ACCADEMIA NAZIONALE DEI LINCEI

CONFERENCE

NATIONAL CONFERENCE ON PREVENTION

17 NOVEMBER 2026

ABSTRACT

Organising Committee: Carlo PATRONO (Coordinator, Linceo, Catholic University of the Sacred Heart), Giovanni CAPELLI (Istituto Superiore di Sanità, Rome), Garret A. FITZGERALD (Linceo, University of Pennsylvania), Silvia FRANCESCHI (Oncology Reference Centre, Aviano), Silvio GARATTINI (Mario Negri Institute, Milan), Michela MATTEOLI (Lincea, Humanitas University, Director - Neuro Centre, Humanitas Research Hospital), Silvia PRIORI (Lincea, University of Pavia), Maria RESCIGNO (Lincea, Humanitas University), Lorenzo RICHIARDI (University of Turin and Italian Association of Epidemiology), Alessandro RONCAGLIA (Linceo, Sapienza University of Rome), Rodolfo SARACCI (Formerly, International Agency for Research on Cancer, Lyon), Silvana SCIARRA (Lincea, President Emerita of the Constitutional Court), Nadia URBINATI (Lincea, Columbia University, New York), Paolo VINEIS (Linceo, Imperial College London).

PROGRAMME

Prevention has historically been, and remains today, the fundamental approach for the control of infectious (communicable) diseases caused by microorganisms, including viruses. Today prevention is also emerging as a preferred option for non-communicable diseases (NCDs), which account for approximately 70% of total mortality worldwide. NCDs have very diverse nosological profiles (diabetes, heart attacks, cancers, etc.) but very often share common aetiological roots [Allen, 2017]: risk factors internal to the body (hyperglycaemia, hypertension, hypercholesterolaemia, etc.) or arising from personal behaviours (diet, physical activity, tobacco use, alcohol, etc.) and factors in the physical environment (occupation, urbanisation, climate, infectious agents) or socio-economic conditions. This very often results in a concentration of multiple NCDs among the most disadvantaged sections of the population. Continuing to prioritise an approach that diagnoses and treats each NCD individually, using increasingly sophisticated and personalised methods, implies a continuous rise in demand for healthcare services alongside a parallel increase in costs, which is certainly unsustainable in the medium to long term. The alternative of a comprehensive prevention of these diseases by tackling them at the level of their common aetiological roots may slow down the rise in costs whilst offering the fundamental and certain advantage that 'being healthy is better than being sick or dead' [Rose, 1992]. The conference aims at examining and discussing how, in light of the advances in biomedical research and social sciences, a health policy centred on prevention as a comprehensive approach to health and disease may be implemented.

The cultural revolution of prevention

Manolis KOGEVINAS (ISGlobal, Barcelona)

The revolution in prevention is not primarily a revolution in knowledge. For many major causes of disease, we already have sufficient knowledge and effective interventions. What is needed is a revolution in priorities, institutions and political responsibility: moving from treating the consequences of unhealthy environments to changing the conditions that produce disease. The greatest opportunity to improve population health is not necessarily where the burden of disease is greatest, nor where medical technology is most advanced, but where effective interventions, preventive or therapeutic, can achieve the greatest health gains.

I will examine how the determinants of population health, and the relative contributions of prevention and increasingly effective treatments, vary across countries with different economic and health-system contexts. Drawing on Global Burden of Disease estimates, I will examine the current burden of disease, the contribution of major risk factors, and the proportion of this burden that could realistically be avoided through effective interventions. Finally, I will consider how the scope of prevention is expanding to address systemic threats, including climate change, pandemics and armed conflicts, and the challenges of evaluating risks for which evidence and methods differ substantially.

Prevention, a population approach to health

Rodolfo SARACCI (Formerly International Agency for Research on Cancer)

Prevention of diseases is intrinsically a population based approach to health: it addresses everybody in all phases of life (the earlier the better) while clinical medicine essentially intervenes on single individuals at the time they become ‘patients’.Three main features of this population trait of prevention are worth considering.

First preventing disease is a population issue as health conditions are directly connected between individuals, both for Communicable Diseases , via contagion and herd immunity and Non-Communicable Diseases , via competition for services between the mass of cases occurring in moderate-low risk persons and cases in high risk people.

Second, the widespread and expanding transposition to prevention of the clinical model "one person-one disease-one treatment (often complex)" is obviously not population based and confronts limitations and problematic aspects. To the extent that prevention is equated with early diagnosis (itself a worthwile but different objective) its task becomes to screen with the best advanced instruments for a vast and increasing number of distinct clinical entities instead of tackling the causes of diseases : for a spectrum of these, among others cardiovascular and metabolic diseases and many cancers, common root causes lie in the physical and social environment as “social determinants of health(SDH)”, generating diseases clusters and sizable, persistent social health inequalities. Limitations also apply to risk predictions of major diseases while real health benefits and overuse risk driven by market forces characterize pharmacological prevention, well exemplified by drugs for obesity control.

Third, side-stepping these limitations prevention ambitiously aims both at positively modifying the SDH and at reducing or removing specific diseases causes, such as tobacco use, alcholic beverages, salt in foods, pollution from fossil fuels combustion (in Europe these alone account for about one death in four). At the same time findings of diminishing gains in expectation of life in populations of economically developed countries and of an increasing 'morbity gap' (life expectation minus healthy life expectation) in all macroregions of the world raise questions about the actual place of preventive actions. Plenty of these fall outside the health services system and demand people’s participation not only in adopting healthy behaviours but - a critical “sine qua” condition - as citizens proactively engaged to shape and promote policies to direct, incentivate or restrict industrial, commercial and other society activities often involving major economic interests.

The global context

Paolo VINEIS (Linceo, Imperial College London)

At the macro or global level, projections of mortality and morbidity indicators up to 2050 do not suggest a marked departure from a general improvement, with slow gains predicted in life expectancy and further shifts from communicable, maternal, neonatal and undernutrition-related diseases towards chronic diseases. An implicit assumption underlying these trends—at least in the Global Burden of Disease (GBD) scenario—is a relatively stable climate and biodiversity, the availability of effective antimicrobial medicines, the intensive use of renewable and non-renewable natural resources, a continuous increase in agricultural productivity and a marked (although uneven) decrease in poverty and malnutrition. GBD projections for future decades, in addition, were based on scenarios involving gradual decrease of lifestyle-related risk factor exposure from current levels to 2050. In reality, humanity is breaching the limits of environmental stability. Depending on socioeconomic development pathways, humanity may be entering an era defined by systemic volatility and the erosion of the "safe operating space"—the stable climatic and ecological conditions of the biosphere that human societies have relied on during the entire journey of advancing human civilizations (i.e., for the past 10,000–12,000 years), landing in the Holocene after leaving the ice age as a few million hunters and gatherers. The environmental conditions that allowed civilizations to flourish are undergoing rapid and substantial alterations. In this new era, the public health progress of the recent past is being replaced by unpredictable shifts in human health trajectories. Early instances of this transition can be seen locally in some populations (mainly in LMICs) but have yet to be observed on a global scale. I will report some early examples of instability that need to be monitored.

The value of prevention and the role of economic incentives

Franco SASSI (Imperial College London)

Prevention is increasingly discussed not just as an approach for improving health, but also as a solution for the financial sustainability of health systems. Expectations must be realistic, because prevention remains challenging and even more so as medical means of addressing the same problems that prevention tries to avoid are becoming increasingly available. The cost effectiveness of prevention is not systematically better than that of treatments. However, prevention has some potential to reduce future health care expenditures and provides substantial returns on investment by removing factors hindering GDP growth. Economic incentives are fundamental components of the prevention toolkit, given that a large part of disease risk originates from behaviours. Taxes have been used for centuries to curb the consumption of products that generate externalities, and their effects on health are now widely recognised as part of the rationale for using them in prevention. Other economic incentives have been tried with some success, including tax credits, one-off incentives, and price regulation. Taxes remain politically challenging and they are complex to design, especially in areas, like food, in which affordability is a key concern. To be a credible solution, prevention requires a more substantial investment, more thorough assessment of impacts, and deeper consideration of policy design factors that may determine their effectiveness.

Discussion on the morning sessions

Vaccines in the era of artificial intelligence

Rino RAPPUOLI (Linceo, Fondazione Biotecnopolo di Siena)

During the last 45 years the vaccine field has been transformed by many breakthrough technologies, which allowed to conquer diseases that were previously impossible to tackle with conventional technologies. Starting from 1980s the vaccine field was transformed first by the advent of recombinant DNA, followed by glyco-conjugation, licensure of novel adjuvants, and by the ability to discover antigens directly from the genome of microorganisms (reverse vaccinology). This was followed by the ability to perform high throughput determination of the structure of antigens and use the information to do structure-based design of properly folded antigens. The ability to generate quickly novel vaccines and novel vaccine candidates grew enormously with the advent of synthetic biology. In 2013 it was possible for the first time to generate a vaccine candidate in one week starting from the sequence of the influenza virus delivered by the internet. Today, reverse vaccinology, structure-based antigen design, and synthetic biology, powered by

artificial intelligence (AI), are part of the routine design of any vaccine. Indeed, vaccine discovery is now deeply facilitated by the power of AI which can predict the structure of proteins in fractions of seconds and can rapidly design antigens that are stable, properly folded and induce appropriate immunity against the desired epitopes. In the future AI is expected to change the entire vaccinology pipeline, including immune responses and emerging infectious disease prediction, manufacturing and regulatory processes, clinical trial design and implementation, and vaccine access and equity. However, realizing the promise of AI for vaccinology requires more high-quality data.

Developing a strategic approach to population-based discovery science

Rory COLLINS (Linceo, University of Oxford)

For the quantification of the combined effects of lifestyle, environment, genotype and other exposures on a variety of health outcomes, large prospective studies with stored biological samples have a number of advantages. Exposures can be assessed prior to disease development, which avoids recall bias and allows investigation of factors affected by disease processes and treatments (e.g. blood markers, blood pressure) or an individual's response to developing a condition (e.g. weight, physical activity, diet).

However, since only a minority of participants in a prospective cohort will develop any particular disease, they typically need to involve hundreds of thousands of well-characterised individuals followed for many years, ideally with repeated assessments of exposures and health, in order to be able to provide reliable estimates of the associations of risk factors with some particular disease (and, to an even greater extent, of interactions between them).

Establishing several large prospective studies in a range of settings with very different risk factor levels (in order to extend the range of exposures studied) and very different disease incidence rates (in order to extend the range of diseases that can be studied), and making these data readily accessible to the widest range of scientific interrogation, would be a cost-effective way of providing more widely generalizable evidence about the relevance of the full range of human exposures to many different health conditions.

Nutrition policies: experience from France

Chantal JULIA (University of Paris 13)

Improving population diets requires coordinated policies that address both individual determinants of dietary choice and the environments in which they are made. WHO recommendations, and in particular the "best buys" for preventing non-communicable diseases provide a framework for actionable and cost-effective measures for nutrition prevention. These include front-of-pack nutrition labelling, taxation, regulation of the promotional environment, and food-based dietary guidelines and represent complementary approaches within a broad policy agenda.

France's National Nutrition and Health Programme (Programme national nutrition santé, PNNS) illustrates how these approaches can be integrated into a national strategy. Front-of-pack labelling, implemented in 2017 with the Nutri-Score, aims to make nutritional information more accessible and support healthier food choices for consumers. Taxation of sweetened beverages implemented since 2012 seeks to influence purchasing patterns by changing the relative prices of targeted foods and beverages and incentivize reformulation from manufacturers. Regulation of the promotional environment attempts to address commercial influences on dietary preferences and consumption. Food-based dietary guidelines translate scientific evidence into practical recommendations adapted to the national context and targeted populations.

Together, these instruments connect public information with measures targeting the economic and commercial determinants of dietary behaviour. Their implementation raises questions of policy design, population reach, and the balance between voluntary and mandatory approaches. Attention to nutrition-related health inequalities is essential to ensuring that improvements benefit all population groups.

The French experience highlights the importance of coherence across policy instruments within a comprehensive national nutrition strategy.