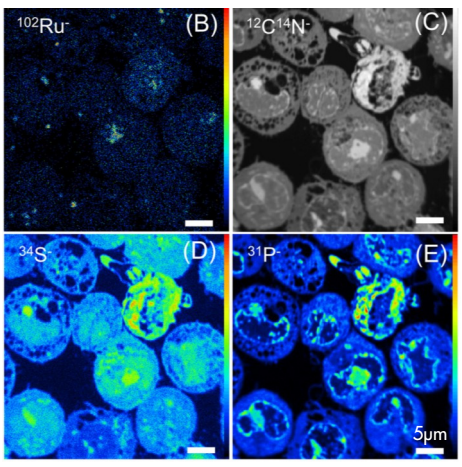
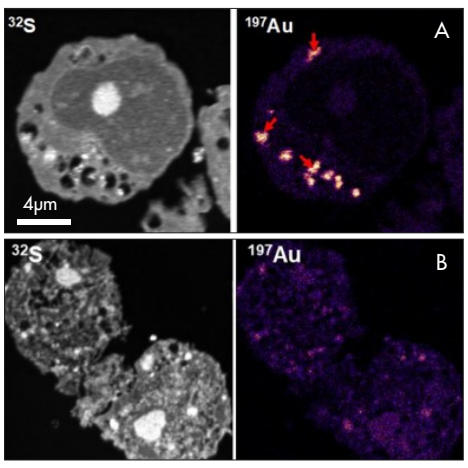
Subcellular Imaging of Anticancer Metallodrug:
Recent Hight Impact Research using NanoSIMS

Endoplasmic reticulum stress induced anticancer drug

Ruthenium-based anticancer drug BOLD-100 is investigated as a non-platinum metal-based. Scientists from the University of Vienna showed, using multi-omics approach and TEM imaging, that BOLD-100 drug is responsible for endoplasmic reticulum stress. The NanoSIMS revealed the localization of the Ru-based BOLD-100 drug in the subcellular structure of the HCT16 cells after treatment for 24h. Ruthenium was found highly concentrated in the cytoplasm as hotspots (arrow), supporting the direct interaction of BOLD-100 with cytoplasmic ribosomes.

B. Neuditschko et al., Angewandte Chemie (2021)





Cysteine thiol targeted by gold-activated porphyrin drug

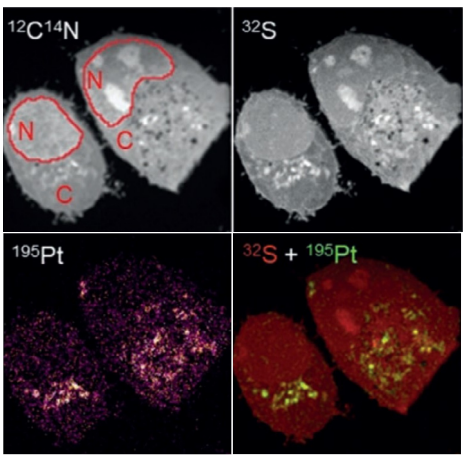
Cysteine thiols of many cancer-associated proteins are targets of anticancer agents. Scientist shows the unique compound, the AuMesoIX, adducts cysteine thiols of cancer-associated proteins. Treatment of cancer cells with AuMesoIX produced gold bounded sulfur-rich proteins aggregates. Those aggregates are revealed with the NanoSIMS in A2780 ovarian cancer cells treated with 3µM of AuMesoIX for 18hrs (A). The association of sulfur and gold is less clear with for the AuTPP complex on B.

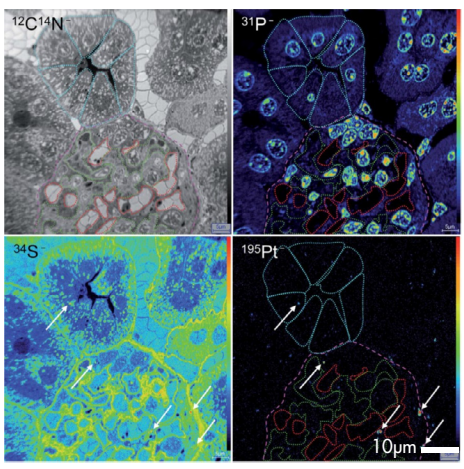
K.C Tong et al., PNAS (2021)

Rare Pt-based antitumor complex overcome cisplatin resistance

Scientists from the University of Hong Kong, Shenzhen Institute of Research and Innovation and University of Western Australia describe an antitumor Pt-based complex targeting a tumor-associated protein. This complex overcomes cisplatin resistance in cancer cells and displays significant tumor growth inhibition in mice. NanoSIMS revealed the Pt-drug interactions with biomolecules occuring in the cytoplasm.

D. Hu et al., Angewandte Chemie (2019)





Anticancer platinum (IV) compounds in murine tumor and kidney

Scientists from the University of Vienna treated mice with murine tumor with Pt-based anti-cancer drug. Pt-drug distribution in kidney and liver was investigated with NanoSIMS. Arrows show platinum and sulfur-rich cytoplasmic organelles in podocytes of murine kidney cortex.

A.A Legin et al., Royal Society of Chemistry (2016)

The NanoSIMS a is Secondary Ion Mass Spectrometer enabling quantitative imaging as well as :

- (co)localizing drugs and biomolecules in subcellular compartments thanks to its 50nm spatial resolution and 2D/3D imaging capability
- tracking up to 7 different biomolecules and drugs simultaneously by multiplexed imaging and elemental/isotopic labelling
- detecting trace amounts of drug and/or major biomolecules thanks to its 6 order of magnitudes dynamic range

By allowing the precise localization of added metal compounds and revealing sites of drug accumulation, the NanoSIMS opens new avenues for drug development.

Check our website at ***https://www.cameca.com/products/sims/nanosims*** for more information including the list of most scientific papers based or using NanoSIMS measurements in your field.

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