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Copper and Zinc isotopic fractionation induced by major infections: The SARS-Cov-2 case study

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It has been several years now that isotopic compositions of transition metals such as copper (Cu) and zinc (Zn) have shown their potential as new pro-diagnostic markers [1-5]. Indeed, these elements are known to have specific roles to insure the well-functioning of biological processes. Concentration of these elements can vary between people due to different parameters such as the environment and lifestyle, but not regards to the body condition. However, their isotope ratios are directly linked to specific biological and/or chemical processes. Fractionation of Cu and/or Zn isotopes can suggest a metabolic or immune [2] disturbance induced by some diseases such as neurodegenerative diseases [1,3] and cancer [4,6-7].

Since December 2019, human health has encountered a new challenge due to the pandemic situation induced by the new SARS-Cov-2 virus, causing major failure of organs sometimes without apparent relationship with the initial disease. Based on a new analytical protocol, we investigated the possibility of using Cu and Zn isotopic signatures as a marker of metabolism failure following infection by SARS-Cov-2. Considering the short turnover of Cu and Zn in human body, we hypothesize a dysregulation of these two different elements during severe COVID-19.

Preliminary results were obtained on two different patients, who spent time in the intensive care unit (ICU) of Mont-Godinne hospital (UCLouvain, Belgium). For both, we have daily records of their health evolution in ICU. The first patient spent 7 days before his/her death. For the second case, the patient spent 11 days before his/her recovery. Data show that in both cases Zn isotopes are significantly fractionated from nominal values. These results show the potential of investigating isotopic compositions of these metal elements to better understand the new Coronavirus and COVID-19.

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