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A potential universal cancer biomarker revealed by bioimaging of fluorescent probes for point-of-care screening of cancer

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Cancer remains as one of the leading causes of death in many countries. Cancer is not a single disease but a complex progression of cellular/tissue mutation. Currently, no "universal" cancer biomarker has been documented. It is a great challenge to find a universal cancer biomarker. Finding a common target of intracellular difference between cancer and normal cells is extremely important for cancer prevention, detection, and treatment. A single-stranded Guanine-rich (G-rich) sequence is capable of forming G-quadruplex (G4) via Hoogsteen hydrogen bonds under physiological condition. G4 oligonucleotides have recently gained much attention as a possible target for cancer research. Fluorescent probe together with optical imaging provides a means of visualizing the possible differences between cancer cells and normal cells. A fluorescent probe, 3,6-bis(1-methyl-2-vinylpyridinium) carbazole diiodide (o-BMVC), showed a large contrast in binding affinity to DNA of ~107 for G4s and ~105 for duplexes. Moreover, the fluorescent decay time of o-BMVC is longer (≥2.4 ns) upon binding to most G4s such as G-rich sequences in telomeres and some promoter oncogenes, while the decay time is shorter (~1.2 ns) upon interaction with duplex structures such as linear duplexes

Biography

Ta-Chau Chang was awarded his PhD degree from Iowa State University, USA 1985. He was a visiting fellow in CIRES at Boulder for one year and a postdoctoral fellow at University of Illinois at Urbana for two years. He went back to Taiwan and joined the Faculty of Institute of Atomic and Molecular Sciences, Academia Sinica 1988. His current research interests focus on the development and application of fluorescent theranostic agents in cancer research and advanced optical methods, and G-quadruplex in biomedical research.

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