

Potential PhD student projects Laboratory Animal Science group

1º Title: Refinement of anaesthesia in rabbits.

Responsible researcher: Luís Antunes lantunes@utad.pt

Summary: We have recently made new development for the safer use of propofol in this species. These studies aims to provide the student with the tools to develop the propofol pharmacokinetics / pharmacodynamics (PD /PK) model to be used in rabbits anaesthesia in research and reduce problems related with it.

Work will take place: at UTAD, Vila Real and Faculty of Pharmacy, Porto

Research methods: pharmacokinetics / pharmacodynamics (PD /PK) mode, physiology studies, toxicology basic (histo) pathology

Funded project: Not presently, resubmission planned.

Silva A, Campos S, Monteiro J, Venâncio C, Costa B, Guedes de Pinho P, Antunes L (2011).

Performance of Anesthetic Depth Indexes in Rabbits under Propofol Anesthesia: Prediction Probabilities and Concentration-effect Relations. *Anesthesiology*, Aug; 115(2):303-314.

Silva A, Ferreira DA, Venâncio C, Souza AP, Antunes LM (2011). Performance of electroencephalogram-derived parameters in prediction of depth of anaesthesia in a rabbit model. *Br J Anaesth*, 106 (4):540-7.

2º Title: Refinement of anaesthesia using zebrafish as alternative to mammals.

Responsible researcher: Ana Valentim amaria@ibmc.up.pt /_Luís Antunes lantunes@utad.pt

Since 30 years ago, the use of laboratory Zebrafish (*Danio rerio*) in research had been increasing. This project intents to evaluate the effects of anaesthetics commonly used in mammals (ketamine and isoflurane) applied to zebrafish in its early stages of development and in adulthood, to improve anaesthesia in Zebrafish and promote this model as an alternative to rodents regarding the 3Rs.

Work will take place: at UTAD, Vila Real, IBMC, Porto, and CNC, Coimbra

Research methods: behaviour studies, physiology studies, basic toxicology, (histo)pathology, genetics

Funded project: Yes (PTDC/CVT-WEL/4672/2012)

References:

Valentim, A. M., Di Giminiani, P., Ribeiro, P. O., Rodrigues, P., Olsson, I. A., Antunes, L. M.

(2010) Lower isoflurane concentration affects spatial learning and neurodegeneration in adult mice compared with higher concentrations. *Anesthesiology* 113(5), 1099-1108

Félix, L., Coimbra, A. M., Antunes, L. (2012) Ketamine can lead to malformation of zebrafish (*Danio rerio*) larvae. Paper presented at the Euroanaesthesia Congress, Paris, France.

Soares J, Coimbra AM, Reis-Henriques MA, Monteiro NM, Vieira MN, Oliveira JM, Guedes-Dias P, Fontaínhas-Fernandes A, Parra SS, Carvalho AP, Castro LF, Santos MM. (2009). Disruption of zebrafish (*Danio rerio*) embryonic development after full life-cycle parental exposure to low levels of ethinylestradiol. *Aquat Toxicol.* 95(4),330-8

3º Title: Refining euthanasia methods for large number of mice

Responsible researcher: Ana Valentim amaria@ibmc.up.pt

High number of mice had to be euthanized everyday in commercial breeders and in animal facilities, and there is still no ideal method. This project aims to study the preference of a mouse to stay in an environment with the commonly used euthanasia method carbon dioxide, or in an environment with other gases or gases combination, in order to assess a better euthanasia method.

Work will take place: at IBMC, Porto

Research methods: behaviour studies, physiology studies, histology

Funded project: No / Internal budgets

References:

Valentim A.M., Alves H., Silva, A. M., Olsson I.A., Antunes L.M. (2008). Effects of depth of isoflurane anaesthesia on a cognition task in mice, *British Journal of Anaesthesia*; 101: 434-435.

Makowska, I. J., L. Vickers, J. Mancell and D. M. Weary (2009a). "Evaluating methods of gas euthanasia for laboratory mice." *Applied Animal Behaviour Science* 121(3-4): 230-235.

4º Title: Early pup mortality in laboratory mouse breeding

Responsible researcher: Anna Olsson Olsson@ibmc.up.pt

Early loss of entire litters during the first days post-partum is a problem in laboratory mouse breeding. The underlying factors are still poorly understood. This project in collaboration with a major mouse breeding facility aims to identify risk factors using an epidemiological approach, and to use pathology and behaviour studies to understand from which causes and in which situations mortality occurs.

Work will take place: at IBMC, Porto with periods of field work at Babraham Institute, Cambridge

Research methods: Epidemiology, behaviour studies, basic (histo)pathology

Funded project: Not presently but funding will be sought from NC3Rs

References

Weber EM, Algers B, Würbel H, Hultgren J, Olsson IAS. 2012. Influence of strain and parity on the risk of litter loss in laboratory mice. *Reproduction in Domestic Animals*. DOI: 10.1111/j.1439-0531.2012.02147.x

Weber EM and Olsson IAS. 2008. Maternal behaviour in *Mus musculus*: an ethological review. *Applied Animal Behaviour Science* 114: 1-22

Other PhD project topics in laboratory animal science, animal welfare and anaesthesia may be discussed.