Geochemistry and health sciences: the added value of stable isotopes.

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For more than ten years now, geochemists have tried to tackle health issues using stable isotopic methods and tools developed in Earth sciences. This interdisciplinary approach can bring new insights on element homeostasis and pathological deregulations.

Traditionally, in hospitals, a pathological deregulation is scrutinized by means of concentration measurements, and a diagnosis can be made when the concentration is out of the normal range. Stable isotopes offer new constraints to clinicians because in principle, the isotope composition is independent of the concentration. Some examples show however that this is not always the case, questioning the necessity to measure isotope compositions.

One advantage for health sciences applications, is that the amplitude of isotopic fractionation induced by biological processes is generally sizeable and thus does not require high precision measurements. But in the meantime, the complexity and the instability of biological systems generates large isotopic variability that requires high throughput measurements. The identified bottleneck in the workflow is sample preparation and innovative techniques are actually developed to overcome this limitation.

When the two above criteria are met, ie clinical relevance of the isotope composition and low cost (automated) sample processing, solutions exist that are developed by research spin-offs, mainly in the field of biomarkers.