S41-1 The isotopic composition as a new marker for nutritional status of elements

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Many vital activities and body functions require essential elements, and both the excess and deficiency of essential nutrients can cause various disorders or diseases. Evaluation of the nutritional status of the elements, however, is often very difficult by the concentration data in biological fluids such as blood or serum, because the concentration levels of these elements are finely modulated by the homeostatic control. Despite the invariability in the concentration ranges, the isotopic composition of the elements can vary due to changes in the elemental metabolism or bioavailability of the inorganic nutrients. This suggests that the isotope signature of the elements can provide a new clue to evaluate bioavailability or nutritional status of the elements. In this study, we have measured the isotope ratios of Ca and Fe existing in the samples to evaluate the nutritional status of Ca and Fe. For the Ca, the ability to quantify the daily consumption using the isotope fractionation of Ca has been demonstrated, and the $^{44}Ca/^{42}Ca$ ratio for bone and plasma collected from the experimental mouse varied significantly. For the Fe, preferential absorption of lighter iron isotopes by the human body was reported, and the resulting $^{56}Fe/^{54}Fe$ ratios demonstrated that the Fe in red blood cells from female samples was isotopically heavier than that from male samples. In this symposium, the wide versatility of the present stable isotope technique, as well as elemental imaging technique using an inorganic mass spectrometer will be described as a new tool for the study of Metallomics.