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Sixth Session: ECLAM/ESLAV Foundation supported study

“Eutanasia mediante dióxido de carbono en ratas. Respuesta de comportamiento y del Sistema Nervioso Autónomo a la exposición del gas”.

“Carbon dioxide euthanasia in rats - behavioural and autonomic system responses to exposure”

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Carbon dioxide euthanasia in rats - behavioural and autonomic system responses to exposure. Huw Gollidge, Johnny Roughan, Lee Niel*, Claire Richardson, Sian Wright-Williams and Paul Flecknell, University of Newcastle, UK and *University of British Columbia, Canada

Exposure to Carbon Dioxide is widely used as a method of euthanasia for laboratory rodents, but recently it has been suggested that this technique may cause significant pain and distress (reviewed by Conlee et al, 2005). Carbon dioxide exposure can cause pain in human subjects, primarily by activation of nociceptors in the nasal mucosa and elsewhere by carbonic acid formed from CO₂. Similar nociceptor activation has been demonstrated in anaesthetised rats. If it is accepted that nociceptor activation occurs during euthanasia, then any behavioural changes seen could be related to pain perception. If this is the case, then treatments to alter nociceptor activation should modulate behaviour when rats are exposed to carbon dioxide. We tested this hypothesis by exposing rats (n=6 per treatment group) either to 100% carbon dioxide or a slowly rising concentration of the gas (2.4l/min in a 12.25l chamber). Prior to exposure rats were implanted with radio-telemetry devices to monitor either EEG and EMG or arterial blood pressure and ECG. This enabled assessment of autonomic and CNS responses and correlation of these with the behavioural changes observed. To modulate nociceptor responses, rats were treated either with the local anaesthetic lidocaine (applied to the nasal mucosa, oropharynx and cornea) or systemic acetazolamide which blocks carbonic acid formation. Control measurements were taken in the exposure chamber using air as the filling gas. 24-48h later behaviour was filmed and physiological parameters recorded during exposure to one of the two CO₂ filling methods. Behaviour was videotaped and analysed by an observer who was blinded to the treatments given. Preliminary analysis of the data showed major differences between the two methods of exposure, with marked cardiovascular responses to 100% CO₂, and much more modest responses to gradual exposure. The magnitude of the latter responses was no greater than would be expected from the known physiological effects of elevated arterial carbon dioxide concentrations. EEG analysis and video analysis of behaviour allowed estimates of time of loss of consciousness, which, as expected, was much more rapid with use of 100% exposure. Detailed results will be presented, and the welfare implications of the use of CO₂ discussed.