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ABSTRACTS

POSTER SECTION 4: TOXICOLOGY

P4.1 | Humboldt penguin's feathers as bioindicators of metal body burden: a case study

S. Squadrone¹; P. Brizio¹; L. Favaro²; D. Florio³; C. D. Rugna³; M. C. Abete¹¹Istituto Zooprofilattico PLV, Torino, Italy; ²Department of Life Sciences and Systems Biology, University of Torino, Torino, Italy; ³Acquario di Cattolica, Costa Edutainment SpA, Cattolica, Rimini, Italy

Introduction: Avian feathers have the potential to accumulate trace elements originating from contaminated food and polluted environments. In fact, in feathers, metals are bound to keratin, a sulfur-containing protein for which several metals have a strong affinity (1). Captive birds, living close to human settlements, can be exposed to environmental contaminants. The concentrations of 18 essential and non-essential metals were investigated in *Spheniscus humboldti* feathers hosted in an Italian zoological facility. This species is listed as vulnerable in the Red List of the International Union for Conservation of Nature. According to the literature, there is usually a link between metal levels in the diet of birds and levels detected in their feathers. Accordingly, metals were determined in penguin's food (Capelin, *Mallotus villosus*) as well.

Materials and Methods: Feathers were collected from 12 adult penguins in 2016. Surface lipids and contaminants were removed from the feathers that were subjected to microwave digestion (ETHOS 1, Milestone) with 7 ml of HNO₃ (70% v/v) and 1.5 ml of H₂O₂ (30% v/v). Multi-elemental determination was performed using ICP-MS (ICP-MS Xseries II from Thermo Scientific). The quantification limit (LOQ) for all elements was set at 0.010 mg kg⁻¹.

Results: Trace elements (mg kg⁻¹) were found in feathers with the following decreasing mean concentrations: Zn (50) > Fe (17) > Al (12) > Cu (11) > Hg (2.8) > Mn (2.6) > Se (0.85) > Ni (0.78) > Cr (0.54) > Pb (0.18) > As (0.14) > V (0.076) > Cd (0.060) > Sn (0.031) > Co (0.027) > (Sb 0.013); Be and Tl were < LOQ. In penguin's diet, metals levels were Fe (9.7) > Zn (4.4) > As (2.0) > Cu (1) > Se (0.55) > Mn (0.32) > Al (0.27) > Ni (0.050) > Hg (0.041) > Cr (0.40) > Pb and Sn (0.020), Be, Cd, Co, Tl and V were < LOQ.

Conclusions: We found a relatively high concentration of zinc, iron, aluminium, copper and mercury being excreted to feathers in comparison to levels found in penguin's food. These captive penguins received a controlled and homogeneous diet, capelin caught in North-East Atlantic FAO zone 27, containing naturally low levels of

trace elements. However, some of them, such as mercury, could be efficiently accumulated in seabirds. In fact, it is known that seabirds that feed exclusively on fish have high mercury levels (2,3). We suggest that feathers could be a suitable and non-invasive monitoring tool for evaluating the exposure to essential and non-essential elements accumulated through food consumption both in wild populations and in animals kept under human care.

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2. Honda K et al. (1990) *Arch Environ Contam Toxicol*; 19: 704–711.
3. Squadrone S et al. (2015) *Ecotoxicology*; 25(2): 431–438.

P4.2 | Simultaneous determination of creatinine, iohexol and p-aminohippuric acid in animal plasma by ultra-high-performance liquid chromatography–tandem mass spectrometry

L. Dhondt¹; S. Croubels¹; P. De Cock^{2,3,4}; P. De Paepe³; M. Devreese¹¹Department of Pharmacology, Toxicology and Biochemistry, Faculty of Veterinary Medicine, Ghent University, Mellebeke, Belgium; ²Department of Pharmacy, Ghent University Hospital, Ghent, Belgium; ³Heymans Institute of Pharmacology, Ghent University, Ghent, Belgium; ⁴Department of Paediatric Intensive Care, Ghent University Hospital, Ghent, Belgium

Introduction/Objective: The kidneys have a pivotal role in the excretion of various endogenous as exogenous substances, such as medicinal products. This excretory function can be significantly altered in case of illness. To assess this renal function both glomerular filtration rate (GFR) and effective renal plasma flow (ERPF) determinations are valuable techniques. To measure the GFR, iohexol and exogenous creatinine clearance can be used whereas para-aminohippuric acid (PAH) clearance reflects the ERPF. To date, no methods have been reported for the simultaneous determination of creatinine, iohexol and PAH. The aim of this study was to develop and validate a sensitive and specific ultra-high-performance liquid chromatography–tandem mass spectrometry method for simultaneous determination of iohexol, creatinine and PAH in porcine and avian plasma.

Materials and Methods: Sample preparation of porcine plasma consisted of a deproteinization step of 100 µl plasma using methanol,