

tion of nitric oxide into an specific intracellular response, suggesting an intriguing task of "signal transducer", similar to that found for calcium in the past. However, many aspects of this model are still unexplored, because the intracellular mechanisms involved in the regulation zinc homeostasis have been poorly studied in ageing.

It is known is that during ageing, the intake of zinc decreases, thus contributing to cause frailty, general disability and increased incidence of age-related degenerative diseases (cancer, infections and atherosclerosis). This situation may be better or worse in different European countries, taking into account the large differences in dietary habits between southern and northern areas. One of the aim of the ZincAge project is therefore to investigate how different dietary habits and intrinsic factors (genetic background) contribute to the risk of developing zinc deficiency in different European countries [1]. Considering all these aspects, the meeting was divided into 5 sessions.

Session 1) Zinc, genetic background and brain

Chronic non-specific inflammation and immunopathology, which are thought to be a major problem in ageing, contribute significantly to the decline of the zinc status possibly aggravated by an unfavourable genetic background concerning genes involved in the inflammatory response (such as TNF- α and IL-6) and in the maintenance of zinc homeostasis, such as metallothioneins (MT). This means that in order to perform an appropriate supplementation with zinc in the elderly, it is necessary to consider zinc status, dietary habits and the individual genetic background. This last point may be crucial also in order to identify subjects that are at higher risk of developing zinc deficiency in ageing. In such subjects, there is the potential for a preventive intervention with zinc supplementation as suggested by **Eugenio Mocchegiani (INRCA, Ancona, Italy) (Coordinator of the project)** [2] who reported on the existence of differences in zinc status, measured by total plasma zinc, available intracellular and plasma zinc and MT, in elderly individuals recruited in different European countries (Italy, France, Germany, Poland and Greece). This was found to be related to different dietary habits and to the presence of particular polymorphisms of IL-6 and MT genes, thus confirming that the rationale for zinc supplementation should take these factors into account. This issue was further extended in the "young scientists session" of the Meeting by **Catia Cipriano (INRCA, Ancona, Italy)**, who showed the relevance of MT functional polymorphisms for successful ageing, and by **Marco Malavolta (INRCA, Ancona, Italy)** who discussed the role of genetic factors in determining zinc dyshomeostasis in ageing with an emphasis on a flow cytometry-based assay to detect the NO-induced release of zinc from MT.

Since the elderly population is rapidly increasing, and the prevalence of overweight and obesity in elderly populations ranges widely upon geographical location and study design, **George Dedoussis (Harokopio University, Athens, Greece)** [3] reported the health status, blood and anthropometrical indices from 249 old Greek subjects (including nonagenarian) in relation to plasma zinc and dietary habits. Blood analysis confirmed the good health status of the elderly population recruited except for the high prevalence of obesity and hypercholesterolemia, which are in accordance with similar studies conducted in the elderly Greek populations [4].

A multi-disciplinary approach was used in the ZincAge project in order to evaluate the relationship between zinc, psychosocial conditions and life-style in old healthy subjects. **Fiorella Marcellini (INRCA, Ancona, Italy)** [5] used a series of tests and questionnaires chosen with special regard to elderly people, including a life-style Questionnaire and a Food Frequency Questionnaire designed for the needs of ZincAge in collaboration with **George Dedoussis**, the Mini Mental State Examination (MMSE), the Geriatric Depression Scale (GDS 15 items) and the Perceive Stress Scale (PSS). The results were an important outcome to evaluate the psychological differences among European elderly subjects (including nonagenarians) in relation with their zinc status. All psychological variables in the whole sample were related to physical zinc measurement. Among European countries, Greek elderly people, who were characterized by the lowest levels of plasma zinc, displayed also a significantly higher score both for PSS and GDS and a more marked age-dependent decline of MMSE when compared to other countries. In contrast, the old French population, which was characterized by the highest levels of plasma zinc, also had the lowest GDS and PSS scores and the highest score of MMSE compared with the other countries. A specific insight on lifestyle and psychological aspects of the Italian elderly, that confirmed the general trend shown in the whole sample, was further delineated in the "young scientists session" by **Cinzia Giuli and Roberta Papa (INRCA, Ancona, Italy)**. Even if these results suggested that the zinc status is somehow positively associated with psychological variables, the rationale for promoting zinc supplementation in the elderly must be considered in the context of the possible neurotoxic effects of Zn²⁺ [6]. Addressing the injurious role of zinc in neurological disease, **Stefano Sensi (University G. D'Annunzio, Chieti, Italy)** showed how excessive influx and/or mobilization of free zinc ions in neurons can promote the neuronal injury observed in cerebral ischemia, epilepsy, and brain trauma. The mechanisms by which zinc exerts its neurotoxicity include mitochondrial and extra-mitochondrial production of reactive oxygen species and disruption of metabolic enzyme activity, ultimately leading to activation of apoptotic and/or necrotic proc-