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Effect of spermine-derived AGEs on oxidative stress and polyamine metabolism

Tsutsui A., Pradipta A., Kitazume S., Taniguchi N., Tanaka K.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017 The Royal Society of Chemistry. Non-enzymatic glycation between proteins and carbohydrates, such as advanced glycation end products (AGEs), are naturally occurring compounds implicated in aging and numerous degenerative diseases. Methyl glyoxal (MG), which is an intermediate of the AGE biosynthetic pathway, is known to react with primary amines of proteins to create a wide range of AGE modifications, such as carboxyethyl lysine (CEL) and methylglyoxal-derived lysine dimer (MOLD). As a means to investigate and probe the ROS production pathways of AGEs, low molecular weight compounds carboxyethyl spermine (CES) and methylglyoxal-derived spermine dimer (MOSD) were synthesized, which replace lysine with another highly nucleophilic biological amine, spermine (SPM). Contrary to expectations, results show CES- and MOSD-induced oxidative stress proceeds through different pathways. As such, we have developed useful probes that can be used to better understand and investigate pathways related to acrolein-based oxidative stress and/or polyamine metabolic pathways.

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