Joanne Blanchfield et al., J Glycobiol 2017, 6:2(Suppl)
DOI: 10.4172/2168-958X-C1-008

Glycosylation affects the bioavailability of saponins in herbal extracts

Joanne Blanchfield[1], Stockdale T[1], Hong Hung Trie[1], Challinor V L[1], Leitch D[2], Wohlmuth H[2] and **De Voss J J[1]**
[1]The University of Queensland, Australia
[2]Integria Healthcare (Australia) Pty Ltd, Australia

Saponins are a class of natural products that are present in many herbal extracts. These compounds consist of a hydrophobic core, often a steroid or terpenoid derivative, decorated with varying numbers and types of sugar units attached at various positions. These compounds are often suggested to be the bioactive components of extracts but little is known about the bioavailability of the compounds. Our group recently identified a new class of open-chain steroidal saponins from Chamaelirium luteum, an indigenous American herb marketed for women's issues. We have fully characterized a series of these compounds and used the Caco-2 monolayer model of the GI tract to evaluate the potential bioavailability and metabolic vulnerability of eight of these compounds. The saponin, 6-Dehydrochamaeliroside A(1) was found to have good permeability and chamaeliroside A(2) was found to have moderate permeability. All bidesmodic saponins based on chiograsterol A and B cores exhibited low permeability. The aglycone steroids, chiograsterol B and helogenin showed minimal bioavailability. None of the compounds appeared to be significantly metabolized by Caco-2 cell homogenate. Our results suggest an interesting structure activity relationship with the compounds with sugar units on one site of the core being absorbed while compounds with sugars at both ends of the core are not absorbed. We are further examining this relationship to determine if active transporters such as the GLUT transporters may be involved in the absorption of some saponins but not others.

Biography

Joanne Blanchfield is a Teaching and Research Associate Professor in the School of Chemistry and Molecular Biosciences at the University of Queensland. Her research broadly concerns drug and vaccine development and delivery. Her research includes projects concerning the isolation and biological evaluation of the bioactive compounds from herbal extracts with emphasis on the oral bioavailability of compounds as estimated via the Caco-2 cell model of the GI tract. The group also explores the design and synthesis of antigen presenting constructs designed to mimic more complex antigen structures using simplified components on a rigid scaffold. We are currently studying the construction of carbohydrate and peptide antigens from Staphylococcus aureus, HIV and HPV.

j.blanchfield@uq.edu.au

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