

SIMULTANEOUS ASSESSMENT MERCURY SPECIATION AND SELENIUM IN BLOOD, PLASMA, URINE AND HAIR IN AMAZONIAN RIVERINE COMMUNITIES

Juliette Esplugas¹; Gabriel Neves Cezarette^{1,2}; Emmanuel Tessier¹; Camille Chen¹; Fernando Barbosa Jr²; Maïté Bueno¹; Zoyne Pedrero Zayas¹

¹ IPREM Université de Pau et des Pays de l'Adour CNRS – Pau – France, ² University of Sao Paulo School of Pharmaceutical Sciences of Ribeirao Preto – Ribeirao Preto – Sao Paulo

INTRODUCTION, The Amazonian riverside population exhibits a mercury status exceeding international safety thresholds and presents some of the world's highest levels of selenium. Exposure to these elements results from specific anthropogenic factors and dietary patterns. Understanding their fate and interactions in humans requires comprehensive studies investigating both elements in different complementary biological matrices.

OBJECTIVE, The objective was to characterize Hg speciation/distribution, examine its relationships with Se levels in complementary samples (blood, plasma, urine, hair) from Amazonian riverside individuals to better understand element dynamics in humans.

MATERIAL AND METHODS, This study is part of larger investigation conducted among volunteers from 13 communities of the Tapajós and Amazon River basins (state of Pará, Brazil). Blood (using heparine as anticoagulant), plasma (obtained after blood centrifugation at 1500 xg) and urine (self-collected in sterile containers) were stored at -20 °C until analyses. Hair samples were cutted from the 3 cm of the proximal end. Total Hg and Se in liquid matrices were determined by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). After hair digestion, total Hg was measured using cold vapor atomic fluorescence spectrometry and total Se was measured using ICP-MS. After extraction from blood, plasma and urine (basic medium) and hair (acidic medium), Hg species (iHg and MeHg) analysis was performed by gas chromatography coupled with ICP-MS.

RESULTS AND DISCUSSION, MeHg dominated in blood (76±10% of total Hg) while plasmatic Hg was almost equally distributed between MeHg (49±14%) and iHg (51±14%) species. Blood MeHg partitioning in plasma (7±5%) decreased exponentially with increasing Hg and Se blood levels to reach a stable state of 5%. Urinary excretion of Hg was dominated by iHg which concentration positively correlated with that of Se. Urinary iHg proportion increased exponentially with Se blood concentrations. Excretion of Hg in hair was dominated by MeHg and, positive correlations with fish consumption frequency were found for both Hg species. Weak positive correlation was observed between hair Hg and Se concentrations. Results from this comprehensive human study highlight the need for further biomolecular speciation approach to clarify the complex interplay of Hg and Se biomolecules in Amazonian populations chronically exposed to Hg and Se.