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The role of the organoselenium in small molecular probe for detection of biologically important analytes

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Organoselenium molecular probes show great promise in the detection of deleterious/essential biological analytes such as reactive oxygen species (ROS) and biothiols in living biological systems. These biological species are thought to play important roles for normal physiological processes; an overproduction or deficiency of them can be indicative of cancer, neurodegenerative disease disorders such as Alzheimer's and Parkinson's disease. ROS play an important role in many biological systems such as apoptosis, gene expression and activation of cell signalling cascades. When cells produce ROS beyond its antioxidant capacity, damage to lipids, proteins, and DNA may occur. It is a major cause of cellular damage and cell death resulting in/suspected in many disorders, e.g. cancers, neurodegenerative diseases and cardiovascular diseases. Biothiols, such as cysteine (Cys), homocysteine (Hcy) and glutathione (GSH), play crucial roles in biological systems. GSH, an enzymatic antioxidant, is the most abundant intracellular biothiol, composed of Cys, glutamine and glycine. GSH plays a central role in protecting the cell from oxidative damage and in maintaining biological homeostasis which plays a significant role in cell growth and function among other biothiols (e.g. Cys, and Hcy). Although GSH is concentrated in the liver, it protects the whole body from various toxins produced by the body itself as a result of normal metabolic processes and exposure to external toxins such as environmental agents, harmful and illicit drugs, etc. Abnormal levels of GSH lead to oxidative stress responsible for, or observed in, premature aging and other conditions such as Alzheimer's disease (AD), Parkinson disease (PD), cancer, cystic fibrosis, AIDS, osteoporosis, cardiovascular disease and sickle cell anemia. Hence, selective determination of these species is required for a better understanding of their role in biological systems and in early diagnosis of disease. The task of preparing next generation probes is found at the synthetic laboratory bench. The details of synthesis, screening, biological studies and general application of phenyl selenium-based small molecular probe will be discussed in this presentation.

Biography

Youngsam Kim is presently studying Ph.D. coursework at KAIST under supervision of Professor David G. Churchill. He has obtained a bachelor's degree in Chemistry from Kyung Hee University. While an undergraduate, he worked in the "Organic catalyst and Synthesis Laboratory" as a research student

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