

Research Topic for the ParisTech/CSC PhD Program

Subfield: Life Sciences

ParisTech School: AgroParisTech/ABIES Doctoral School

Title: Control of infectious diseases by anti- α -Gal immunity induced by a probiotic compound.

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Short description of possible research topics for a PhD:

All mammals, except old world monkeys, apes and humans, produce the α -1,3-galactosyltransferase (α 1,3GT) enzyme that synthesizes the carbohydrate α -Gal. The inactivation of the α 1,3GT gene resulted in an almost unique ability of this group of primates, including humans, to produce high antibody titers against α -Gal. Surprisingly, it was recently demonstrated that anti- α -Gal antibodies induced by host microbiota inhibit *Plasmodium* spp. transmission by *Anopheles* mosquitoes. Notably, several *Plasmodium* species as well as other pathogens such as *Leishmania* spp., *Trypanosoma* spp., *Mycobacterium* spp. and *Borrelia* spp. were found to express α -Gal on their surface. This groundbreaking finding suggested that anti- α -Gal antibodies induced by host microbiota might protect not only against *Plasmodium* parasites, but also against other pathogens containing α -Gal on their surface. This project aims to develop a new functional product based on probiotics with the capacity to enhance the anti- α -Gal immunity and therefore it will protect humans from major infectious diseases.

Required background of the student:

We expect a highly motivated student with experience in molecular biology and/or immunology. Experience working with probiotic bacteria and/or animal models of infectious diseases will be highly appreciated. Good command of English is very important.

A list of 5(max.) representative publications of the group:

- Cabezas-Cruz A, et al. Exp Mol Med. 2017;49(3):e301.
- Cabezas-Cruz A, et al. Trends Parasitol. 2017; 33(7):495-498.
- Mateos-Hernández L, et al. Oncotarget. 2017; 8(13):20630-20644.
- Cabezas-Cruz A, et al. Expert Rev Vaccines. 2016; 15(8):953-5.
- Cabezas-Cruz A, et al. Trends Parasitol. 2015; 31(10):470-476.
- Cabezas-Cruz A, et al. Lancet Infect Dis. 2014; 14(10):916-7.