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Contribution ID: **266** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Measuring calcium isotopic composition in the body to understand metabolic processes.

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Calcium (Ca) is an essential mineral in the body that helps maintain healthy bone density. Dysreguation of Ca can result in serious health issues and a reliable and efficient method of identifying changes in bone mineral balance can help to provide eaarly diagnosis of deteriorating bone health. The objective of this project is to investigate the application of naturally occurring Ca isotope abundance variations to understand biological processes, including biomineralization. This is because the kinetics underlying metabolic processes that involve Ca are mass dependent and will redistribute the abundances of naturally occuring, stable Ca isotopes. Thus, a careful measurement of Ca isotopic composition of the Ca pools in the body (i.e. bone, blood, and urine) can provide unique insight into the disruption of Ca metabolism. The extent of natural variations of stable Ca isotopes in the human metabolism is limited with a relative natural variation of less than 0.5% in the 44Ca/40Ca isotope amount ratio. Therefore, reliable measurement of Ca isotopic composition has remained very challenging, especially considering low Ca levels and significant procedural blank levels. The goal of this project was so develop a reliable and accurate analytical measurement procedures specifically for small amounts (approx. 1 µg) of Ca in biological materials.

In this study the extraction and isolation of calcium from a diverse set of biological matrices was optimized for low procedural blanks and separation from matrix elements and isobaric interferences such as Na, Mg, K, Mg, Ti, Fe, Ba. A 42Ca–48Ca double spike (DS) was applied to correct for potential isotopic fractionation during sample preparation and measurement. Ca isotope abundance analysis was performed using a multicollector thermal ionization mass spectrometer. The measurement procedure enabled processing of total Ca amounts of 1000 ng, with a total procedural blank of <10 ng and enabled measurement of the Ca isotopic compositions of the reference materials NIST SRM 1400 (bone ash), NIST SRM 1486 (bone meal) and IAPSO (seawater).

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