# P55

## Assessment of body composition of laboratory animals by bioimpedance spectroscopy

LC Ward, K Battersby, S Mason
*School of Molecular and Microbial Sciences, University of Queensland, Brisbane, QLD 4072*

**Background** – Extensive use is made of laboratory animals, typically rats and mice, in nutritional research, for example in feeding trials. Often, knowledge of treatment effects upon body composition, serially over the duration of the trial, is required. Unfortunately, there are few suitable non-destructive analytical methods. Dual energy X-ray absorptiometry (DXA) has been used, but instruments specific for animal use are no longer commercially available. Quantitative magnetic resonance is also possible, but the equipment is expensive and not portable. Bioimpedance spectroscopy (BIS) is a potential alternative, the equipment being inexpensive, hand-held and easy to use.
**Objective –** The aim of the study was to assess the practicality of an impedance device, specifically designed for use in animals, for body composition assessment in rats and to determine tissues fluid resistivity coefficients, ρ, a necessary pre-requisite for future use of the technology.
**Design –** Total body water (TBW) was determined in 50 rats (30F:20M, weighing 80-505 g) by tritium dilution simultaneously with measurement of extracellular water (ECW) by NaBr dilution as reference methods. Whole body impedance, base of the tail to between the ears along the midline, was determined using an ImpediVET™ BIS device in lightly anaesthetised animals. Resistivity coefficients were determined for both males and females in a 2/3 sub-set of randomly selected animals and used to predict fat-free mass (FFM, as TBW/0.732) in the remaining one-third of animals. Results were compared with dilution values using correlation and limits of agreement analysis.
**Outcomes –** Percentage TBW, by dilution, of all rats were 55.4 ± 6.7% and 58.1 ± 3.8% for females and males respectively, equating to 74.8 ± 8.1% and 79.4 ± 5.2% FFM respectively. ECW volumes were 23.9 ± 5.0% and 24.8 ± 3.6% for males and females respectively. Predicted FFM in the cross-validation groups of rats were 156.1 ± 44.5 g and 322.4 ± 69.5 g compared to measured values of 161.1 ± 47.3g and 326.0 ± 66.9 g for females and males respectively. Data were highly correlated ($r$ = 0.99) with a mean bias of 2.0% and limits of agreement of ± 12%.
**Conclusion –** BIS is a practical method for the assessment of body composition in rats (also in mice, unpublished data). A potential disadvantage is the need to anaesthetise the animal, albeit lightly and for only 2-3 min.

# P56

## β-glucan degradation in white wheat bread during fermentation and baking

J Cleary, CS Brennan
*Institute of Food, Nutrition & Human Health, Massey University, Palmerston North, New Zealand*

**Background –** Soluble fibres such as (1→3)(1→4)-β-glucan (hereafter referred to as β-glucan) have been illustrated to be effective in reducing postprandial glycaemic, insulin, and cholesterol responses in humans. Cereals, such as oat and barley are rich sources of β-glucan, with numerous studies demonstrating their nutritional benefits. The nutritional efficacy of β-glucan preparations is in part related to dose, molecular weight, fine structure and rheological characteristics of extracted and native β-glucan.
**Objective –** To quantify effects of the baking process on the molecular weight profile of differing β-glucan preparations in relation to the potential glycaemic affect post ingestion.
**Design –** White wheat bread was formulated to contain 4.5g β-glucan (d.w.b), a control bread, containing no extract was also prepared. Doughs were fermented for 1 and 3 hours, followed by a high temperature bake. Height, volume and firmness of baked breads were determined. Breads were subjected to a 300 minute *in vitro* digestion and the micro-structure of the digesta (at 0, 150 and 300 minutes) determined using scanning electron microscopy. The molecular weight of β-glucan contained within doughs, breads and *in vitro* digestas were determined.
**Outcomes –** Incorporation of Glucagel™ to the bread resulted in lowered volume, height and increased crumb firmness. Glucagel™ resulted in a significant reduction *in vitro* sugar release from the breads, over a 300 minute digestion. Differences in the structure of digestas were observed with Glucagel™ incorporation, with an apparent retention of starch granule structure, compared to control bread. There was minimal degradation of the molecular weight of the β-glucan during fermentation, baking and *in vitro* digestion, suggesting stability of the extract.
**Conclusion –** Such information about commercial β-glucan extracts will allow for greater use as nutraceuticals.