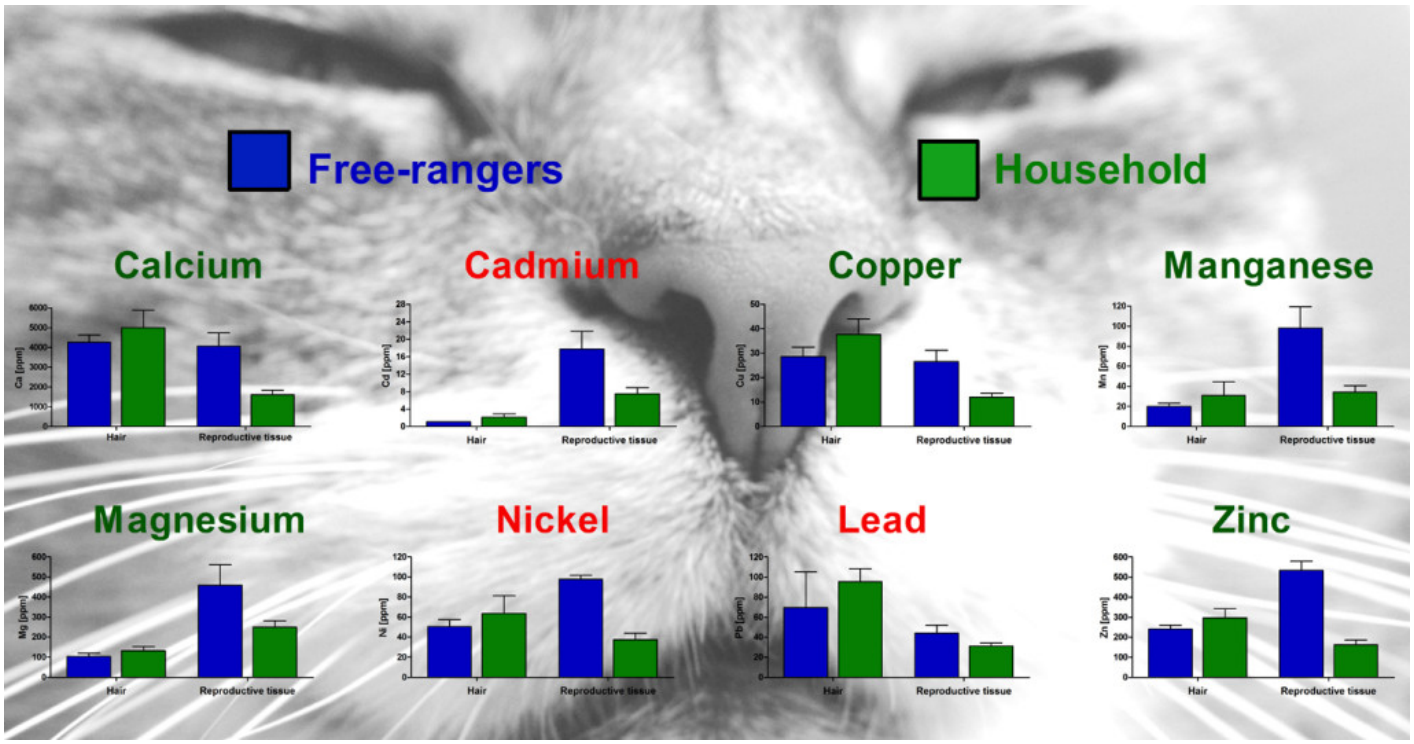
“Metal cats”: on the presence of chemical elements in feline reproductive system

Our cats may have their own ways but they still have a lot in common with humans. For example they suffer from similar diseases: diabetes mellitus, overactive thyroid or Alzheimers. However, most importantly, they often inhabit nearly the same environment as we do and experience the same environmental pressures. They can therefore be a valuable model for biomedical research.

As regards their lifestyle, domestic cats can be generally divided into two groups: household and free-rangers. The former may have more comfortable conditions of existence but do they really always realise their natural physical and dietary needs? They may still purr while lying for hours on your sofa in front of the TV after having a high quality meal served at a fixed time but how do such conditions affect their health in the long-term? A comparison between free-rangers and household cats is interesting not only from the feline point of view but because humans also experience various lifestyles: from sedentary to highly active. This may help us understand how the way we live can influence us, although on a smaller scale.

In an attempt to answer this question various approaches can be used. We have chosen to compare trace metal status in the hair and reproductive tissues (uterus and testis) of household and free-ranging individuals of domestic cat. Analyzed elements included those essential for proper reproductive function: calcium, copper, manganese, magnesium and zinc, and metals which can disrupt it: cadmium, nickel and lead.



Content of metals in hair and reproductive tissues of free-ranging (blue) and household (green) domestic cats.

Because of the continuous contact of the follicles with the bloodstream and high levels of keratin, hairs can potentially bind and deposit various metals while growing. Hence they could potentially be used for biomonitoring toxic exposures and body nutritional status, although to what extent the hair metal levels can really reflect their status in tissues remains a subject for ongoing discussion. Nevertheless, it would be of great value if it was possible to analyse hair and determine how the things are possibly going on in uterus or testis. This issue is however very difficult to study in humans due to problems in collecting sufficient tissue material. Cats, on the other hand, are frequently sterilized – by their owners or under spay*/neuter programs.*

As found in our study, the reproductive tissues of free-ranging cats unfed by humans were characterized by a generally better status of essential metals than household individuals fed on a commercial diet. This is likely to be attributable to the difference in the dietary habits of these two groups. In comparison with the recommended allowances for household cats, free-rangers were observed to consume larger amounts of minerals. It is probable that these differences arise from other nutritional goals - supporting survival and procreation in free-ranging cats and optimizing health and longevity in household individuals. Importantly, free-rangers were also characterized by increased levels of toxic metals. This was particularly obvious for individuals inhabiting urban areas which are often exposed to contaminated air and who feed on low-quality human waste. Our study found no association between concentrations of toxic and essential metals in the feline reproductive system and hair indicating that the latter may not be useful in the evaluation of exposure and nutritional status, at least in cats.

While these findings may be interesting for cat lovers, they also highlight the further need to research how the inhabited environment and diet influence metal status in the human reproductive system and its potential outcomes. This remains a difficult task but to paraphrase M. Twain “ *Challenges* are what *make science interesting,* overcoming them is what *makes science* meaningful”.

Publication

Free-ranging domestic cats are characterized by increased metal content in reproductive tissues.
Rzymski P, Niedzielski P, Poniedzia?ek B, Rzymski P, Pacy?ska J, Kozak L, D?browski P
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