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Arginine modification by 1, 2-dicarbonyl compounds studied by liquid chromatography-electrospray ionization mass spectrometry (LC-ESI-MS)

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1, 2-dicarbonyl compounds are highly selective in covalently modifying side chain guanidine group of arginine. Hence, these compounds find application for understanding the importance of arginine in enzymes, e.g. ATPase, kinase, etc. that recognize anionic substrates. Studies by radioactive 14C labeled phenylglyoxal (PG) or electrospray ionization mass spectrometry (ESI-MS) show that either 1 or 2 molecules of PG modify guanidine moiety of arginine in enzymes; whereas MS based investigations indicate addition of only one molecule of 1, 2-cyclohexanedione (CHD) onto guanidine group of arginine in proteins/peptides. To attain clearer insights, herein, we decided to probe amino acid L-arginine (L-Arg) modification by liquid chromatography (LC)-ESI-MS (LC-ESI-MS). Reactions were conducted using equimolar concentrations of reactants at room temperature (25^0C) in seven different mediums. In borate buffer, exclusively 1:1 adduct of L-Arg:PG (m/z 309) is observed. However, with CHD, L-Arg forms 1:1 adduct (m/z 287), 1:2 adduct (m/z 399) and respective water condensed products (m/z 269 and m/z 381) in borate. Interestingly, in water medium too, L-Arg is modified yielding condensed and uncondensed products of both 1:1 and 1:2 stoichiometries with PG as well as CHD. This is the first LC-ESI-MS study on L-Arg modification accomplished by phenylglyoxal and 1, 2-cyclohexanedione. Additionally, observations from modification by 2, 3-butanedione and LC-ESI-tandem MS (MS/MS) investigations on some model peptides containing one or two arginines shall be discussed. Furthermore, results obtained from the experiments conducted on a model protein, bovine pancreatic ribonuclease A will also be presented.

Biography

V Sabareesh completed his PhD in Molecular Biophysics Unit at Indian Institute of Science, Bengaluru, India. He received Prof. B. H. Iyer Medal for best PhD thesis. He completed his Post-doctoral research at Michael Barber Centre for Mass Spectrometry, University of Manchester, UK, during 2008-09. He received Young Scientist Award from Indian Society for Mass Spectrometry in 2013 and is a recipient of 'Start-Up Research Grant (Young Scientists)' from SERB, Government of India. His research interest includes "Biomolecular mass spectrometry, specifically tandem mass spectrometry of peptides and proteins".

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