KEYNOTE TALK

Friday, October 9, 2020 at 9:00am

From mathematical modelling of cancer cell plasticity to philosophy of cancer

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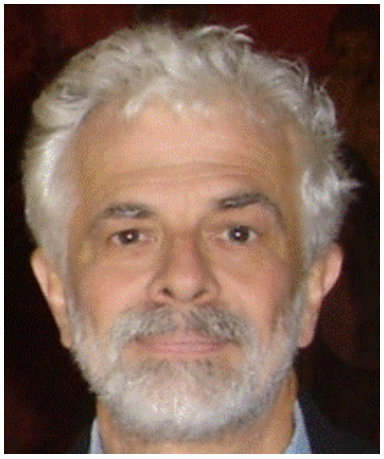
Abstract: In this talk, I will suggest that cancer is fundamentally a disease of the control of cell differentiation in multicellular organisms, uncontrolled cell proliferation being a mere consequence of blockade, or unbalance, of cell differentiations. Cancer cell populations, that can reverse the sense of differentiations, are extremely plastic and able to adapt without mutations their phenotypes to transiently resist drug insults, which is likely due to the reactivation of ancient, normally silenced, genes. Stepping from mathematical models of non genetic plasticity in cancer cell populations and questions they raise, I will propose an evolutionary biology approach to shed light on this problem both from a theoretical viewpoint by a description of multicellular organisms in terms of multi-level structures, which integrate function and matter from lower to upper levels, and from a practical point of view oriented towards cancer therapeutics, as cancer is primarily a failure of multicellularity in animals and humans. This approach resorts to the emergent field of knowledge named philosophy of cancer



Speaker Bio-Sketch: Jean Clairambault, PhD, MD, is an emeritus research director (senior scientist) at Inria Paris, France. He is also a member of Jacques-Louis Lions Lab at Sorbonne University (which now includes the former Paris VI, Pierre-et-Marie-Curie University) in Paris. After studies in mathematics until French 'agrégation' and PhD in geometry, he switched to medical studies until MD (thesis on heart rate variability in sleeping newborns), and then accomplished his research career at INRIA teaching mathematics and modelling biomedical topics by means of multidimensional statistics and differential equations. Having started from autonomic control on cardiovascular dynamics and later circadian clock control on the division cycle in healthy and cancer cells, he devotes himself to therapeutic optimization for cancer therapeutics, in particular with respect to reversible, drug-induced, anticancer drug resistance. Related to evolution towards drug resistance in cancer cell populations, he is also interested in understanding cancer as a disease of differentiation control in multicellular organisms, seen in a billion-year evolutionary perspective.