

Mechanisms of nutrient absorption in bats

Principal Supervisor: Todd McWhorter

Email: todd.mcwhorter@adelaide.edu.au

Phone: 8303 7896

Recent research into mechanisms of water soluble nutrient absorption in vertebrates has revealed some interesting patterns. Small flying vertebrates (birds and bats), for example, exhibit relatively higher reliance on non-carrier mediated (paracellular) nutrient uptake than other groups of vertebrates, possibly as compensation for their generally shorter and lighter guts (Caviedes-Vidal et al., 2008; Caviedes-Vidal et al., 2007; Tracy et al., 2007). Paracellular nutrient uptake can provide additional capacity for nutrient absorption that is energy efficient and does not saturate like carrier-mediated mechanisms of absorption. Because it is not specific and is associated with relatively higher intestinal permeability, it does however come with increased risk of systemic exposure to water soluble toxins found in animal diets.

This project is part of a collaborative U.S. National Science Foundation funded project to explore patterns in and mechanisms of nutrient absorption in small flying mammals (i.e. bats). It will include both in vivo measurements of nutrient absorption in bats using pharmacokinetic techniques, and studies of the function and expression of nutrient transporter proteins and tight junction proteins (important in forming the epithelial barrier).

This project will be available for 2012 honours intake, but I would consider a mid-year 2011 intake for a highly motivated student. Similar projects on mechanisms of nutrient absorption (both carrier-mediated and paracellular) can also be developed in other animal models.

Relevant reading:

Caviedes-Vidal, E., Karasov, W. H., Chediack, J. G., Fasulo, V., Cruz-Neto, A. P. and Otani, L. (2008). Paracellular absorption: a bat breaks the mammal paradigm. *PLoS ONE* **3**, e1425.

Caviedes-Vidal, E., McWhorter, T. J., Lavin, S. R., Chediack, J. G., Tracy, C. R. and Karasov, W. H. (2007). The digestive adaptation of flying vertebrates: high intestinal paracellular absorption compensates for smaller guts. *Proceedings of the National Academy of Sciences of the USA* **104**, 19132-19137.

Tracy, C. R., McWhorter, T. J., Korine, C., Wojciechowski, M. S., Pinshow, B. and Karasov, W. H. (2007). Absorption of sugars in the Egyptian fruit bat (*Rousettus aegyptiacus*): A paradox explained. *Journal of Experimental Biology* **210**, 1726-1734.