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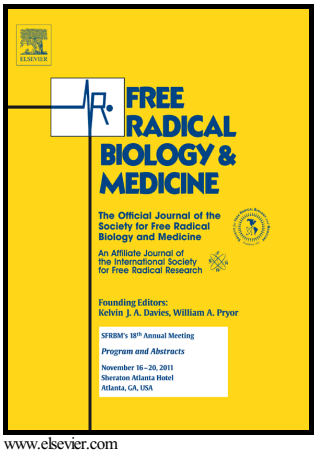

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PII: S0891-5849(17)30065-5
DOI: http://dx.doi.org/10.1016/j.freeradbiomed.2017.02.003
Reference: FRB13196

To appear in: *Free Radical Biology and Medicine*

Cite this article as: Bebiana C. Sousa, Andrew R. Pitt and Corinne M. Spickett Chemistry and analysis of HNE and other prominent carbonyl-containing lipi oxidation compounds, *Free Radical Biology and Medicine* http://dx.doi.org/10.1016/j.freeradbiomed.2017.02.003

Chemistry and analysis of HNE and other prominent carbonyl-containing lipid oxidation compounds

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Abstract

The process of lipid oxidation generates a diverse array of small aldehydes and carbonyl-containing compounds, which may occur in free form or esterified within phospholipids and cholesterol esters. These aldehydes mostly result from fragmentation of fatty acyl chains following radical oxidation, and the products can be subdivided into alkanals, alkenals (usually α,β-unsaturated), γ-substituted alkenals and bis-aldehydes. Isolevuglandins are non-fragmented di-carbonyl compounds derived from H_2-isoprostanes, and oxidation of the ω-3-fatty acid docosahexenoic acid yield analogous 22 carbon neuroketals. Non-radical oxidation by hypochlorous acid can generate α-chlorofatty aldehydes from plasmenyl phospholipids. Most of these compounds are reactive and have generally been considered as toxic products of a deleterious process. The reactivity is especially high for the α,β-unsaturated alkenals, such as acrolein and crotonaldehyde, and for γ-substituted alkenals, of which 4-hydroxy-2-nonenal and 4-oxo-2-nonenal are best