European School of Molecular Medicine

2025 summer call PhD selections

AVAILABLE POSITIONS

Principal Investigator	Nicola Segata
Affiliation	Trento University, CIBIO
Title of the proposed project:	Microbiome signatures of early on-set colorectal cancer
Short description of the project	The research program is part of the project "PROSPECT " funded by Cancer Research UK, the National Cancer Institute, the Bowelbabe Fund for Cancer Research UK and Institut National Du Cancer through Cancer Grand Challenges. The overall aim of PROSPECT is to identify and understand the processes through which different biological and environmental factors cause early-onset cancers (EOCRC), and specifically the work packages led by prof. Nicola Segata are focusing on the role of the microbiome in such processes. The researcher will investigate the microbiome associations with EOCRC and will develop computational approaches for the identification of the gut microbiome biomarkers in EOCRC; identify prospective EOCRC microbial biomarkers; and assess their transmissibility. This will be performed by developing new computational and statistical analyses, and machine-learning investigations on newly collected samples from the project and samples from already public studies
Main research area for the project	Computational Biology
Second research area for the project	
3 key words for project	microbiome, metagenomics, cancer
Main topic/s of the lab	computational metagenomics, microbiome studies
Short description of the lab activity	Next generation computational metagenomic tools. The potential of metagenomics is only partially expressed due to computational challenges. We are working on novel methods to profile microbiomes at increased resolution (e.g. strains) and perform large-scale comparative genomics on uncharacterized microbes. Integrative and machine learning meta'omic approaches. We develop new machine learning tools to cope with the variability and dimensionality of microbiome profiles and provide clinically relevant signatures by integrating complementary meta'omic approaches (e.g. metatranscriptomics or metaproteomics). Microbiome-pathogen interaction in human infections. The role of the microbiome in the acquisition and development of infections is largely unknown. By coupling longitudinal pathogen/microbiome sequencing we aim to understand how the microbiome can modulate the virulence profile and antibiotic resistance of human infections. Microbiome transmission. We study how microbes can be transmitted between different environments with specific focus on how members of the microbiome are vertically transmitted

	from mothers to infants at birth and horizontally between family members or individuals sharing the same environment.
Recent bibliography	1. Aitor Blanco-Míguez,... Nicola Segata. Extending and improving metagenomic taxonomic profiling with uncharacterized species using MetaPhlAn 4. Nature Biotechnology, 41:1633–1644, 2023. 2. Lee, K., Thomas, … Segata, N. (2022). Cross-cohort gut microbiome associations with immune checkpoint inhibitor response in advanced melanoma. Nature Medicine, 28, 534–544. 3. Thomas, A.M., Fidelle, M., Routy, B. et al. Gut OncoMicrobiome Signatures (GOMS) as next-generation biomarkers for cancer immunotherapy. Nat Rev Clin Oncol 20, 583–603 (2023). https://doi.org/10.1038/s41571-023-00785-8 4. Piccinno, G., Thompson, K,N, ..., Huttenhower, C., Naccarati, A., Budinska, E., Segata N. The gut microbiome in colorectal cancer: a cross-stage strain-level pooled analysis of 3,741 individuals from 18 cohorts. Accepted Nature Medicine
Group composition	25 members: 10 PhD students, 11 postdocs, 3 pre-doc, 2 research assistants
Institutional page link	https://www.unitn.it/en
Lab website link	http://segatalab.cibio.unitn.it/index.html
Social media links	
Video link	