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A new approach to deliver anti-cancer nanodrugs and to reduce toxicity by temporarily blunting the reticuloendothelial system

Nanodrugs, like nanoparticles, are known to be taken up by the cells of the reticuloendothelial system (RES), resulting in a great majority of these particles/drugs not being delivered to the target sites, namely tumors. Consequently, these drugs can cause serious toxic side effects in liver, spleen, and kidney. Various attempts (including the "stealth" strategy) have been made to alleviate these side effects, but none has been fully successful. These toxic effects have presented a serious challenge to making use of these nanodrugs for treatment of diseases. Our approach is to temporarily blunt the RES by a prior administration of an FDA approved nutrition supplement, Intralipid®, before dosing rats with a nanodrug. We have applied four anti-cancer nanodrugs, namely an in-development platinum (Pt)-containing anti-cancer nanodrug, and three FDA approved anti-cancer nanodrugs, Abraxane®, Onivyde®, and Marqibo®, to test our methodology. In this talk, we will give a summary of recent results. We have observed different toxicities for these four nanodrugs and have found that Intralipid® can reduce their toxic side effects in the RES and kidney of rats to different levels. Intralipid® methodology could be a valuable complement to the current techniques, e.g., stealth strategies, to reduce RES uptake and toxicity. Our approach is a general one applicable to any approved and in-development nanodrugs without any modification of the nanoparticles, thus facilitating their translation to clinical settings.

Speaker Biography

Dr. Ho received his BA degree in Chemistry from Williams College and his PhD degree in Physical Chemistry from Yale University. From 1961-64, he took his postdoctoral training in the Departments of Chemistry and of Biology at Massachusetts Institute of Technology. He is Alumni Professor of Biological Sciences at Carnegie Mellon University. His research goal is to understand the relationships between structure and function in biological systems by correlating information obtained from biochemical, biophysical, and molecular biological techniques. He has two major research projects, one on the structure-function relationship in hemoglobin and the other on imaging immune responses *in vivo* by MRI using animal models. He has co-authored over 300 scientific papers. He has received a number of awards and honors including the election to Academician of Academia Sinica, Fellow of the International Society of Magnetic Society (ISMAR), the International Society of Magnetic Resonance in Medicine (ISMRM), and the American Association for the Advancement of Science (AAAS). He is a recipient of a John Simon Guggenheim Fellowship, a MERIT Award of the National Heart, Lung, and Blood Institute, and a Gold Medal of ISMRM for his contribution to the development of *in-vivo* cell tracking methodology by MRI.

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