RESEARCH TOPIC DASMEN5
Understanding colonization resistance from a single-cell perspective
Curriculum DASMEN Standard

Laboratory name and address
Microbial Ecology group
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Abstract
Since the 1960s we know that using antibiotics can disturb the gut microbiome, leading to an increased vulnerability to inflammation caused by pathogens. This observation has highlighted the significant role that bacteria play in human health by protecting us from pathogen colonization, known as colonization resistance. Despite over 70 years of research, the precise mechanisms that prevent pathogenic invasion are still not well understood.

Main technical approaches
Cellular and molecular biology will be complemented with microfluidic techniques and microscopy that allow for imaging of individual bacterial cells over space and time. The successful candidate is expected to learn image analysis techniques to quantitatively interpret microfluidics time lapses.
Candidates with a background in molecular biology, life sciences, medicine or related subjects are encouraged to apply. Experience molecular biology is recommended. Experience with data analysis of large datasets and/or image analysis is welcome but not strictly necessary to start. Willingness to work in an interdisciplinary environment, to learn computational techniques and to approach problems with a quantitative mind-set are requirements. Curiosity, critical thinking and motivation are desirable qualities.
We are an interdisciplinary lab and we welcome applicants with quantitative background as well.
We are committed to promoting diversity and we encourage applications from underrepresented groups.

Scientific references

[1] The Integrative Human Microbiome Project. Nature 569, 641–648 (2019)

[2] Bohnhoff, M. & Miller, C. P. Enhanced susceptibility to salmonella infection in streptomycintreated mice. J. Infect. Dis. 111, 117–127 (1962)

[3] Stern, C. D. The 'Omics' Revolution: How an obsession with compiling lists is threatening the ancient art of experimental design. BioEssays 41, 1900168 (2019)

[4] Ackermann, M. A functional perspective on phenotypic heterogeneity in microorganisms. Nat. Rev. Microbiol. 13, 497–508 (2015)

[5] Hockenberry, A. M., Micali G., Tak'acs G., Weng J., Hardt W.-D., Ackermann M. Microbiotaderived metabolites inhibit Salmonella virulent subpopulation development by acting on singlecell behaviors. PNAS 118, 31:e2103027118 (2021)

Type of contract

Scholarship of € 21.000 gross per year awarded by Istituto Clinico Humanitas. This sum is subject to IRPEF income tax and exempt from social security contributions.

Borsa di studio pari a € 21.000 annui lordi erogata da Istituto Clinico Humanitas. Importo soggetto a tassazione IRPEF ed esente da contribuzione previdenziale.

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