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| Event | Youth Symposium |
| Presenter | Dr. Michel Sadelain<br>Director, Columbia Initiative in Cell Engineering and Therapy (CICET) and Cancer Cell Therapy Initiative at the Herbert Irving Comprehensive Cancer Center (HICCC) |
| Title | Creativity and Rigor: Emergence of a Synthetic Lymphocyte |
| 中譯 | 創意與嚴謹：合成淋巴細胞的誕生 |
| Abstract | Chimeric antigen receptors (CARs) are synthetic receptors for antigen that reprogram immune cells to perform therapeutic tasks of our choosing. CARs that target CD19 effectively program human T cells to specifically target B cells and B cell malignancies, irrespective of a patient's genetic background, by circumventing the restriction to HLA imposed upon antigen recognition by natural T cells. The first CARs to target CD19 have already changed the standard of care for several hematological malignancies and are poised to be similarly impactful in autoimmunity and organ transplantation.<br><br>CARs are composite structures that assemble naturally disjointed protein domains and artificial linkers to produce a single polypeptide designed to on its own perform multiple functions: antigen recognition, T cell activation, and functional and metabolic T cell programming. CARs embody a symbiotic approach to cellular rewiring. They closely dovetail natural circuits, introducing amplifications, short-cuts or deviations in the signaling pathways inherited from Evolution. The successes of CD19 CAR T cells, as well as their present limitations, provide a roadmap for crafting future CAR therapies to tackle a large number of pathologies.<br><br>Nature could not have created CAR T cells as their composition infringes several axioms of immune cell development, tolerance and function. At the same time, CAR T cells insert themselves in the natural order of adaptive immunity. CAR T cells thus represent a novel paradigm for synthetic immunology, providing “living drugs” to patients who fail to generate protective immunity on their own. They further embody Thomas Kuhn’s concept of a “paradigm shift”. |