Research Experiences for Students of Honours College (RESHC) Programme 2017

RESHC Ref. no	Institutes	Mentor	Email	Project Title	Level	Duarations	Commencement month	Project Description	Internship Requirement
RESHC/2017/038	ICMS	Defang Ouyang	DefangOuyang@umac.mo	An intelligent system for cyclodextrin formulation development	L1 - 40 hours/month	6 months	May	Conventional formulation development is laborious, time-consuming and cost-expensive on the basis of traditional trial-and-error approaches by individual experiences of pharmaceutical scientists. Although cyclodextrin molecules are widely used in the solubilisation of water-insoluble drugs, the design of cyclodextrin formulations still presents significant challenges. The aim of the project is to develop an intelligent system for cyclodextrin formulations by integrating artificial intelligence techniques, molecular modeling and experimental techniques. Molecular simulation and experimental results will be used as the origin of training data and validation data. The intelligent system will contain four components: chemical database, the decision module, the prediction module, and the control module. In summary, an intelligent formulation system will be developed for water-insoluble drug cyclodextrin formulations.	The student should have good computer skills. Machine learning, big data analysis experience is prefered.
RESHC/2017/039	ICMS	Xin Chen	xchen@umac.mo	Elimination of regulatory T cell activity by targeting TNFR2 as a novel approach to breast cancer immunotherapy (以TNFR2 為靶標抑制調節性T 細胞活性作為新的乳腺癌免疫療法的研究)	L3 - 60 hours/month	6 months	May	Key issue for devising effective immunotherapy to breast cancer is to eliminate the activity of CD4+FoxP3+ T regulatory cells (Tregs). Targeting CD25+ cells is the current strategy to deplete Tregs. However, this approach concurrently removes both Tregs and tumor-reactive effector cells, and may induce antoimmune reactions. Recently, we found that TNF, by interacting with TNFR2 which is predominantly expressed by both rodent and human Tregs, was able to selectively activate and expand Tregs. Furthermore, we found that TNFR2 was more closely associated with immunosuppressive activity of Tregs than CD25. Importantly, in association with elevated levels of TNF in the tumor microenvironment, the majority of tumor infiltrating Tregs were highly suppressive TNFR2+ Tregs. As shown in our preliminary experiments, blockade of TNF-TNFR2 interaction inhibited tumor growth in mouse solid tumor models. We thus hypothesize that depletion of TNFR2+ Tregs or inhibition of TNFTNFR2 interaction may efficiently eliminate tumor-associated Treg activity while minimizing the loss of tumor-reactive effector cells, and consequently may liberate endogenous anti-tumor immunity and can enhance the efficacy of immunotherapy and chemoimmunotherapy. We will test this hypothesis through a series in vitro and in vivo studies, by employing both transplantable and spontaneous mouse breast cancer models.	1. Good analytical and evaluative skills 2. Strong interpersonal and communication skills 3. Good organizational skills, efficiency and flexibility 4. Computer skills, including familarity with Mircrosoft products (MS Word, Excel, PowerPoint), email software, internet searching, and other programs. 5. Applicants may come from any academic discipline 6. Enthusiatic about and will be trained in cancer or immunology research 7. Actively participate research activity in the lab
RESHC/2017/040	ICMS	Jiahong Lu	jiahonglu@umac.mo	靶向Beclin1互作蛋白組的新型自噬激動劑的篩選及其在帕金森病模型中的藥效評估	L3 - 60 hours/month	6 months	May	建立細胞模型篩選自噬激動劑 天然自噬激動劑的篩選	1. Cell culture work 2. Biochemistry experiment