Post-doc position in CEA-Grenoble, France

Mineral particles as food additives: involvement in inflammatory bowel disease and oral tolerance

Mineral particles are currently approved as food additives and used in food products, cosmetics and pharmaceutical industry. The most produced are titanium dioxide (TiO_2, namely E171 in EU), used as a white colorant and synthetic amorphous silica (SiO_2, E551 in EU) used as anticaking agent in powdered food. Generalized use of these additives has raised concerns on their potential effects on health and the environment, especially their impact on the intestine. The presence of nanoparticles (NPs) in these food additives has been proved in their formulation. One of the paradigms of mineral particle-induced toxicity is that they cause inflammation, either via direct induction of inflammatory conditions or because they would boost existing immune responses in pathogenic conditions. In western countries the prevalence of inflammatory bowel diseases (IBD, including Crohn's disease and ulcerative colitis) and of food intolerance (active immune responses to foreign proteins) is increasing from the late 50's. The causes of these pathologies are unclear, they result from the combination of genetic, psychological and environmental factors. Among them chronic ingestion of particulate food additives has been proposed.

In this context, the scientific objectives of this project are:

i) to investigate the link between the consumption of E171 and E551, and the occurrence and/or aggravation of IBD and food intolerance, by assessing intestinal inflammatory status, permeability and local and systemic immune homeostasis in intestinal cell models exposed to E171 and E551 provided by industrial partners,

ii) to clarify whether the presence of free (i.e. unbounded) NPs in these additives are responsible for initiation or promotion of the pathologies, by comparing the responses to E171 and E551 treatment to those obtained with reference TiO_2 and SiO_2-NPs, using the same toxicological endpoints as in i),

iii) to shed some light on the mechanisms through which these food additives may cause these pathologies, by using an *in vitro* approach on advanced gut epithelial models of genetic susceptibility to IBD vs. normal models. On these models will be addressed particle- and NP-induced cytotoxicity, genotoxicity, inflammatory disorders; impact on the gut barrier function i.e. epithelial integrity, mucus secretion, expression of xenobiotic efflux pump, autophagy and endothelial reticulum stress.

A two-year post-doc position is open on this project in CEA-Grenoble (contact: marie.carriere@cea.fr). The candidate will be expert in cell culture, possibly in toxicology and nanoparticle impact. Expertise in inflammation assessment would also be desirable. Technical skills: RT-qPCR, western blot, classical biochemistry and toxicology assays.

Deadline for application: January the 15th, 2017, work will begin in April 2017.