Elda Iljazi, J Glycobiol 2018, Volume 7
DOI: 10.4172/2168-958X-C2-014

Defining D-arabinose metabolism in *Leishmania major* and *Crithidia fasciculata*

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The metabolism of D-arabinose (D-Ara) in eukaryotes is poorly understood. Arabinose (Ara) is one of the "rare" aldopentose sugars distributed in nature, principally as a component of cell wall structures in plants and bacteria. Arabinose exists naturally in both pyranose and furanose conformations and D- and L- configurations. However, D-arabinopyranose (D-Ara*p*) is found, uniquely, in cell surface glycoconjugate structures of certain trypanosomatid parasites: *Leishmania major* lipophosphoglycan (LPG), *Crithidia fasciculata* lipoarabinogalactan (LAG) and *Endotrypanum schaudinni* glycoinositol phospholipids (GIPLs). The activated donor molecule of D-Ara*p* has been identified in L. major as GDP-α-D-Ara*p*. However, the source of the GDP-Arap is not fully understood. So far it is known that both L. major and C. fasciculata have a salvage pathway allowing the parasites to internalize D-Ara from the extracellular medium or the lumen of the insect guts and convert it to GDP-α-D-Arap via an arabinose-1-kinase/pyrophosphorylase. A *de novo* pathway, whereby D-Glucose (D-Glc) is converted to D-Ara*p* via loss of the Glc C-1 carbon atom has been postulated but many details are missing. Many Gram-negative bacteria have an arabinose-5-phosphate isomerase (APIs) enzyme. In bacteria, API enzymes catalyze the interconversion of D-ribulose-5-phosphate (Ru5P), the product of the oxidative phase of the pentose phosphate pathway, and D-arabinose-5-phosphate (A5P). A5P is a precursor to 3-deoxy-D-manno-octulosonic acid (KDO) that is a component of the bacterial capsular polysaccharides and lipopolysaccharides (LPS). KDO is an essential component of the cell envelope of Gram-negative bacteria. We speculate that trypanosomatids may also convert D-Glc to D-Ara*p* via Ru5P and its isomerization to A5P, followed by dephosphorylation to D-Arap. Apart from cell surface incorporation by *L. major* and *C. fasciculata,* it is possible that D-Arap may be used by all the kinetoplastids to make D-erythro-ascorbate, a C5 ascorbate analogue similar in structure and physicochemical properties to ascorbate (Vitamin C). In summary, central to the problem of eukaryotic D-Arap metabolism is the bioconversion from D-Glc to D-Ara*p*.

Biography

Elda Iljazi received her Bachelor's Degree and Master's Degree from the University of Milan. She then moved to the University of Dundee for her PhD studies to work with Professor Mike Ferguson.

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