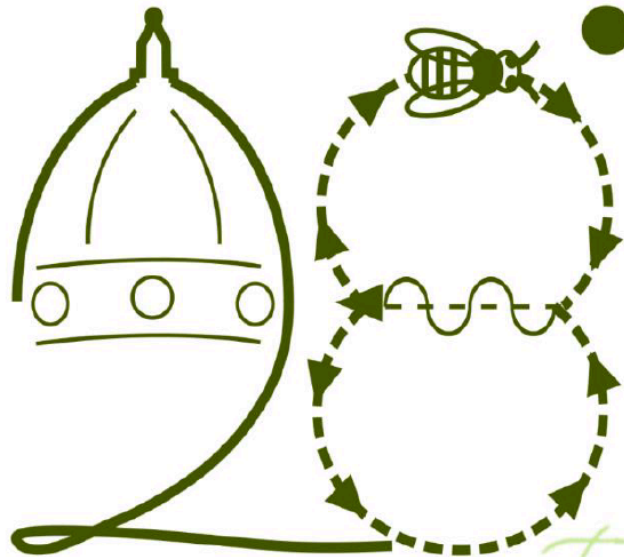


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## Evaluation of stress-induced genomic damage in shelter and home cats

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Chronic psychological stress was found to induce, in laboratory mice and rats, alterations in the expression of hepatic and brain genes. In humans, stress and anxiety conditions were associated to modifications in DNA methylation patterns and in the levels of genomic damage and telomeres erosion. No data are present in literature about the possible correlation between stress and genomic damage in felines. For this reason, we decided to evaluate the level of genomic damage in shelter cats ( $n = 30$ ), by buccal micronucleus assay. As control group, we sampled family cats ( $n = 30$ ) matched for age and sex but without any experience of shelters. The hypothesis was that stress conditions, like those potentially present in shelter houses, could affect the levels of genomic damage. Moreover, for the first time in literature, the baseline frequencies of buccal micronuclei (MNi) and nuclear buds (NBUDs) were provided for non-human mammals. MNi represent chromosome fragments or whole chromosomes that fail to segregate properly during mitosis, appearing in interphase as small additional nuclei. NBUDs represent elimination processes from cells of amplified DNA and/or excess chromosomes. For both groups, 30.000 cells were analysed. MNi and NBUDs frequencies (%) in shelter cats were  $0.210 \pm 0.209$  and  $0.220 \pm 0.183$ , respectively, whereas in family cats were  $0.100 \pm 0.383$  and  $0.110 \pm 0.092$ , respectively. Significant differences were found between shelter and family cats in terms of MNi ( $P < 0.001$ ) and NBUDs ( $P < 0.01$ ) frequencies, whereas sex and age did not influence the level of genomic damage in both groups. Animal behaviour was also assessed: all animals were subjected to Cat Stress Score (CSS), a short test to assess their stress level. This was done to give even more emphasis to the importance of animal welfare and to highlight some maladaptive behaviours that the animal can show, both in home and in shelters. These behaviours could also lead to fewer prospects for adoption and problems in the relationship between man and cat. As general result, we provided evidences of a possible association between stress conditions and highest levels of genomic damage in shelter cats. Our hope is that these results can be a stimulus to improve the hospitality conditions in shelters, in terms of living space and assistance, in order to reduce the stress conditions suffered by housed animals.

**Keywords:** *micronuclei, nuclear buds, genomic damage, stress*