Zinc-Chelating Ratiometric Fluorescent Probes And Related Methods

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Technology description

Investigators at Northwestern University have synthesized a new class of zinc-chelating probes that are useful as ratiometric probes for zinc (Zn(II)). The development of this probe allows the use of a new research reagent to be utilized in the investigation of the functions of zinc in biological systems.
The inorganic physiology of intracellular zinc is poorly understood but of emerging importance in understanding a variety of disorders in humans. Histochemical studies of mammalian tissues including the prostate, the insulin secreting beta cells of pancreatic islets, and the dentate neurons of the hippocampus reveal patterns of Zn(II) accumulation that are disrupted in some types of prostatic cancer, diabetes and neurodegerative disorders respectively.

BACKGROUND

Zinc is essential for life through its role in hundreds of zinc enzymes and thousands of zinc proteins. An essential role of zinc has been demonstrated in the folding of the DNA-binding domains of eukaryotic transcription factors, including the zinc finger transcription factors and the large family of hormone receptor proteins. Similar functions are also expected for zinc found in the RNA polymerases and the zinc-containing accessory proteins involved in nucleic acid replication. The involvement of zinc in the activity of so many proteins demonstrates the need for tools that can be used to quantitatively and qualitatively measure zinc. catalytic, structural, and regulatory functions of zinc in these proteins impact metabolism, gene expression, and signal transduction, including neurotransmission.
The probes of this invention incorporate 2-(2'-hydroxypheny)benzooxazole (HBO) as a fluorophore with an aminomethyl pyridine moiety, to bind heavy metal ions selectively. Probes of this family are effective probes to measure zinc concentration in physiological solutions,as the absorption spectra of these indicators shift upon zinc binding. Shown below is the emission spectra for Zinbo-5, one of the indicators in this family. A variety of other probes have been developed and further non-confidential information is available upon request.

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