PHYSICIAN SCIENTIST
LA MEDICINA INCONTRA LA RICERCA
promosso da: AIRC Fondazione CARIPLO | con il supporto di: SIBMM Società Italiana di Biologia Molecolare Medica | UNIVERSITÀ DEGLI STUDI DI MILANO

Principal Investigator	Cosentino Lagomarsino Marco
Hosting institution	IFOM - Istituto Fondazione di Oncologia Molecolare, ETS
Proposal title	Characterization of persister cell population dynamics through high-content methods
Keywords	Cell cycle; Drug screening; Growth induction and/or growth arrest; Tolerance; Mathematical modeling
PhD project description	An obstacle in cancer treatment is the emergence of drug-tolerant "persister" cells, subpopulations capable of surviving therapy and driving relapse. For example, in colorectal cancer (CRC), persisters can survive anti-EGFR treatments, possibly contributing to minimal residual disease and recurrence. In our previous work (Russo et al., Nat. Genet. 2022), we quantitatively characterized the kinetics of persister formation and survival in CRC cell lines under drug pressure, and an ongoing high-content screening effort from our group is identifying promising drug combinations that synergize with EGFR blockade to target these persister cells more effectively. This PhD project will extend these findings, initially focused on a single cell line, to a broader panel of CRC cell lines and organoids. The project aims to explore how these combined treatments influence persister cell dynamics, including their formation, survival, and population-dynamics parameters, thus providing a predictive understanding of population-level responses. The position will be based at IFOM, a leading scientific institute in Milan dedicated to fundamental cancer research, as part of an AIRC-funded IG project on cancer persisters, as part of an AIRC-funded IG project on cancer persisters. We seek candidates with a strong motivation for interdisciplinary work and open to learning new techniques. The work will include (and potentially provide training for) cutting-edge experimental techniques, including high-content imaging at IFOM (Experimental Therapeutics, Mercurio Lab) and advanced cell culture in collaboration with the Russo Lab (U Turin) and the Bertotti Lab (IRCCS Candiolo). Furthermore, the candidate will work closely with the group's experts in mathematical modeling and quantitative data analysis to interpret experimental data and refine hypotheses. Finally, while CRC remains a central focus, we welcome the integration of the candidate's clinical perspective, to transfer our quantitative approach to different cell line models and drug combinations relevant to specific tumor types within their medical field.
Main topics of the lab	Computational Biology
Short description of the lab activity	The group "Statistical Physics of Cells and Genomes" specializes in an approach to living systems based on our core expertise of mathematical modeling and data-analysis tools from theoretical physics, with a strong track record of biological applications and experimental collaborations. Our approach can be described as "model-driven data

	science," employs simple yet falsifiable mathematical models to identify and interpret complex biological behaviors, validated through quantitative data analysis from published sources, symbiotic experimental partnerships, and more recently in-house experiments. Currently, the group focuses on developing quantitative models of cellular growth and cell-cycle progression, particularly to predict tumor cell behavior and responses to growth-inhibiting therapies. A key research interest is the phenomenon of "persistence," where dormant tumor cell subpopulations survive lethal drug doses, causing cancer relapse after remission. We aim to provide physiological explanations for persistence and create predictive models that could inform future clinical strategies.
Main research area	Computational biology
Group composition	Marco Cosentino Lagomarsino | PI | Simone Pompei | Senior Scientist | Evolution and phenotypic strategies Rossana Droghetti | PhD | Cell growth Mattia Corigliano | PhD | Cell cycle and persistence Giorgio Tallarico | PhD | Cell growth Valentina Guarino | PhD | Cell cycle arrests, phenotypic stragies, evolution Andrea Ripamonti | PhD | Cell growth, maintenance and proteostasis Alessia Sanbruna | Student | Cell growth
Institutional page link	https://www.ifom.eu
Lab website link	http://spcg.unimi.it
Social media link	https://bsky.app/profile/spcggroup.bsky.social
Lab bibliography	A modified fluctuation-test framework characterizes the population dynamics and mutation rate of colorectal cancer persister cells. Russo M, Pompei S, Sogari A, Corigliano M, Crisafulli G, Puliafito A, Lamba S, Erriquez J, Bertotti A, Gherardi M, Di Nicolantonio F, Bardelli A, Cosentino Lagomarsino M NAT GENET 2022 Jul; 54: 976