: Health Policies to Promote Healthy Aging Globally

Dr. Sergio Dompé
President, Farmindustria, Italy

The Revolution in Life Sciences: the Public-Private Network for Research, Healthcare and Sustainability Policies
Thank you Your Excellency Ambassador Terzi for your very kind invitation. Exactly as follow up of what you have just said, I am trying to propose to your reflection some industrial sights that, in my opinion, might combine very well with all the relevant pieces of news we have heard during these presentations. I only have five slides, so, please, relax, it’s not dramatic.

(Slide 1) First, I want to give you an economical view of the “market of ideas” regarding pharmaceutical Research. We’re speaking about € 50 billion per year, that means about USD 65 billion at the current exchange rate, so it’s a very huge market. Nobody is in the condition to produce something significant alone. Today the dimension of the knowledge and the speed of the new techniques and the real advantages of crossing the different approaches are giving a complete integration of the system.

And so pharmaceutical industries, in this scenario, keep their fundamental role, but in a different way than in the past they share this role with other parties. If you look at the research model in 20 years, it has changed dramatically because today 80% of research activities funded by the pharmaceutical industries are carried out outside the walls of the industry. And I think this is extremely important.

I think that, as Professor Pecorelli has just said, we need a completely different framework in the regulatory pathway, with a continuous upgrading in the adjustment of the models, and I think that there should be an adequate intellectual property protection. I think that the system currently in place is old and we have to move towards an open source protection system, that has to be very strong by the way.

I don’t want to go towards a weaker protection of the intellectual property, but towards a different one, which could give the possibility to grant more power and integration of the different knowledge.

(Slide 2) This is a provocation, showing the last example of the Italian creativity into Research, that is the Italian Technology Institute.

I’m a member of the Board, so I declare my conflict of interest in speaking on that, but it is a good example. As you know in Italy is almost impossible to select people on the basis of their merits and to have contracts just for a certain period of time. This is an appropriate example showing that nevertheless it is possible.

In this Institute we have been able to take the researchers from 38 different countries and none, including of course the boss, has a contract longer than 5 years. So, this is a good example, among many others, one of which is the Max Planck Institute. We heard from our Minister that we have a good system in Italy, that’s true. It is not very common for Italians to have a World Street Journal titling that Lombardy has one of the best healthcare systems worldwide. And we could also quote the growth of clinical studies between 2003 and 2008: +47%.

(Slide 3) This is another example: how many companies in Italy are currently engaged in biotech and how many projects, 233, are under development at international level. These are real projects.

Of course – as you know– not all these projects will bring to products, but anyway a good number of them – 144 – are in the clinical phase and this is very important. Another example is the cluster of life sciences in Milan.
We tried to put on a piece of paper all the elements of the system in Lombardy, and we tried to measure the interactions and the number of contacts they have. And in this representation you have exactly the feeling that the single element is not important, because we have not single elements as such.

To demonstrate this is the real focus. In fact there are most elements that demonstrate that Italy and Lombardy today are competitive in some areas, like cancer, for example. This weekend we had the ESMO meeting with more than 15,000 attendees, 80% coming from abroad, so that’s really a big number.

(Slide 4) Another demonstration, going quickly to the end, is the vocation of our country. This is the percentage of the scientific publications regarding rare diseases, and you see that in Italy these are 10.4% of total in Life Sciences, that is the highest percentage among Advanced Economies. We have 31 orphan drug designations both in Europe and US, and that’s a very big number for a nation like Italy.

Recently, Sigma Tau, that is an Italian company, acquired the US company Enzon. Enzon is dedicating a lot of its efforts towards rare disease conditions.

(Slide 5) Last but not least, what is the vision today?

The vision today has to capitalize on the good quality and the economical equilibrium of our system. Where? Only in the good areas like Lombardy, but we also have Lazio, Tuscany, we have Piedmont. We have six or seven Regions that can offer good quality in healthcare.

Most of these Regions have good Research centers and industries. We have another example of charities; we have Telethon for example, AIRC, regarding cancer. These Institutions have given a substantial contribution to the improvement of the Italian quality of approach and I think we don’t have to look at the single agent, but we need a more comprehensive vision where one plus one, instead of making two, has to produce an added value to make three.

For example, by fiscal deduction. Or where there are private contributions, it doesn’t matter if they come from companies or from privates or charities, to the public institutions involved into important Research for diseases.

I think that we have some other elements and I close with one which does not belong to pharmaceutical industry but it is one of its most important upstream industries. We have a sector in Italy, very strictly connected to the micromechanics (especially in the neighborhood of Bologna), a high quality and competitive one, whose average export rate is 90%, as demonstrated by facts. I think this is a good example of a good combination between different technologies and different opportunities.

If you have a good healthcare system, you can cure people and even, improve knowledge and create a good economical environment.

If you look at the different systems you will see that in the capacity of giving a good healthcare to the citizens, probably Europe is one of the areas in the world with the best balance between costs and delivery to the patients.

I think that this is another contribution to complete the picture of this interesting day.

Thank you very much.
Healthy aging globally: a life cycle approach

Health policy to promote healthy aging

Sergio Dompé
Farindustria President

Washington, 12 October 2010

An “international market of ideas” worth over €50 billion per year

Source of pharmaceutical innovation deemed most efficient

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<th>Internal R&amp;D</th>
<th>Outsourcing and biotech company acquisition</th>
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<tr>
<td>20%</td>
<td>80%</td>
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Value of clinical studies (% on total R&D investments)

At international level every year more than €50 billion investments in pharmaceutical R&D are made outside pharmaceutical companies. This value doubles every 10 years, reflecting the process of open innovation. In order to be competitive a company must be leader in a specific phase or area of skill and capable to implement it in a network. Italy has the capacity to grow in this market.
This reality has a high growth potential. Max Planck Institute is a good example at international level:

- revenues of € 1.8 billions
- 14,000 employees, over 5,000 researchers
- 75 patents valued at about 15 million per year
- 58 start-ups created from 1999 to 2008

Lombardy has recently been cited by the Wall Street Journal among the cases of international health excellence:

Growth in clinical studies between 2003 and 2008 in Italy

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<tr>
<th></th>
<th>Total</th>
<th>Phase I and II</th>
<th>Phase III</th>
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<tbody>
<tr>
<td>Total</td>
<td>+47%</td>
<td>+69%</td>
<td>+23%</td>
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The R&D pharmaceutical revolution: network’s value is growing

<table>
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<tr>
<th>Phase</th>
<th>R&amp;D biotech</th>
<th>Pharmaceutical companies</th>
<th>TOTAL</th>
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<tr>
<td>Predclinical and phase 1</td>
<td>96</td>
<td>29</td>
<td>125</td>
</tr>
<tr>
<td>Phase 2</td>
<td>24</td>
<td>38</td>
<td>62</td>
</tr>
<tr>
<td>Phase 3</td>
<td>10</td>
<td>36</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
<td>103</td>
<td>233</td>
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69 discovery projects to be added to this total

In Italy:

- Over 200 pharmaceutical companies
- 197 Red biotech companies
- Pharmaceutical and “pure” biotech companies account for 8,000 R&D employees

Biotech R&D is concentrated in the early phases, fuelling the innovation of pharmaceutical companies, which play a prevalent role in clinical development.

The Cluster of Life Sciences in Milan

(///The limits represent researchers, companies, institutions that cooperate in R&D activities///)

Source: CERPI, Ernst&Young-Assobiotec, Farmindustria
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

The results of the innovation network: two areas of R&D excellence in Italy

Specialisation index for publications on rare diseases (% of total 2000-2008 Life Sciences)

- ITA: 10.4
- JAP: 9.0
- FRA: 8.6
- GER: 8.3
- USA: 7.3
- UK: 5.8

15 Companies operating in Italy have at least one orphan drug designation, for a total of 31 products.

Recently Sigma Tau acquired (US $300 million) the US company Enzon, listed on NASDAQ and specialised in rare diseases in oncology.

Institutions, companies, R&D centres: a virtuous model to be sustained by a shared strategy

Italy offers some competitive advantages that rank it among the leading countries in the world in terms of NHS quality/cost, research excellence and industrial presence.

- Quality of skills and Human Resources (researchers, managers, technical staff) mentioned as the main factors of attraction by foreign companies
- 5th pharmaceutical industry worldwide by number of employees (after USA, Japan, Germany and France)
- Excellence in upstream sectors, exporting up to 90% of sales
- Institutions with increasingly research-oriented managements

However to improve health-care policies, systemic choices are needed in order to access innovation, if the disparities with other Countries and inter-regional differences are to be overcome.
2010 GLOBAL HEALTH FORUM
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Panel 4: Health Policies to Promote Healthy Aging Globally

Dr. Dalmer Hoskins
Director, Division of Program Studies, U.S. Social Security Administration; Former Secretary General of the International Social Security Association

Demography as destiny: unmet needs
I am rather compelled to bring up a subject I think needs closer attention in our discussion. I am referring to long-term care. A number of speakers have mentioned that our goal is to keep people living longer, healthier and more active lives. There is however frailty among the aging population, particularly in the 85+ age category, plus there are disabled persons at any given age of the population.

The team that I head up at the Social Security Administration looks at social policy abroad and one of the areas that has the starkest variation in national approaches is long-term care. If you were to figure out how countries have arrived at such different long-term care policies, you would have quite a challenge even within the relatively small circle of the EU member states.

Some countries such as Germany, Austria and Luxembourg have opted for a 6th pillar of social insurance and have adopted a mandatory social insurance program covering all dependent persons. Other countries, such as France and Italy, have opted for a system of shared responsibility, that is a division of responsibility between the health care sector and the local authorities responsible for the delivery of social services. Whatever the approach many countries are aware that long-term care is often being inappropriately and very expensively provided in hospitals and other medical institutions rather than at home or in community-based situations.

The US has been struggling with this issue for some decades. The AARP represented here today by Jessica Frank carried out a survey a few years ago among its members and found that a majority thought that the Medicare program (which ensures the 65+ population for medical care) covered long term care benefits which is of course absolutely erroneous. Such surveys demonstrate that we have a big problem since many people don’t know what they will be entitled to with respect to publicly provided benefits when they reach older ages and need home or institutional care.

Our Medicaid program (not Medicare which is a social insurance program) was established for poor people to have access to health care but it has inadvertently become the social safety net for long term care. Medicaid is financed from taxes rather than worker or employer contributions.

A health minister from France once said to me, our problem is not with the rich people nor the poor people; our problem is the vast majority of the population who have to meet an asset or means test in order to be eligible for long-term care services. This is in some ways a failure of public policy since middle-class citizens who have done all of the right things in life by working, earning a pension and acquiring a house and other assets are obliged to divest themselves of these assets or to spend down their savings in order to be eligible for Medicaid’s long-term care benefits. This surely was not the intent of the legislators when they introduced Medicaid many years ago to ensure that the poor would have access to needed health care.
Now the reason I’m compelled to bring this up is because we have new legislation in the US. It’s called the Class Act. How many of you in this room have heard of the Class Act? A few.

I recently spoke to a group of social security specialists of the US and asked what the Class Act is. Some thought it had to do with higher education, some a new ethical standard for elected officials. But the Class Act stands for Community Living Assistance Services and Support. It’s not in force yet and it will not be until 2012 but it’s an important social innovation for the United States. Since it is such a an important social experiment, we will need to have all the cross-national support and cooperation to find out what works best in providing services to a growing population of older people who are going to be living much longer, many of whom may experience disabling diseases or dementia as they reach very advanced years.

The Class program will be a voluntary program, unlike the German or Austrian systems. It will be based on automatic enrolment and the contributor must opt out if they do not wish to participate.

The employers will be required by law to deduct contributions from the worker’s paycheck, but since the individual can opt out, it will be a nationwide experiment that is unprecedented in our history of social protection.

There are other important questions such as what will be the reactions of the private insurance companies that currently offer long-term care insurance products. Very few persons in the US, less than 8%, currently have a long-term care insurance policy. Moreover, these private insurance plans are often very limited in the amount or duration of the benefits they provide.

Also, we don’t know what employers will do, if they will play the game, if they will contribute to the experiment by including long-care insurance financing in their employee health insurance plans. We don’t know how individuals will react; if they will understand this new program, if they will readily contribute to it or rather see it as a new and unfair tax.

There are therefore many critical questions about the implementation of the Class Act and the future of our national long-term care policy. Clearly the government and all concerned organizations have a big job to do, to educate the public about this new law which represents one of the biggest changes being introduced in the American health care system. Given the scope of our new health care reform legislation, perhaps it is not surprising that this particular innovation has not yet received the attention that I think it deserves. It has not yet been realized by most Americans that the United States will be joining the relatively small group of countries that provide some form of public insurance for long-term care.

I think that this issue of appropriate, cost-effective and integrated care for people who are becoming dependent is too important not to succeed and for that to occur, we need to encourage all of the debate and the research about what succeeds in meeting this critical social need. So the next time you hear about the Class Act, I trust that our national dialogue will be much further along to finding appropriate solutions.

Thanks.
Panel 4: Health Policies to Promote Healthy Aging Globally

Sharon Hrynkhow
Ph.D., Senior Advisor to the Assistant Secretary, Bureau of Oceans and International Environmental and Scientific Affairs, U.S. Department of State

*Global health in a foreign policy context*
Thank you, Mr. Ambassador and Dr. Blumenthal for organizing and hosting such a wonderful event. Scientifically it was a feast and the policy discussions I know are very rich and will lead us to action. I am delighted to be here for the Department of State, thank you. I am going to be very brief with my comments today.

What I want to do is put our conversation into an even broader global context. We heard from our colleagues at PAHO about the Latin American experience. I would like to say a little bit about global health and put this into context with global aging.

We heard this morning about the global burden of disease, and how the global burden of disease will shift from the infectious disease proportion to more of the chronic disease proportion. We heard about data from Chris Murray and Alan Lopez which bears out this global shift toward chronic disease. Where will that burden be felt most acutely? In countries with the weakest health care infrastructures. As we have learned from working globally on infectious diseases, such as AIDS, TB and malaria, we know that countries with weak health care systems are not well positioned to tackle urgent challenges. And so as we look out to 2020 and think about chronic disease we start to think more acutely of the needs of the developing countries.

And so that is what I want to spend some more time on this afternoon. This came home to me very clearly a few years ago when I was serving as deputy director at the Fogarty international center of NIH. We received many visitors from many countries at Fogarty. One visitor came to us, the Dean of the University of Mali, and we fully expected that he would want to talk about our support for infectious disease programs. NIH had significant programs of support for malaria in Mali. We were stunned when he asked us for help with research on dementia and Alzheimer’s disease. This was a surprise for us because we appreciated well the burden of acute infections, and the impact of infectious disease on life expectancy and quality of life. Of course, he was thinking 20 years down the line, and he recognized that even in a poor country like Mali, in the not too distant future, he’d be worrying about how to treat patients with Alzheimer’s disease.

And so this image has stuck with me. Now we fast forward. Today, working at the State Department, we work to advance the goals of good governance, economic stability, conservation of natural resources, equality. We recognize that global health is very much part of what we need to be thinking about to meet those broader objectives. And, as we think of chronic disease, and as we have seen already during the course of our sessions today, the economic impacts are great, and will be greater as the burden grows.

So my message to you is that we should work through partnerships with developing countries in order to support the research needed on the ground and to build capacity in order to meet the healthy aging and chronic disease agendas.

Now knowing that I would be among the last of the speakers today, I wanted to come up with a way to capture for you an image of how we can crystallize some key principles. Since we are at the Italian Embassy, I thought it would be fitting to talk a little bit about Dr. Rita Levi-Montalcini as a premier example and whose life work embodies some key principles. For those of you who do not know of her, Dr. Levi-Montalcini, an Italian medical doctor and scientist, received the Nobel prize in Medicine in 1986 for her landmark work on the discovery of nerve growth factor. As a
neuroscientist, I can tell you that her discovery had an astounding impact on the way that we started to understand the precision with which the nervous system develops. She excited a generation of researchers and continues to inspire today. She is 101 years old, herself a picture of healthy aging, and she is a fabulous scientist. For our purpose today, we should also recognize that she is a great internationalist.

She conducted her studies at Washington University, where she spent some 30 years. And together with Stanley Cohen, she shared the Nobel Prize for her work. She returned to Italy and continued to collaborate with her American colleagues. So again, from a foreign policy perspective, we like these stories of international collaboration that span decades and that are rooted in good science.

But she did something else when she returned home; she and her twin sister Paola created a foundation to support women and girls in poor countries with their education, including in the sciences. So, she moved from being a scientist to being a philanthropist, and she really understands capacity building as a broader part of her agenda.

But then lastly she has used her political voice to speak about the rights of women, recognizing that if we are going to pursue good solid science globally, which is our intent today, then we have to be able to recognize every voice and every good idea. So she’s moved from a scientist to a philanthropist, understanding capacity building, to a political activist who is teaching us all something about women’s rights. So I chose her because she supports science; she understands partnerships and intellectual international collaboration; capacity building; she puts scientific discourse in a broader perspective which we need; and she has a rights-based approach.

As we move forward at the State Department on global health, all of these principles so well exemplified by Dr. Levi-Montalcini’s contributions are important. President Obama’s Global Health Initiative -- which I will not discuss for lack of time -- includes these principles in its operations.

I am going to close with a forward look, and since this is a policy forum, I am going to mention a policy event which is coming on up: the U. N. Commission on the Status of Women. This is fitting to mention given my focus on Dr. Rita Levi-Montalcini, and her efforts toward equity for women in science.

As we think of ways in which we might advance science we have to be reminded that in many parts of the world women are underrepresented in the top levels of science and that girls do not have access to science education.

As Secretary Clinton likes to remind us, “Talent is universal. Opportunity is not.” So we are delighted that the Commission on the Status of Women, of which both the United States and Italy are members, will focus its 2011 meeting on women in science and girls’ access to science education. We think that this is a terrific opportunity to highlight the needs of women in science and for girls to have increased access and opportunity in science education. We also see this as an important platform to discuss use of science and technology in order to address local challenges and needs. This would fit with our discussion today of the growing burden of chronic disease, including in developing nations.

So with that let me stop here, and thank you for your kind attention.
Panel 4: Health Policies to Promote Healthy Aging Globally

Prof. Massimo Fini,
Scientific Director IRCCS (Italian Scientific Institute Conducting Clinical and Biomedical Research), San Raffaele Pisana, Roma

Making Healthy Policies for Active Aging
The former UN Secretary General U Thant stated back in 1964 that “it was already too late to plan for the future”, referring to the essential need of world governments to consider the impact of the aging population on health and social security in their policy planning for the following decades.

As it appears today this predictive statement, unfortunately, has been underestimated.
In Italy the proportion of the elderly has been rising steadily with a consequent dramatic increase in life expectancy.

The main determinants of the increasing elderly population are:

- reduction in infant and adult mortality
- reduction of fertility
- increase in longevity.
Moreover, good quality of life has always guaranteed longevity. As demonstrated in this slide, the median age of popes, apparently a privileged category, has remained the same during last centuries.
Recent ISTAT data in Italy reveal that there are 2 million eight hundred thousand people over 6 years of age with disabilities, representing 5 percent of the Italian population, of whom more than 200,000 are institutionalized.
Women live longer than men and therefore constitute the majority of older persons. The over 80-ies are the demographic which is increasing more rapidly in the developed countries, and it must be stressed that 50% of people with disabilities are over 80. Therefore, it is expected that the number of people among those aged 80 years or over, with disabilities will increase in the near future, with a significant economic impact.
Health outputs evaluation based on cost-benefit analysis

Table 1: Cost per Quality-Adjusted Life Year (QALY) Gained from Selected Clinical Strategies.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cost (2008 U.S. dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch to an aromatase inhibitor for early-stage breast cancer vs. continued tamoxifen</td>
<td>$12,000</td>
</tr>
<tr>
<td>Implant a left ventricular assist device (primary prevention) vs. continued medical management</td>
<td>$11,400 to $17,000</td>
</tr>
<tr>
<td>Perhaps fusion surgery for degenerative spine problems with some cancers vs. continued care management</td>
<td>$100,000</td>
</tr>
<tr>
<td>Prescribe treatment for metastatic breast cancer vs. standard chemotherapy</td>
<td>$150,000</td>
</tr>
<tr>
<td>Prescribe erlotinib for advanced pancreatic cancer vs. gemcitabine alone</td>
<td>$170,000 to $190,000</td>
</tr>
<tr>
<td>Perform bilateral computer tomographic screening for lung cancer in a 5-year old former heavy smoker vs. no screening</td>
<td>$210,000</td>
</tr>
</tbody>
</table>

* Values are given in 2008 U.S. dollars, with adjustment for inflation according to the Consumer Price Index. Numbers are the ratios of the added cost per person to the gain in QALYs per person.


Numbers in health care and rehabilitation

<table>
<thead>
<tr>
<th>Service</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>2,609,000</td>
</tr>
<tr>
<td>People in social-health care facilities</td>
<td>&gt; 200,000</td>
</tr>
<tr>
<td>Total number of hospital stays (2008)</td>
<td>12,128,678</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>364,391</td>
</tr>
<tr>
<td>Ordinary hospital stay</td>
<td>294,644</td>
</tr>
<tr>
<td>Day Hospital</td>
<td>64,747</td>
</tr>
</tbody>
</table>
Recent pension reforms in Italy suggest that in the coming decades the expenses of the social security area will not substantially change as a percentage of the gross domestic product. On the contrary, health expenditure is expected to significantly increase, more than two points of GDP over the next 50 years.

This increase is largely due to the area of long term care (home care, institutional care and cash benefits).
This situation will be sustainable in Italy and other Western countries only if a policy of active aging, as determined by the WHO, will be promoted on a scientific, cultural and practical level. Active aging means realizing individuals potential for physical, social, and mental well-being throughout the life course and participating in society allowing for independent living and a life free of disability.
The policy framework for active aging is represented and indicated by the World Health Organization.

The cultural level and sex are independent transversal factors which are influenced by several economic factors such as personal income and the average country income; furthermore, environmental, living, social, behavioral related to lifestyle factors, genetics, and the presence of adequate social and health care services able to promote a correct health policy.
These elements are strictly correlated and need to be addressed in a global and synergistic way in order to maintain equity and sustainability in health and social policy. In Italy, especially during the last two years, a series of initiatives has been activated completely in agreement with these principles. Some of these initiatives are:

- a three-year prevention plan (2010-2012) with a person-centered approach, including initiatives for the promotion of active aging. Specific attention is given to the development and strengthening of tertiary prevention with the creation of paths that ensure continuity of care, integration of health services and integration between health and social services. The proper application of prevention programs addressed to the healthy population, to those at risk and to people with specific disease represent an effective response to emerging health issues.

- a national rehabilitation plan, based on the WHO biopsychosocial model, and considering the needs of the most vulnerable population groups, primarily the elderly, defines the guidelines for prevention, disability management and health promotion.
- the creation of various dedicated and personalized pathways for the most elderly people, allowing proper management of frail people in specific circumstances such as the difficult transition between home-hospital and hospital-home. The hospital centered approach must change towards a patient oriented, or even more appropriately, to the person centered health approach. The hospital must be integrated in a health care service network as one of the counterparts of the patients’ effective demands and needs. The organization of health care services within the community is the only guarantee for the actual continuation of health care support, quantity and quality of life. Service must be tailor-made and delivered at the point of care established and needed. Therefore, with the dramatic increase of the elderly population, the challenge of health systems will be to rethink the health care system at a scientific level and reorganize at a practical level.

In Italy, a first step has been made to activate the reorganization of the health system with the Health Contract (Patto per la Salute) in December 2009.

The Health Contract determines that the number of hospital beds may not be superior to 4 per 1.000 habitants, including 0.7 beds per 1.000 habitants dedicated to rehabilitation and post-acute long term care. The reduction of beds in hospitals is to promote the switch from ordinary hospital stay to day hospital regimen and from day hospital to ambulatory regimen and to further residential and home care.

Further developments:
Technological advances enhance new procedures, diagnostic methods and treatments. Clinical developments, less invasive surgical techniques, advances in reproductive technology, and gene therapy for cancer treatment, continue to increase the longevity and improve the quality of life. Advances in medical technology also have improved the survival rates of trauma victims and the severely ill, who need extensive care from therapists and social workers as well as other support personnel. Moreover, advances in information technology have a perceived improvement on patient care and worker efficiency. Devices such as hand-held computers are used record a patient’s medical history. Information on vital signs and orders for tests are transferred electronically to a main database, eliminating the need for paper and reducing recordkeeping errors. Adoption of electronic health records is still low presently.

Cost effectiveness also is improved with the increased use of integrated delivery systems, which combine two or more segments of the industry to increase efficiency through the streamlining of functions, primarily financial and managerial. These changes will continue to reshape the manner in which healthcare is provided.
CONCLUDING REMARKS
Concluding Remarks

Rear Admiral Susan J. Blumenthal
MD, MPA
The poet Robert Browning once wrote, “grow old along with me / the best is yet to be.”

Today’s conference has provided a roadmap and call to action for achieving a long and healthy life, revealing some of the secrets of how our genes, behavior and the environment interact to promote healthy aging or make us more vulnerable to disease. The meeting also underscored the range of interventions and multiple sectors required—a health in all policies approach—to promote healthy aging across nations.

Researchers from Italy and the United States revealed an exciting future ahead with the promise of new discoveries from the science of longevity—with regenerative medicine including stem cell research, nanotechnology, and the discovery of substances and medications that may thwart the aging process.

But we also learned today that some of the secrets of longevity are more mysterious than others. While we are still unraveling the mysteries of our genes and molecular approaches to avert the aging process, an important message of this conference has been that the fountain of youth is in part found in our own hands—smoking, obesity, poor nutrition, lack of physical activity, excess alcohol use, and unsafe sexual behavior—are linked to at least 50% of deaths and disability worldwide.

That means there is a poetry of common sense to a recipe for healthy aging…don’t smoke, maintain a healthy weight, eat smart, be physically and mentally active, ensure sufficient income as well as enjoy strong connections to friends and family.

Louis Pasteur once said, “chance favors the prepared mind.” What then must every nation prepare for?

We must stem the chronic disease tsunami in every country (which will experience the double jeopardy of both infectious and chronic diseases) with the power of prevention and by investing in education, providing occupational and economic opportunities, and developing evidenced based public policies that will promote a healthier future.

We must also work together to prevent age and gender discrimination and address the poverty experienced by a significant proportion of seniors.

And we must transform health systems from being “sick care” systems to real health care systems by putting prevention into practice because today only 3-5% of our nation’s health budgets are spent on prevention while 75% of health care costs are linked to preventable factors. This must change.

Furthermore, the current information revolution with new media is connecting people to knowledge about their health like never before. Yet, while we can get our checking balances and cash with an ATM card anywhere in the world, the health system is one of the last sectors to change with only a small percentage of doctors and hospitals effectively using it in their practices today.

That’s why another message of this meeting has been that in the 21st century, we must build a health information infrastructure like was done in the US in the 1950’s for the National Interstate Highway System. This will help ensure more effective, efficient systems where the 15 year science to service gap that currently exists in medicine is
replaced with information in health care providers, scientists, and consumers hands to improve health in the blink of an eye! This is critical for the productivity and national security of our nations.

Another key message of this forum: research is medicine’s field of dreams and is producing many revolutionary advances about aging everyday. But research just doesn’t happen. It requires sustained investments in science and the career development of researchers at the U.S. National Institutes of Health, the Italian Institutes of Heath, and other research organizations around the world.

And in this each one of us has an important role to play…being advocates for increased investments in science to promote healthy aging and to fight international enemies like heart disease, cancer, diabetes, arthritis, aids, and alzheimers.

The last message of this meeting that I want to highlight is the importance of collaboration. The hallmark of 21st century science is multidisciplinary work and solutions require a health in all policies approach. This extends to cooperation and partnerships across countries to create effective, evidenced based policies for 21st health systems that address the needs of our seniors—the people to whom we owe so much for building the strong foundations of our societies—and who at some point in the future will be ourselves!

And that’s what this Italian-US collaborative conference on aging has been all about. You see, health diplomacy—the quest for better health—crosses cultures, politics, and languages. It is a common currency for building understanding and for cooperation across nations. And it is this common quest to promote healthy aging that mobilizes us to continue our work together to do more.

A special note of gratitude—mille grazie—to Minister Fazio and the extraordinary Ambassador from Italy to the United States, Giulio Terzi, for his leadership and vision in convening this forum as well as for the treasured friendship and strong bonds between our countries. My appreciation to the distinguished health experts from Italy and the United States who participated in today’s meeting; to Dr. Richard Hodes, Director of the National Institute of Aging at NIH for his outstanding leadership and his contributions to the organization of this conference; and my appreciation to the wonderful people who work at the Embassy of Italy including Professor Alberto Devoto for his important work and service and the dedicated Donatella Verrone.

Let me close then with an ancient proverb that says, he—let’s also make that she—who has health has hope, and she who has hope has everything— that’s what this conference and the work of everyone here today is all about: providing hope for a healthier and more prosperous future for people in the United States, Italy, and around the globe—in a world where the best is yet to be.
Concluding Remarks

H.E. Giulio Terzi
Ambassador of Italy to the United States
Thank you very much again. I don’t want to spoil a wonderful eloquent conclusion of this conference with additional words. I only would like to underline how important it has been in terms of substance and discussion. A logic path has been followed from the beginning. We have started by talking about biology, then about the problem of aging, technologies and health policies, under the guidance of, and in close cooperation with, Rear Admiral Susan Blumenthal. We owe a lot to her and to the very distinguished personalities who participated in this last panel as well as in the previous ones.

I would like to underline the importance of networking and cooperating at the international level. This is indeed an example of health diplomacy. It is something that we have to continue to pursue, not only because it opens up incredible opportunities for bilateral relations, but also as a common endeavor in the multilateral fora. Minister Fazio was very glad to be able to sign an important bilateral Memorandum of Understanding today, in order to make further progress in this area of cooperation. He’s also interested in promoting, from the governmental point of view, cooperation among scientists.

There are examples in the United States of scientific networks which combine and put together personalities from the world of medicine, the world of physics and the different branches of science. The person who has initiated ISSNAF, Giorgio Einaudi, is here with us today. A meeting of scientists has been convened by Minister Fazio in Cernobbio on the 8th and 9th of November. These are examples of a process which we are trying to reinvigorate and to keep alive in the interest of our countries and our people.

I would like to thank you all very much for having participated, listened with so much attention and taken part in this discussion.

H.E. Giulio Terzi
Ambassador of Italy to the United States
APPENDIX
Appendix

The Italian Medicines Agency (AIFA)
The Italian Medicines Agency (AIFA) is a public authority with legal status, established by Law n. 326/2003, operating autonomously, transparently and according to cost-effectiveness criteria, under the direction of the Ministry of Health and under the vigilance of the Ministry of Health and the Ministry of Economy. The Agency also supports the Italian Government as high scientific and technical advisor on drug policy.

Responsible for all the activities related to the drugs regulation, from registration, to the check of production sites and manufacturing quality, from the verification of drug safety, to pricing and reimbursement, AIFA supports the activities of Health Technology Assessment and ensures the unity of the pharmaceutical system. It also provides drug expenditure governance in order to maintain the pharmaceutical expenditure in balance with the cost cap annually established by the Government.

The Organization pays attention to strengthen the International Relationships. In this way, after the signing of the AIFA-FDA Confidentiality Agreement, in December 2009, in order to allow confidential information exchange in the field of drugs safety and quality, AIFA has been promoting meetings with FDA representatives, aiming at developing of a fruitful dialogue in order to design a global network that ensures the quality of medicines and active principles, in an inspection context, which has become global.

Another field of strategic importance for the Agency is the promotion of profit and non-profit biomedical and clinical research. Prof. Sergio Pecorelli, the President of AIFA, during the opening of the First National Conference on Health Research, which was held in Cernobbio on last 8 November, stressed the importance of the presence of science in the regulatory system and the convergence of public and private research in an effective partnership to ensure the fastest crossing of the innovations from the laboratory to the patient.

Another area of interest for AIFA is the innovation. In this context, the creation of shared rules and principles has been considered fundamental for the proper definition of the therapeutic innovation, that does not lie in the technological or commercial value but in the therapeutic one, in the continuous and delicate relationship between cost and efficacy. The traditional models based on the blockbuster drug and the Evidence Based Medicine have been overtaken by the molecular and personalized medicine. Therefore it
is necessary to redefine the clinical trials and endpoints, with the cooperation of all stakeholders, doctors and companies included.

In addition to ensuring the unity of pharmaceutical assistance throughout the country, the Agency is also focusing its attention on the most vulnerable population groups, such as the elderly.

The Italian population is currently one of the longest-lived people in the world and the prevalence of use of medicines reimbursed by the National Health Service shows that in older populations, the 100% of patients took at least one drug during a year.

This is confirmed by the new national report about the consumption of antibiotics, that has shown that the 50% of the elderly receive at least one antibiotic prescription during the year and 15 out of 100 more than 6.

The Agency's activities are many in this field and they analyze all the different and important issues related to a part of the population that presents problems related to the presence of polypathology. For this purpose, AIFA, in addition to many working groups (paediatric, ophthalmology, oncology table, etc), also established a group specifically dedicated to the elderly population "Geriatric Working Group" which study the drugs utilization characteristics in the elderly population in close cooperation with the Technical and Scientific Commission.

The Italian Medicines Agency is also involved in all activities that are ongoing at European level between EMA and the European Commission in order to optimize the authorization process also for pricing and reimbursement. The Italian National Health Service is one of the most "generous" among those European, because it minimizes the expenditure of patients for drugs.
2010 GLOBAL HEALTH FORUM
HEALTHY AGING GLOBALLY: A LIFE CYCLE APPROACH

Appendix

Farmindustria
Comprising over 200 national and foreign-owned companies operating in Italy, Farmindustria - the association of pharmaceutical companies and member of Confindustria - was founded in May 1978.

Employing 67,500 highly qualified workers, the pharmaceutical industry plays a leading role in the international pharmaceutical scenario. In 2009, Italian pharmaceutical production was valued at € 22.6 billion, with exports (a 200% growth from 1996 to today) accounting for 54% of all sales.

With 6,150 researchers (of whom more than half are women) and investments for € 1,220 million, Italy is buttressing its pharmaceutical research commitment, as demonstrated by over 230 Italian biotechnological pharmaceutical development projects at the preclinical and clinical phase, achieved through cooperation between public and private centers of excellence.

The member companies of Farmindustria have adopted a Code of Professional Conduct - today one of the most rigorous in Europe - to regulate not only the relations between companies but also relations with the scientific and medical community.

For purposes of the association’s governance, the new Articles of Association attach particular importance to the research effort and investments of its single members, thereby recognizing the Italian nature of their activities, regardless of whoever may detain their share capital.

Nor has its commitment to rare diseases flagged. In recent years Farmindustria has promoted initiatives to heighten the awareness of this question, such as Rare Diseases Day, a guide to Italian Associations for Rare Diseases, and training courses entitled "Knowledge for Caring" in cooperation with scientific societies and medical federations to "train the trainers", and renewed the memorandum of understanding with the Telethon Foundation (2009) to encourage research on these pathologies.
In the international scenario, Farmindustria is a member of the European (EFPIA) and world federations (FIIM-IFPMA).

In order to correctly inform the public of the importance of research and the work of pharmaceutical companies, which is one of Farmindustria's key objectives, special communications have been undertaken with campaigns in schools and the press, and the deployment of the site www.farmaci-e-vita.it.

“Research is life” and more than 90% of research is carried out by pharmaceutical companies.

A SECTOR AT THE CENTRE OF THE KNOWLEDGE ECONOMY

Since 1951 Italians have gained a month of life for every four lived. Like in all advanced economies, pharmaceutical research is credited with 40% of this success.

Italy offers some competitive advantages that rank it among the leading countries in the world in terms on NHS quality/cost, research excellence and industrial presence: quality of skills and the Human Resources (researchers, managers, technical staff) mentioned as the main factors of attraction by foreign companies; 5th pharmaceutical industry worldwide by numbers of employees (after USA, Japan, Germany and France); excellence in upstream sectors, exporting up to 90% of sales; Institutions with increasingly research-oriented managements.

Key statistics of the pharmaceutical industry in Italy in 2009:

- € 2.3 billion invested in manufacturing (€ 1.1 billion) and R&D (€ 1.2 billion)
- € 4.1 billion in directly-generated taxes and social security costs
- the pharmaceutical industry generates 4.4% of total manufacturing export (1.3% in 1991 and 3.4% in 2001)
- pharmaceuticals account for 43% of Italian science-based exports
- around 40 acquisitions abroad by Italian operators since 1999 (more than 200 industrial facilities)
- the pharmaceutical industry is the leading sector in Italy in terms of R&D intensity (it accounts for 1.5% of employment and 12.4% of R&D investment as compared to manufacturing)
In the European Union Italy ranks:

- 2nd for number of companies
- 3rd for number of employees
- 4th for investments
- 1st for the presence of SMEs

A network of research increasingly focused and integrated

Increased research costs, more complex R&D projects and new scientific discoveries lead to higher specialization and division of innovative work.

The drive to excellence in specific areas encourages the interdisciplinary nature of Research, multiplying opportunities and changing R&D structure of Big Companies into more flexible and specialized units. Increasing Research hunting, by identifying innovative ideas to develop thanks to the know-how of Big Companies.

In the new Research model, new technologies offer the opportunity to do cutting-edge science while drawing from pharmaceutical companies the skills, know how and resources to make innovative therapeutic tools available.

Until recently critical mass was indispensable, today the competitiveness of the network, and no longer size alone, is decisive.

Clinical trials are vital for industrial growth, because – especially in the translational model – excellence in clinical practice can create a decisive competitive edge by transferring R&D results more effectively from the laboratory to therapy and to manufacturing.

Since the clinical phase can generate a competitive advantage, it should be encouraged with incentives (e.g. R&D tax credits), so strengthening cooperation between public and private research (NHS, University, Industry).

Growth in clinical trials between 2000 and 2008 in Italy:

- total +51%
- phases I and II + 123%. 
A market of open innovation ideas requiring improved tools to promote competitiveness - through larger investments, clearer legislation, less red tape, effective protection of intellectual property - and a new approach. Efforts must be directed towards building a framework of open source protection in order for the latest discoveries to unleash their full potential across a wider range of applications and share the development of products that could benefit other areas too.

The evolution of pharmaceutical research also involves therapies, increasingly targeted and tailored to individual needs. The biotech industry - the technology or meta-market platform - can play a key role in this field.

Biotech is in fact the new “gasoline” of the pharmaceutical industry in Italy, exploiting the Country’s competitive advantages (Human Resources, industrial skills, clinical excellence, auxiliary industries…). Biotech R&D is concentrated in the early phases, fuelling the innovation of pharmaceutical companies, which play a prevalent role in clinical development.

Biotech in Italy:

- 197 red biotech companies
- Pharmaceutical and “pure” biotech companies account for 8,000 R&D employees
- 233 products under development.

Biotech provides solutions in terms of targeted therapy and rare diseases and, looking ahead, also for widespread pathologies that run the risk of becoming “orphans” of new medicinal products (for example, cardiovascular pathologies)

At international level every year more than € 50 billion investments in pharmaceutical R&D are made outside pharmaceutical companies.

This value doubles every 10 years, reflecting the process of open innovation. In order to be competitive, a company must be leader in a specific phase or area of skill and capable to implement it in a network. Italy has the capacity to grow in this market.

Italy has the highest rate of publications on rare diseases out of the total of Life Sciences (10.4% from 2000 to 2008) versus Japan (9%), France (8.6%) and Germany (8.3%). Fifteen companies operating in Italy have at least one orphan drug designation, for a total of 31 products.
The increasing number of older people in societies can be viewed as a success story for public health policies and for socioeconomic development maximizing health and functional capacity of older citizens as well as their social participation and security. It also challenges countries and their governments to shape sustainable health care systems that address the needs of seniors and the dramatic costs that accompany the rise in chronic diseases.

This is why an emphasis on healthy aging is urgently needed to prevent disease, decrease costs associated with chronic diseases, and promote healthy years of life.

Longevity as a critical emerging global health issue must be addressed from scientific, behavioral, environmental and political perspectives. Promoting healthy aging requires both personal and social responsibility, mobilizing all sectors of society to prepare for this demographic reality.

Sharing the experiences of Italy and the United States provides a useful framework for further action.