

Ultrasonographic imaging as a refinement technique in laboratory rodent models and potential applications of the technology in gastro-intestinal disease studies.

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Background

Animal models are widely used in biomedical research for investigations into disease processes and potential therapeutic applications. As investigators we have both an ethical and legal duty to consider “the 3 R’s” i.e. replacement, reduction and refinement. Whilst ultrasound technology is not new, it is often an expensive and bulky piece of equipment which often precludes its use in rodent studies. The Speq ultrasound scanner is a handheld scanner which is currently on trial in the veterinary market and has been shown to have the resolution capable of distinguishing intestinal organs and pathological conditions in the larger veterinary species.

Aims and Significance

The aim of this project will be to validate the Speq scanner in rodent models thus determining whether it has the resolution capacity to distinguish abdominal and thoracic organs and allow meaningful measurement. After this initial work, collection of a body of data on organ sizes and their normal variation as determined by the scanner will be carried out for use in comparison in later studies. Following validation, use of the scanner in proven animal models of intestinal disease will be investigated as a tool for investigating progression of disease and as a potential alternative to timed sacrifice of animals for pathological investigation. Application of this technology will thus contribute to refinement and reduction of animal use in this, and potentially other animal models. The ability to non-invasively image pathological changes at an earlier stage of disease will also give greater insight into the pathogenesis of disease by allowing comparisons at different disease stages. The current study will seek to validate the machines in question and record objective organ data in the normal animal.

Techniques to be used

Training in use of the instrument will be received and knowledge regarding basic ultrasonographic principles will be acquired. The study will involve rodent handling and potentially use of anaesthetic techniques in these species. Use of basic post-mortem and gross and histological pathology techniques will also be gained. The student will also use basic statistical techniques to analyse the data.

References

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