FALL 2023

SEMINAR FOR NEUROTRAUMA AND DISEASES

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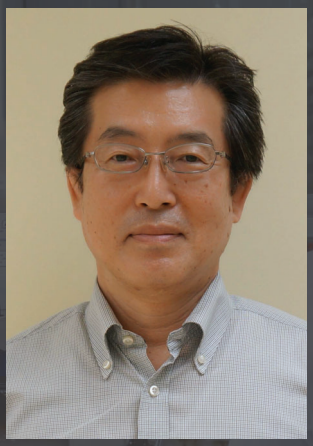
PRESENTS

FEATURED SPEAKER



KOJI UCHIDA, PHD

Professor of Food Chemistry, Department of Applied Biological Chemistry, The University of Tokyo

Koji Uchida is a Professor of the Laboratory of Food Chemistry, Department of Applied Biological Chemistry, Graduate School of Agricultural and Life Sciences, The University of Tokyo. His interests are interdisciplinary and span food sciences, lipid peroxidation, natural antibodies and innate immunity. In the past years, his team has made important discoveries in the field of covalent protein modification with endogenous electrophiles. The work on the electrophiles has been focused on lipid peroxidation-derived aldehydes, such as 2-alkenals, 4-hydroxy-2-alkenals, and ketoaldehydes. His research has focused on the identification and characterization of oxidation-specific epitopes as well as of soluble pattern recognition proteins, such as antibodies, that specifically recognized the epitopes. He has also been interested in the immune recognition of the modified proteins, and particularly how these responses can be associated with human pathogenesis, such as atherosclerosis and autoimmune diseases.

His laboratory in Tokyo is currently defining the functional role of immune cells and pattern recognition proteins, including multi-specific natural antibodies as well as complement factors and apolipoproteins as a sensor of oxidation-derived epitopes bearing electronegative potentials. He is particularly interested in the mechanism of how these epitopes could serve as a ligand of natural antibodies and in events important in controlling the immune responses. Another important focus of Dr. Uchida's research interests is on the inflammatory response of macrophages to defined oxidation-specific adducts and the role of circulating serum proteins, such as albumin, as carriers of biologically active oxidized lipids.

DISCOVERY OF COVALENT MODIFICATIONS THAT GIVE PROTEINS SIMILAR CHEMICAL PROPERTIES TO DSDNA

Date: November 29, 2023 **Time:** 4:00 p.m. - 5:00 p.m. EST

Location: DLR 131 **Zoom Link:** https://bit.ly/441Dllq

Meeting ID: 998 3163 3744 **Passcode:** CPR

ABSTRACT

Endogenous reactive species, such as oxidized fatty acids and intermediates of glycolysis, mediate covalent modification of proteins under physiological conditions. The α-amino group of lysine represents one of the targets of modification, which has a great impact on the chemical properties of proteins and has important functional and regulatory consequences. Lysine N-pyrrolation, converting lysine residues to N^{ε}-pyrrole-L-lysine (pyrK), is a recently discovered posttranslational modification. This naturally occurring reaction confers electrochemical properties onto proteins that potentially produce an electrical mimic to DNA and result in specificity toward DNA-binding molecules such as anti-DNA autoantibodies. The discovery of this unique covalent protein modification provides a rationale for establishing the molecular mechanism and broad functional significance of the formation and regulation of pyrK-containing proteins. This presentation summarizes the state of knowledge about the chemistry of this unique conversion reaction of proteins into DNA mimetics by reactive species.

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