Animal Welfare in Diabetes Research: A Humane Endpoint Scoring System

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Abstract:

Humane endpoints are increasingly being used in animal experiments to ensure compliance with ethical regulations, namely the 3Rs policy. This study aimed to develop a clear humane endpoint (HE) scoring system for a streptozotocin (STZ)-induced diabetes model in male Sprague-Dawley rats. The rats were divided into a control (n=8) and an induced (n=16) group, with the latter receiving 10% fructose in their drinking water for 14 consecutive days. Following intraperitoneal administration of STZ (40 mg/kg) or 0.1 M citrate buffer, respectively, the following parameters were evaluated and scored: body weight, body posture, hair/tail appearance, grooming, grimace scale, mental status, response to external stimuli, hydration status, stool appearance, convulsions, and response to abdominal palpation. If the sum of the scores reached four or more, the animal was sacrificed. Additionally, several nutritional parameters, such as Lee index, body weight index (BWI), and abdominal and thoracic perimeters, were registered.

Following eight weeks of experiments, no animal reached the HE score of four, and no deaths were recorded. No changes were observed in control animals. However, after fructose administration, induced animals showed dehydration (14/16). After STZ administration were observed lack of grooming (8/16), narrowing of the orbital area (1/16), curved posture (10/16), liquid (3/16), pasty diarrhea (1/16), and abdomen distention (1/16). The nutritional parameters were significantly lower in diabetic animals when compared with control ones ($p<0.01$). This research has demonstrated that the HE scoring system can be successfully implemented in an animal model of diabetes, while still adhering to the 3Rs policy and addressing animal welfare concerns.

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Biography:

Ana Faustino is a Professor at the Department of Zootechnics of the University of Evora and a Researcher at CITAB/UTAD. She holds a Master's in Veterinary Medicine and a European PhD in Veterinary Sciences. Animal models of cancer, tumoral angiogenesis and imaging are her main areas of interest. She has collaborated in several Financed Research projects. The results of her works were published in more than 250 publications in several formats. She received several prizes of scientific merit, and highlights and press honors. She has experience in supervising graduate and post-graduate students. She participated in several courses, workshops, international and national meetings. She is an editorial member of several scientific journals and a reviewer of more than 300 manuscripts. She is the Guest Editor of two special issues in Veterinary Animals and in Life.