From Combinatorial Chemistry to Nanotheranostic Agents Against Cancer

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Biography

Professor Kit Lam was born and raised in Hong Kong. He is a physician-scientist and an expert in combinatorial chemistry, peptide chemistry, chemical biology, drug discovery and development, molecular imaging, nanotherapeutics, nanoimmunotherapy and medical oncology. He obtained his B.A. in Microbiology in 1975 at the University of Texas at Austin, his Ph.D. in Oncology in 1980 from McArdle Laboratory for Cancer Research, University of Wisconsin, and his M.D. in 1984 from Stanford University School of Medicine. He completed his Internal Medicine residency training and Medical Oncology Fellowship training at the University of Arizona. He is board certified in both Internal Medicine and Medical Oncology. He is currently Chair of the Department of Biochemistry and Molecular Medicine, University of California Davis School of Medicine, Professor of Hematology and Oncology, and a Fellow of the American College of Physicians. He has made a seminal scientific contribution through the development of the one-bead-one-compound (OBOC) approach to combinatorial chemistry. He has published over 350 peer-reviewed scientific publications and holds over 30 patents on inventions.

Abstract

The one-bead one-compound (OBOC) combinatorial chemistry method enables one to rapidly synthesize and screen large number of peptides or small molecules against various biological targets. Over the last two decades, OBOC method has evolved tremendously, in the areas of solid-support, chemical encoding, synthetic chemistry, and high-throughput biochemical and cell-based screening. Most recently, we have succeeded in using OBOC method to discover novel membrane active peptides, genetically encoded small illuminants (GESIs), and self-assembly peptides with supramolecular properties. We have also integrated cancer targeting peptides with self-assembly peptides to create novel cancer targeting transformable nanoplatform for cancer therapy. We were able to demonstrate that HER2-targeting nanoparticle could target HER2 positive tumors efficiently in live animals. At the tumor sites, the nanoparticle underwent receptor-mediated transformation into nano-fibrilles, leading to inhibition of HER2 dimerization, suppression of HER2 downstream signaling, tumor cell death and completion elimination of the tumors in xenograft models.