

WEBINAR REPORT

'Healthy ageing and probiotics'

by IPA Europe and the Congress "Probiotics, Prebiotics and New Foods

with Prof. Claudio Franceschi Prof. Patrizia Brigidi
IPA Europe Moderators: Sylvie Binda and Kristine Koppelhus

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What is the secret of healthy ageing? How can we ensure a long existence, while maintaining a high quality of life and a strong health? These were the topics of the second webinar held on July 13th, organised by IPA Europe in collaboration with the International 11th Congress Probiotics, Prebiotics and new Foods. Featuring Prof. Claudio Franceschi and Prof. Patrizia Brigidi, both from the University of Bologna, Italy, the webinar was attended by a wide public and had a lively Q&A session with the speakers and the moderators answering the public live.

After a short introduction of the IPA Europe activities by Rosanna Pecere, Executive Director of IPA Europe, Sylvie Binda and Kristine Koppelhus of the IPA Europe's Scientific Working Group welcomed the guests and moderated the Q&A session.

The potential of probiotics for cognitive health and improved resistance to disease in healthy ageing has been widely researched by the webinar speakers, **Claudio Franceschi², Professor Emeritus at the**

¹ IPA Europe is the European chapter of IPA, the International Probiotics Association; it was established in Brussels in 2015. The members of IPA Europe are Companies directly engaged in the manufacture of probiotic cultures or probiotic foods, supplements, nutritional or therapeutic products: BioGaia, Chr. Hansen, Danone, DuPont, IPA, Lallemand, Lesaffre, Probi and Yakult. The IPA Europe mission is: to gain acceptance of the term "probiotic" throughout Europe as a defined category and to create a favourable environment for probiotics in Europe. For additional information on IPA Europe's activities see: <http://ipaeurope.org>

² Professor Claudio Franceschi, Professor Emeritus at the University of since 2016, has devoted himself to the study of human immunology and has held numerous positions including Scientific Director of the Italian National Research Center for Ageing, as well as founding and directing the "Luigi Galvani" Center for Integrated Studies of Bioinformatics, Biophysics and Biocomplexity at the University of Bologna. From 2018 he is the head of the Laboratory of Systemic Medicine of Healthy Ageing at Lobachevsky University, Nizhny Novgorod, Russia, and he is the author of more than 800 articles in peer-reviewed journals

University of Bologna, and Patrizia Brigidi³, Full Professor in Fermentation Biotechnology at the Department of Medical and Surgical Sciences, also at the University of Bologna.

Prof. Patrizia Brigidi introduced the topic of the structural and functional specificity of the elderly-type microbiota. When does the microbiome start to change in the healthy elderly? Prof. Brigidi has led a number of studies on the relationship between diet, lifestyle and intestinal microbiome, for the prevention of diet-related diseases and healthy ageing. She presented the most recent results about the role of the microbiome for healthy ageing, describing several factors that are age-dependent such as changes in lifestyle and diet (frailty, hospitalization) that result in gut physiology and functionality. The effects are the changes in gut microbiota and its crosstalk with immune system, Immune senescence, inflammaging and metabolic disorders.

For Prof Brigidi “ the microbiome profile of centenarians is a unique model to study the relationship between gut microbiota and healthy ageing”. The gut microbiome describes an adaptive trajectory along human aging, providing the host with the specific ecological services which are calibrated for each stage of our life.

However, whereas there are many published papers describing the microbiome profile in infants and in adults in both health and disease conditions, much less is known about the microbiome of the elderly. Several questions are still open, such as: **does the microbiome have a role in healthy ageing?** In this scenario, the microbiome profile of centenarians and the semi-supercentenarians is interesting because these subgroups of the population are able to reach the extreme limits of human life, since they live about 20-30 years more than their demographic cohort, avoiding and or postponing all the major age-related chronic diseases. For these reasons they can be considered a unique model to study the relationship between gut microbiome and healthy ageing.

The conclusions of a study conducted on four age groups, including young adults in their 30s and elderly up to centenarians - from 105 up to 109 years- show first of all that microbiome and longevity is a research area still in a rather descriptive stage. Also, aging is characterized by a progressive decline of the gut microbiota diversity, with an increased colonization by opportunistic species and pathobionts bacteria and also is characterized by a strong metabolic rearrangement.

Does the microbiome have a role in healthy ageing? Some specific metabolites can be related to changes in centenarian’s microbiota.

Some peculiarities have emerged in semi-supercentenarians, a distinctive enrichment of health-associated taxa, Akkermansia and Christensenellaceae which could contribute to reduce metaflammation, and in particular the inflammation related to aging. The positive trend concerns also the abundance presence of Bifidobacteria in centenarians and supercentenarians, so this preliminary data suggests that Bifidobacteria can be seen as positive in counteracting the proteolytic layout that is characteristic of aging.

Highlighting the connection between immune health and aging, Prof. Franceschi presented the result of a research on the critical role of the immune system in the aging process, “Clock’ created to predict the immunological health and chronic diseases of aging”, published in July 2021.

The study, conducted together with researchers from the University of Stanford, has created an inflammatory clock of aging (iAge) which measures inflammatory load and predicts multi-morbidity,

³ Prof. Patrizia Brigidi, Full Professor in Fermentation Biotechnology at the Department of Medical and Surgical Sciences, University of Bologna, Italy. She is Delegate of the Rector for European Research. Her main scientific research activity is focused on the characterization of the human intestinal microbiome, in the perspective of it's modulation to promote the host's health.

frailty, immune health, cardiovascular aging and is also associated with exceptional longevity in centenarians.

The microbiome: an unbelievable genetic machinery which can be modified by diet and with the use of probiotics.

Recent research has revealed that certain social, environmental and lifestyle factors can promote systemic chronic inflammation (SCI) that can, in turn, lead to several diseases. Those results were published in December 2019 in "Chronic inflammation in the etiology of disease across life span" suggesting that several diseases, such as cardiovascular disease, liver disease, autoimmunity neurodegenerative disorder, all have a chronic inflammation at their bases. The paper describes the multi-level mechanisms underlying SCI and several risk factors that promote this health-damaging phenotype, including infections, physical inactivity, poor diet, environmental and industrial toxicants and psychological stress. The experts pointed out that human longevity must be considered within an evolutionary and in ecological perspective, and that the related variants are highly context-dependent, changing with age, time and with geography. It is interesting to see some commonalities between Italian and Chinese centenarians in the gut microbiota, and this is the idea that we have at least three genetics: there is the usual genome, the mitochondrial genome and the microbiome. Prof. Franceschi was excited about these findings, he explained that the microbiome is the only modifiable genome, and the number of genes that are present in the microbes are between 30 and 50 times the genes of our genome, so it is an unbelievable genetic machinery which can be modified by diet and with the use of probiotics! Diet is a way of modifying the genetics of our guest, the microbiome, and the other relevant concept is the fact that with aging we become extremely different from each other, so there is an increase of heterogeneity, not only of immune responses, but of all parameters of the so called 'immunobiography'. At the individual level, there is an enormous plasticity because according to early events, or adult and late life events, including the gut microbiome, a person can follow different responses, and this can explain the enormous heterogeneity of immune response and inflammaging at the population level.

An appropriate diet can play a strong role in the decrease of inflammaging.

The newborn are very similar to each other, despite having different fathers and mothers, but with age the trajectories are completely different, there is an enormous divergence which can be explained by the starting genetics, the 'immunobiography' but also by the diet and the microbiome. There is a lifelong adaptive process with the viruses, bacteria, psychological stress, chemicals, or caloric restriction. The Mediterranean diet, for example, is able to counteract inflammation, and reduce inflammaging; this was further explored in the European project Nu Age where prof. Franceschi was coordinator. A total of 1294 volunteers from Italy, France, The Netherlands, Poland and UK were randomly divided into following the Mediterranean diet for one year in the framework of the Nu Age project: the more the people followed the Mediterranean diet, the more they had a positive effect, the rejuvenating effect, having a very strong effect on the gut microbiota. The results of the project show that 'You can put back your biological age with a nutritional intervention: the Mediterranean diet has very profound biological metabolic effect on most of the organs of the body not only on the gut but also the brain and the liver.

Together, these findings suggest that Mediterranean diet, by acting on the gut microbiome, can promote epigenetic rejuvenation, but with country-, sex-, and individual-specific effects, thus highlighting the need for a personalized approach to nutritional interventions.

In conclusion we have learnt really exciting things especially on the microbiome, but also the key role of diet and especially the fact that we can intervene on diet at any age, but to see some changes in the centenary and keep the levels to be a centenarian, we need probably more insight. Developing

and maintaining a healthy gut microbiota has been recognized as essential through life, but becomes more challenging with age.

The full recording of the webinar is available here:

<https://www.youtube.com/watch?v=VARxYzdgW2Q>

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