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Development and Biological Applications of Various Bioimaging Probes

Tetsuo Nagano
(Grad Sch Pharm Sci, Univ Tokyo)

It is generally said that an appeal to the eye is more effective than that to the ear, which may be the basis of the proverb “Seeing is believing”. Techniques to visualize physiological or pathophysiological changes in living cells become increasingly important in biomedical sciences. The most important breakthrough for this purpose is to create selective and sensitive sensing tools. Fuorescence probes are excellent tools to analyze and clarify the roles of biomolecules in living cells, affording high spatial and temporal resolution via microscopic imaging, so the development of tools for probing biological events has been an area of intense interest.

We have developed more than 20 bioimaging fluorescent probes according to the rational molecular designs, based on the mechanisms of photoinduced electron transfer (PeT), fluorescence resonance energy transfer (FRET) and intramolecular charge transfer (ICT).

Newly developed bioimaging probes are shown below;

1. Nitric oxide probes (DAF-2, DAF-2DA, DAF-FM, DAF-FM DA, DAR -4M, DAR-4M AM, DAMBO, DAC)
2. Highly reactive oxygen species probes (HPF, APF)
3. Various esterase probes
4. Zinc probes (ACFs, ZnAF-2, ZnAF-2 DA, ZnAFs, ZnAB, ZnAF-R-2)
5. Magnesium probe (2’-CFs)
6. Singlet oxygen probes (DPAX, DMAX)
7. Caspase probe
8. Anion probe
9. Phosphodiestrase probe
10. Protein tyrosine phosphatase probe
11. beta-Galactosidase probe
12. Glucosidase probe
13. Alkaline phosphatase probe
14. Functional probes based on lanthanide complexes

At the conference I will introduce the rational molecular designs for developing imaging probes and some findings obtained by applications of these probes to living cells and/or tissue cultures.