

Probing stress-induced effects on RNA and post-transcriptional modifications by LC-MS

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Identification of damage inflicted on cellular biomolecules is the first step in potential development of strategies for improvement of tolerance responses. Although stress induced damage to proteins and DNA is well documented, information about RNA damage is largely extrapolated from studies on DNA. Liquid chromatography coupled with mass spectrometry (LC-MS) is a powerful technique used for accurate molecular characterization of stress-induced effects on cellular molecules including nucleic acids. Our initial goal is to document the profile of xenobiotic stress (drug abuse, radiation, viral infection) induced effects on RNA and its post-transcriptional modifications by LC-MS, so that a library of damage products of RNA or modification profiles can be prepared. We are using bacterial and human cell lines as model systems to understand the impact of stress on post-transcriptional modifications (~150) found in RNA. Systematic studies indicating the appearance of significant amounts of RNA damage products, and loss of a specific class of post-transcriptionally modified nucleosides upon exposure to UVA-induced stress environment will be presented. These changes will be compared against those observed in RNA upon stress exposure under intracellular conditions.

Key words: UVR, RNA damage, RNA photoproducts, post-transcriptional modifications, stress responses.