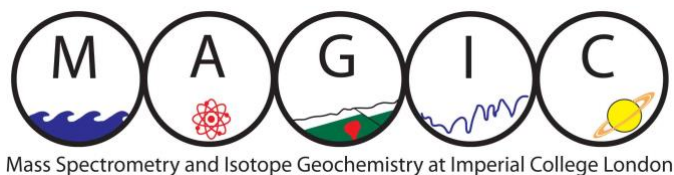


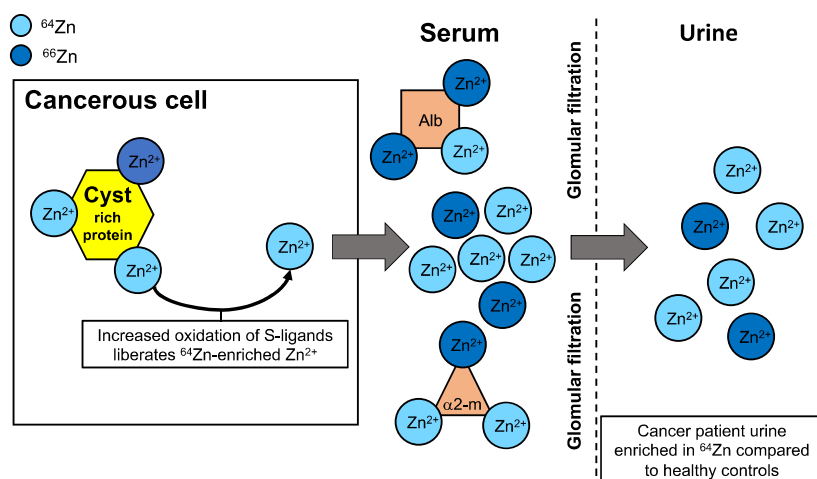
# Novel Applications of Trace Metal Stable Isotopes in Medical Research



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The application of multiple-collector inductively coupled plasma mass spectrometry (MC-ICP-MS) for trace metal stable isotope analysis is well established within geochemistry since the conception of the technique about 25 years ago. The use of such instruments in medical and life science research has only just begun, however, and the scope of applications is vast, from diagnosis to mechanistic understanding. This project will investigate the use of trace metal isotope analyses, originally developed for geochemical research, within a medical context, in particular for studies in neurosciences, oncology, and toxicology.

The analytical work will be carried out in the clean room and mass spectrometry laboratories of the MAGIC Research Center at the Department of Earth Science & Engineering, Imperial College London (<http://www.imperial.ac.uk/earth-science/research/research-groups/magic/>). The interdisciplinary nature of the project implies that the successful candidate will need to communicate effectively with academic professionals from medicine, biology, chemistry and engineering.



Release of isotopically light Zn from cancerous cells, subsequent transfer into the blood system and ultimately urine is associated with lower urinary  $\delta^{66}\text{Zn}$  for cancer of some secretory organs (see Schilling et al., 2021).

Applications from students with degrees in chemistry, biology, biochemistry, Earth sciences, geology, geochemistry, medicine or a related discipline are welcome. Please don't hesitate to get in touch via email ([markrehk@imperial.ac.uk](mailto:markrehk@imperial.ac.uk); [r.moore13@imperial.ac.uk](mailto:r.moore13@imperial.ac.uk)) if you are interested or have further questions.

Selected literature:

Moore, R.E.T., Rehkämper, M., Maret, W., Larner, F., 2019. Assessment of coupled Zn concentration and natural stable isotope analyses of urine as a novel probe of Zn status. *Metallomics* 11(9), 1506-1517. doi.org/10.1039/C9MT00160C.

Sullivan, K.V., Moore, R.E.T., Capper, M.S., Schilling, K., Goddard, K., Ion, C., Layton-Matthews, D., Leybourne, M.I., Coles, B., Kreissig, K., Antsygina, O., Coombes, R.C., Larner, F., Rehkämper, M., 2021. Zinc stable isotope analysis reveals Zn dyshomeostasis in benign tumours, breast cancer, and adjacent histologically normal tissue. *Metallomics* 13, mfab027. doi.org/10.1093/mtomcs/mfab027.

Schilling, K., Moore, R.E.T., Sullivan, K.V., Capper, M.S., Rehkämper, M., Goddard, K., Ion, C., Coombes, R.C., Vesty-Edwards, L., Lamb, A.D., Halliday, A.N., Larner, F., 2021. Zinc stable isotopes in urine as diagnostic for cancer of secretory organs. *Metallomics* 13, mfab020. doi.org/10.1093/mtomcs/mfab020.