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Structure and function of a Custom Anticancer Peptide

Hueih-Min CHEN

National Nano Device Laboratories, Nano
Biomedical and MEMS Technology Division,
Taiwan

Several natural antimicrobial peptides including cecropins, magainins and melittins have been found to kill cancer cells. However, their efficacy may not be adequate for their development as anticancer agents. In this study, we used a natural antimicrobial peptide, cecropin B (CB), as a template to generate a novel anticancer peptide, CB1a. The circular dichroism spectra showed that CB1a is unstructured in aqueous solution, but adopt a helical conformation in membrane-like environment. The solution structure of CB1a in a polar solvent was also studied by NMR. CB1a formed a helix-hinge-helix in 20 % HFIP solution, and it was found with the bent angle between two helical segments ranging from 60° to 110°. Isothermal titration calorimetry reveals the association constant of CB1a bound to low molecular weight heparin is $1.66 \times 10^5 \text{ M}^{-1}$ at physiological ionic strength at 25°C. CB1a demonstrated promising activity against several cancer cells but low toxicity against non-cancer cells. The IC_{50} of CB1a on leukemia and stomach carcinoma cells were in the range of 2- to 8-fold lower than those of CB. Besides, CB1a exhibited low haemolytic activity against human red blood cells. Due to these properties, CB1a has the potential to become a promising anticancer agent.

Biography

Hueih-Min Chen has completed his Ph.D at the age of 32 years from University of Texas at Arlington and postdoctoral studies from University of Minnesota at St. Paul and from National Medical Center of the City of Hope at Los Angeles. He was an assistant professor at Hong Kong University of Science and Technology, Hong Kong, and associate professor at Academia Sinica, Bioagricultural Technology Research Center, Taiwan. Currently, he is a research fellow/PI at National Nano Device Laboratories, Taiwan. He has published more than 45 papers and served as many editorial board members in reputed journals.