



# CI: Improving the Beginning of Human Life

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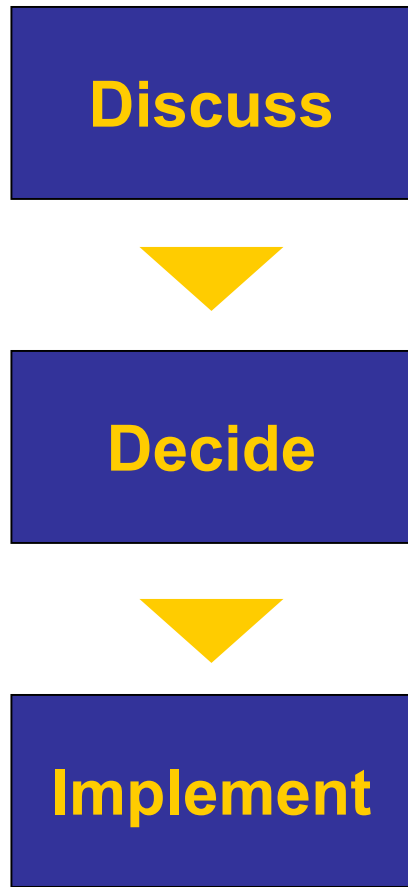
# Improving the Beginning of Human Life

If you were in charge of a low income country,  
how much of your budget would you spend on:

*The Supply of Clean Water*  
*Nutrition*  
*Vaccines*  
*Genetics Services*  
*etc.....*

How do you prioritise ?  
How do you make trade-offs ?

# Key Challenges & Overall Themes ..



- What are our objectives?
- How do we prioritise?
- How do we get organised?
- Do we need to change existing paradigms or improve the current model?
- What is the balance between global standards and regional / local requirements (needs, cultures etc)?
- What collaborations are required?
- What funds are required and how to access them ?
- How do we promote the most appropriate dialogue with the broader community?

# C1: State of the Art

## Key Themes

- Advances in genetic medicine
- Diagnosis-impact of technological advances on the individual
- Government policy vs. The right to individual choice
- Polarised access to technology does not reflect actual need
- The cultural, moral and ethical dilemma

## Areas of Consensus

- In the short-term, designing a baby will remain a myth
- Knowledge of the genetics of disease will evolve as a key element of clinical care
- Scientific advances should result in a shift towards disease prediction, prevention and earlier intervention vs current practice
- The evolution of genetic medicine will never be straightforward and will always be accompanied by media hype and therefore requires appropriate public education, communication and debate
- Technology can be 'misused' through the conflict between access to this technology and the culture into which it is introduced e.g. female infanticide
- Any solution to this 'misuse' must encompass a holistic approach which includes cultural awareness, education, human (female) rights etc.

# C1: State of the Art

## Open Issues

- With greater opportunity for prenatal "diagnosis" should there be limits placed on the severity of disease and magnitude of risk selected for abortion?
- How much should be left to chance rather than pre-determination: do we have a moral duty to prevent disease where possible?
- Should human dignity play a role or is the concept being used as a political tool?
- Government policy makers play vs. the rights of the individual (both adult and embryo)?
- How should these technologies be controlled in countries of differing resource levels?
- Where will the lines be drawn: who makes the final decision?

## Key Recommendations

- Medium income countries should invest more in genetic services
- Creation of an integrated network of genetic services appropriate to the resources of a particular country
- Countries of low/middle income will have the greatest population growth but least access to modern genetic & reproductive technologies - we should ensure they are included in the debate and their needs addressed adequately (including financial implications, differing cultural views, risk & benefit assessment)

# C1: Impact on Human Life

## Key Themes

- Fetal and infant diet and nutrition are important lifelong determinants of health
- The social position of pregnant women has a significant affect on low birth weight for reasons which are readily modifiable

## Areas of Consensus

- It is a priority to avoid low birth weight
- Nutritional status prior to conception, in utero and in early life has a powerful influence on development of disease later in life
- Maternal and child nutrition need to be high on the health agenda particularly in low income countries like those of South Asia and Sub-Saharan Africa
- Breastfeeding is and will remain the reference during early life (some exceptions (e.g. HIV infected mothers))

# C1: Impact on Human Life

## Open Issues

- How do we ensure effective local policies and approaches to address the issues of under nutrition in the low/middle world?
- Can we establish a global standard based on our current scientific understanding?
- How can we improve nutrition without imposing any single cultural view (what is accepted in one country may not be acceptable elsewhere )?
- Implementation of solutions will only be effective if there is the required political will - how can we work with governments / other key decision makers to generate and sustain momentum

## Key Recommendations

- Great efforts should be made to avoid low birth weight
- There needs to be a multi-strategy approach, for example, the "Three A approach" - Awareness / Access / Affordability"
- The approach should provide support for females through the lifecycle (infant, child, adolescent, elderly, and should address health nutrition, education, empowerment and livelihood)

# C1: Life Sciences and Development

## Key Themes

- Lack of social awareness of the importance of vaccines
- High level of unmet medical need – the prevalence of childhood infectious disease
- Rapid advances in vaccine innovation
- Efficient delivery requires technological innovation and the involvement of the local community
- Social, political and financial hurdles constrain vaccines advances – collaboration is critical
- One size fits all - cultural imperialism vs. pragmatism
- Lack of commercial incentives restrict innovation and supply

## Areas of Consensus

- Significant disease burden could be alleviated with improved access to vaccines
- It is morally unacceptable to allow millions of children die from vaccine preventable disease
- There remains a huge unmet need in the development and introduction of new vaccines and an immense and growing target population of end users
- We must stimulate supply but there needs to be significantly more commercial incentive to invest in vaccines research
- Involvement of low/middle countries, not only to ensure their medical needs are pragmatically met, but in the development and manufacture of vaccines to ensure local community commitment and supply/deployment will be critical
- The issue of indemnity and legislation further discourages manufacturers from industrialised nations to focus investment on developing vaccines specifically for developing countries

# C1: Impact on Human Life

## Open Issues

- How should developing countries be involved to best answer their needs: research, manufacture, education?
- Is it morally inappropriate to advocate the same standards for countries where risk/benefit is different?
- How can we best promote and fund further vaccines research:
- How can we prioritise which diseases to address – how to we get consensus on the ‘low-hanging fruit’?
- Could a more diversified supply network improve the overall situation?
- Would a global fund for research and/or purchasing be beneficial?
- Consider establishment of new regional regulatory authorities
- Consider local community advisory boards to promote education and drive involvement in local studies?

## Key Recommendations

- Use the existing vaccines to reduce the disease burdens
- Reassess the level of pre-release testing that is required to allow justified benefit to risk ratio
- Review opportunities for local vaccine production
- Address the ‘research paradigm’ - collaboration will become even more critical but how these partnerships be structured to break down silos while providing the financial incentives for all stakeholders
- Developing countries should be involved in the overall R&D process

# C1: The Vision in Life Sciences

## Key Themes

- **Genetics and environment circumstances are both important determinants of psychological development**
- **Response to drugs can contribute to the definition of mental disease**
- **What are the boundaries of abnormal behaviour and phenotype?**
- **Has genetics lived up to its promise and changed patients expectations of healthcare provision**

## Areas of Consensus

- **Events in fetal development appear to influence the development of aggression and later criminality**
- **Drug response can be a useful although not sufficient criteria in disease definition**
- **Continued dialogue with the broader community is essential so that the Bio-Medical community can effectively manage public expectations (e.g. to explain the gap between basic research and availability of new therapies)**

# C1: The Vision in Life Sciences

## Open Issues

- How to improve the environment both during pregnancy and in the early years of life - how and to what extent to intervene?
- We should be careful in extrapolating data developed across cultures
- How can we use drug response in a preventative manner
- What diagnostic labels should we give to partially atrophied drug -responsive individuals who have not yet demented to warrant an Alzheimer diagnosis
- Can we use pharmacogenomics to define subsets and then examine drug response in these individuals
- What constitutes appropriate genetic counselling?

## Key Recommendations

- More focus on fetal and early post-natal phases of human development

# Improving the Beginning of Human Life: Key Recommendations

**IMPROVING THE BEGINNING  
OF HUMAN LIFE HAS  
BENEFICIAL EFFECTS FOR  
THE REST OF LIFE**



## **CII: Life Expectancy and Longevity**

### **Chairmen:**

**Prof. Etienne Emile Baulieu**

**Dr Eric Meslin**

**Prof. Jonathan Knowles**



# Facts About Ageing

- **Maximum life expectancy has not changed, but the global average life span has been increased as well as the degree of healthiness over the last decades**
- **The number of people who suffer from diseases that are correlated with age varies dramatically from one country to another (even between countries of the developed world)**
- **Globally, the human population is ageing, but there are national variations in rate and distribution of age-linked diseases**
- **The growing number of individuals over 60 years of age increases the number of deaths associated with age-linked diseases**
  - **Some diseases are exclusively age-linked**
  - **Some diseases are linked to a combination of age and environmental risk factors**
- **Better treatment through innovative medicine combined with specific public health interventions have led to a drastic reduction in mortality**

## Facts About Ageing (2/3)

- **Combination of molecular biology, robotics and information technology have lead to the identification of generic risk factors allowing diagnosis, individualisation of risk and more efficient treatment of disease**
- **Significant progress is being made in the two main causes of death in the developed countries, which are cardiovascular disease and cancer**
- **Future increases in the ageing population will cause neurological diseases to become epidemic**
- **Major determinants of health in old age are physical activity, diet, avoidance of stress and smoking.**
- **Psychological factors also play a significant role in avoiding disease**
- **Small behaviour changes (such as a minor change in nutrition) are associated with big differences in disease incidence**

## Facts About Ageing (3/3)

- **Diseases of ageing have both high economic and emotional costs**
- **Even though life expectancy is a function of the GNP per capita there is a limit to life expectancy increase in developed countries**
- **The impact is considerable of social economics on longevity: e.g., Bangladesh longevity equals Harlem, USA**
- **The effect of income is less in developed than in developing countries; for developed countries, health-related behaviour and minimal social inequalities are key**
- **The development of “directed medicine” is affected by regulatory, economic and other barriers**

# Social and Ethical Considerations

- **We are facing three major challenges:**
  - **To better understand biological ageing**
  - **To build social structures that support changes in environmental determinants**
  - **To make use of opportunities for reducing health inequalities and improving health in later life**
- **Health care should not be discussed only in economic terms, but must also consider specific ethical dimensions**
  - **Among the most important of these dimensions is the fair distribution of resources**
  - **Culture plays an important, and underappreciated role in the evaluation of health care decision making**
- **Private and public interests may intersect but are not identical**

## Recommendations and Actions

- **All companies in the private sector that have an interest in health care (e.g., pharmaceutical, biotechnology, civil engineering, computing) should commit themselves to the necessary funding, infrastructure building and other means necessary to develop a global approach for treating age-linked diseases**
- **Countries from the developed world (and in particular the G-8) should immediately take steps to reverse the decline in their contributions to international aid**
- **An ageing program needs to become a priority of WHO, and this program should be funded at an appropriate level**
- **Priority setting in research funding should focus on improving the quality of life before trying to reach maximal life span**
- **Regulatory and legal reform should be undertaken to harmonize and maximize opportunities for drug and technology development**
- **Opportunities should be made available to actively include NGOs, philanthropies and other non-profits in research and development**



## **CIII: Securing enough Safe Food**

### **Chairmen:**

**Prof. M.S. Swaminathan**

**Mr Mark Ritchie**

**Dr Hans Kast**



# Securing enough safe food

- **Biovision brings together representatives of society, science and industry to discuss and promote progress for pressing Life Sciences issues.**
- **This parallel conference asked how we can satisfy the basic human right to a secure supply of safe food and drinking water.**
- **Very different scenarios apply to the industrialized world and developing countries**
  - **Abundance of food and imbalanced nutrition lead to health problems including obesity, cancer and diabetes in the Western World.  
Land set aside schemes are promoted.**
  - **Developing countries are facing hunger and poverty. The distribution of enough food is a major challenge.**



# Introduction

- **This conference affirms that access to adequate and safe food and clean drinking water should be regarded as a basic human right**
- **There is a huge food challenge in the developing world having both a quantitative and qualitative dimension**
- **Global institutions have addressed the food problem in recent years i.e. FAO The World Food Summit and the UN Millennium Development Goals**
- **Unfortunately agronomic productivity has been stagnating in developing countries, while further shrinking per capita arable and irrigation water demand new technologies.**
- **There is a need for an “Evergreen” revolution which will help to enhance productivity perpetuity without associated ecological harm**
- **Agriculture is the most effective safety net against hunger and poverty in rural communities around the world, since a majority of the population depend upon farming for their livelihoods**

# Recent Advances in Technology and Delivery Systems Technology

- **Genetic modification**
- **Integrated Mendelian and Molecular breeding**
- **Resistance to biotic and to abiotic stresses**
- **Nutritive and culinary as well as processing properties**
- **Enlarging the food basket by including under-utilised crops**

# Recent Advances in Technology and Delivery Systems

## Delivery systems

- **Bridging the genomic divide**
- **Access to new and appropriate technologies**
- **Intellectual Property Rights**
- **Public goods research and Public/private partnerships**
- **Reaching the unreached around the planet**
- **Regulatory mechanisms at global and national level including Intellectual Property Rights**
- **Education, training, techno-infrastructure, trade and communication (rural roads)**
- **Women and technology: Access, empowerment and strengthening of their role**
- **Women in science and science and technology for gender differentiated**

## Advances in Public Policies

- Investment in education, research and related infrastructure
- Regulatory mechanisms and biosafety measures at national and international levels need to be harmonized and a global system developed, building on the Cartagena Biosafety Protocol
- The gene flow problem has to be addressed by regulation, as for example by declaring agro-biodiversity rich areas as GM-free zones
- Recognition and reward to primary conservers, the indigenous people.
- Public education and genetic literacy
- Urban food security
- Role of the private sector
- Access to markets should ensure both free and fair trade

# **Bio-partnerships and Bio-complexity**

## **Partnerships are key to realizing the goal for food for all**

- **Coalitions of the concerned (academia, civil society, farm families and the public and private sectors)**
- **International partnerships between private and public sectors**
- **Global Challenge Projects**
  - **Water use efficiency and drought tolerance**
  - **Nutritional enrichment**
  - **Nutrition and health, e.g. combating maternal and foetal undernutrition leading to low-birth-weight children in the developing countries and fighting cancer and obesity in the Western world**

# Bio-partnerships and Bio-complexity

## Bio-complexity

- **Need for a systems approach to match multi-sectoral linkages**
- **Nutrition, education, health and environment need integrated attention**

# Conclusions

- **Access to adequate and safe food and clean drinking water is a basic human right**
- **The most advanced and appropriate technologies need to be applied in combination with traditional methods and ecological prudence**
- **There is a strong need to take a systems approach for example to solve regulatory issues globally**
- **Sustainable food and nutrition security at the level of every child, woman and man requires integrated attention to food availability, food access and food absorption in the body**
- **Biovision for a hunger and malnutrition free world can be realized only by fostering strong political will and symbiotic partnerships among all the stakeholders**



# **CIV: Life sciences, Environment and Industrial Revolution**

## **Chairmen:**

**Prof. Umberto Colombo**

**Mr Guy Ourisson**

**Dr Klaus Töpfer**

**Dr Thomas M. Connelly**



# Key Issues

- **How to make biodiversity and genetic diversity an asset for people?**
  - The best way to make people protect it
  - Has to be known, used (in a sustainable manner) and saved
- **How to overcome poverty?**
  - Developing countries are strongly depending on agriculture, thus on ecosystems
  - Industrial Revolution and Urbanization are constantly modifying the environment
- **Biotechnology is a way (but not the only one) to slow/reverse environmental deterioration induced by:**
  - Past development of our economies
  - Future requirements generated by population and consumption growth
- **How to handle attitude towards risk and precaution of industrialised countries with regards to their side effects in developing countries?**
  - Developing countries might have a different perception of risk, as they have stronger basic needs and as the cost of risk might be difficult to bear
  - Information and communication influences the way risks are perceived in industrial countries

# How to make biodiversity and genetic diversity an asset for people?

## Key open questions

- How to secure communication between biologists and researchers, based on existing taxonomy?
- How to trigger discussions between politicians and business people in order to convince them about the added value of the conservation and administration of the biodiversity information?

## Next Steps / Proposed recommendations

- Share good practices
- Leverage existing solutions (e.g. Costa Rica INBio model)
- Allocate more resources to education in developing countries

# How to overcome poverty?

## Key open questions

- **Future population growth and expected consumption growth will primarily impact ecosystems in areas stricken by poverty**
- **Demand for water is expected to increase in the future. The Earth has enough water resources to cover present and future needs, but requires it to be managed carefully.**
- **Environment cannot be improved in conditions of poverty, nor can poverty be eradicated without the use of sciences and technology**
- **Although a worldwide movement towards resolving water management issues is emerging, there is not clear commitment yet, towards a “value in lifestyle” scenario for future water management**

## Next Steps / Proposed recommendations

- **Encourage countries to internalize costs more rapidly**
- **Adapt solutions to local specificity**
- **Facilitate debates on major ethical issues (GMOs, Development Vs. Sustainability, Precautionary principle, ...)**
- **Encourage alternative choices (clean processes, alternatives to water borne waste disposal, full use of human waste as fertilizer, resilient systems, ...)**
- **Encourage technology transfer from the science community to water managers**
- **Correlate economic development of developing countries with environment protection**

# **Biotechnology is a way (but not the only one) to slow/reverse environmental deterioration**

## **Key open questions**

- **What are the drivers that could lead economies towards the utilization of biotechnologies?**
- **How to deal with current concerns of the Biotech industry (drug approval requirements, marginalization, ...)?**
- **How to optimize resource utilization by avoiding research duplication**

## **Next Steps / Proposed recommendations**

- **Have a long term view**
- **Define policies aimed at encouraging innovation**
- **Advocate for public R&D**
- **Target R&D on the problems of the poor**
- **Openly criticize/discuss new technologies**

# How to handle attitude towards risk and precaution of industrialised countries with regards to their side effects in developing countries?

## Key open questions

- How to re-instore credibility of public opinion in Biotechnologies?
- How to be more understood by public through a more understandable communication with journalists?
- How to conserve criticism confronted with different risk assessment?

## Next Steps / Proposed recommendations

- All actors of Biotech and Agro-Biotech sector (scientists, industrials and governments) should be more transparent and send concrete messages to public:
  - Biotech risks are known
  - All necessary efforts are made to handle these risks and the relation to the precaution principle
- Conserve the diversity of opinions about Biotech, by openly discussing/criticizing new technologies
- Communicate on good practices