Clinical pathology and cardiovascular parameters are not influenced by housing rats under increased environmental complexity

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Abstract

Since the release of the revised Appendix A from the Council of Europe for housing of laboratory animals there have been claims that laboratory animals should be housed under more complex conditions; known popularly as enrichment. A number of studies have expressed concerns that this may increase uncontrollable variation in the animals, thereby creating the need for greater numbers of animals. Within neurobiology there would appear to be a scientific basis for such concern. However, even though this may be used as an argument for denying the animal environmental enrichment, it is unclear whether there is any basis for concern within other research areas. The aim of this study, therefore, was to explore whether clinical pathology and cardiovascular parameters were influenced by housing rats under environmentally enriched conditions. Male, Sprague-Dawley rats were housed under three different regimes: non-enriched, standard-enriched (according to the guidelines of the Council of Europe) and extra-enriched with a shelf and higher cages. All housing forms were based upon commercially available, standardised equipment. A total of 41 different parameters were monitored via clinical pathology, telemetry and coagulation tests and virtually no differences were observed in relation to the manner in which the rats were housed. The uncontrollable variation observed in our study was compared to within-strain variation data supplied from the breeder and was relatively low in all three types of housing. We conclude, based upon our studies in male, Sprague-Dawley rats, that so far there is no basis for concern that enriched housing will lead to increased group sizes when using animals for research within this field and, as such, there is no reason not to enrich the environment of such rats.

Keywords: animal welfare, clinical pathology, environmental enrichment, housing conditions, rats, telemetry

Introduction

Since 1959, there has been much focus on reduction, refinement, and replacement as key principles for the use of animals in research (Russell & Burch 1959). The practice of providing animals under captive care, complex housing conditions and environmental items to stimulate physical activity and natural behaviours as well as reduce stereotypic behaviours is more popularly referred to as environmental enrichment. Environmental enrichment has been defined as an improvement in the biological functioning of captive animals resulting from modifications to their environment (Newberry 1995) and may have a positive impact on well-being (Sorensen et al 2004), and is therefore an important form of refinement. The enrichment can either involve structuring of components within the primary enclosure; cage furniture, objects for manipulation, or cage complexities — or social contact and communication among members of the same species, although it can also include non-contact communication among individuals through visual, auditory, and olfactory signals (Institute of Laboratory Animal Resources 1996). Enrichment is increasingly appreciated as a way of improving the well-being of rodents, providing them with opportunities for species-specific behaviours that might be available to them in the wild (Ottesen et al 2004; Smith & Corrow 2005), and is seen as bringing crucial features of the environment into the laboratory to allow expression of natural behaviours (Blanchard & Blanchard 2003). Environmental enrichment should be regarded both as an essential component of the overall animal care programme; equally as important as nutrition and veterinary care (Baumans 2005), and recently the revised Appendix A of the Council of Europe (CoE) Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes (Council of Europe 2006) stated that environmental enrichment should generally be provided unless withholding is justified on veterinary or welfare grounds (Hansen et al 2002; Stauffacher et al 2002).