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and inflammatory pathways. Downregulated pathways included growth factor signalling. Using qPCR, we determined that miR-144 and 146 which are anti-inflammatory and redox regulating modulators were decreased by oxidised lipids. A neurotrophic factor-targeting miR was increased in expression.

These data highlight that oxidised lipids have important regulatory effects on endothelial microvascular cell function.

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Integrative omics-defined redox, metabolic and functional responses to environmental metal exposure

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Our previous studies showed that low dose cadmium (Cd) altered protein redox states resulting in inflammatory signaling, actin cytoskeleton disruption, and fibrosis. However, little is known about low-level Cd effects on the redox proteomic and metabolic regulation in pulmonary fibroblasts and potential impact on pulmonary health. To address this issue, we investigated low dose Cd effects using an integrative omics approach with biochemical and functional analyses. Redox proteomics was performed on lung fibroblasts and lung tissues of C57BL/6 male mice exposed to Cd (3.3 mg/L, 16 weeks). Lung tissues were also analyzed for metabolomics. Both redox proteomics and metabolomics identified a large number of mitochondrial proteins and metabolites altered by Cd, suggesting that mitochondria are sensitive to Cd-induced oxidation. Cd also increased nuclear translocation of thioredoxin-1 and stimulated myofibroblast differentiation and fibrosis as shown by smad transcription factor activity and subsequent differentiation marker proteins. Pathway analysis showed that PIP2 metabolism, carbohydrate metabolism with pyruvate and TCA metabolism, are significantly affected by Cd. The integrative redox proteomics and metabolomics with mechanistic and functional pathways provide a powerful approach to understand complex mechanisms of low environmental Cd in lung disease.

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Towards Magnetic Mapping of Cellular Organelles using Fluorescent Nanodiamonds

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Keywords: Fluorescent NanoDiamonds; Magnetometry; ROS visualization; Organelle Isolation; Biocompatibility

Recently, Fluorescent NanoDiamonds (FNDs) have gained attention in the physical, chemical and biological fields. Their fluorescence is influenced by the magnetic surrounding. This allows magnetic resonance imaging on the nanoscale. Since the read out is optical only a microscope is needed and the technique is so sensitive that even single electron spins are visible.

We show that nanodiamonds are non-toxic in mammalian cell lines, which freely take up these particles. In addition, we show the effects of different concentrations, size, surface termination, shape and aggregation state on the biocompatibility at the level of genetic and protein changes as well as overall viability and reactive oxygen species (ROS) production.

Yeast cells can be stimulated to ingest FNDs after chemical or electrical transformation. Altogether, Fluorescent Nanodiamonds show much promise to become a sensitive and direct detector for a wide range of molecules, among which free radicals are a major contender because of their high magnetic moment.

In order to understand a spectrum from the interior of a cell, we isolate organelles and analyze these using our highly sensitive homebuilt confocal setup. In addition, we target cell organelles using an antibody targeting with biotin-streptavidin interactions. Here we present the results of our pilot experiments and give an overview of single organelle magnetometry implications.

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Oxysterols are involved in colorectal carcinogenesis by damaging intestinal layer

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Colorectal cancer (CRC) is one of the most common tumors world wild. High cholesterol diet is considered a risk for CRC development.

Cholesterol oxidation products, namely oxysterols, have been shown to have a role in human degenerative diseases, mainly for their ability to favor inflammatory reactions. Therefore, they could be involved in inducing intestinal inflammation, a process strongly associated to colorectal carcinogenesis.

Dietary oxysterols could derange intestinal epithelial barrier by inducing the activation of metalloproteinases (MMPs) as well as

the decrease of tight junctions (TJs), which are essential in mucosa barrier maintenance. Enterocyte-like CaCo-2 cells were treated with a mixture of oxysterols representative of a hyper-cholesterol diet. The time course study of MMPs activity (MMP-9 and MMP-2) showed their significant increase, reaching the maximum at 72 hours treatment. Moreover, the dietary oxysterols decreased the TJ production, in particular of junctional adhesion molecule (JAM), zonula occludens (ZO) and occludin. These two events appeared to be associated. In fact, cell pretreatment with specific MMPs inhibitors restored TJ levels.

Therefore, dietary oxysterols could be actually implicated in tumor progression towards a more aggressive phenotype by inducing extracellular matrix destabilization and intestinal barrier disruption.

Please note that after submission and before production, the following posters P-002, P-004, P-028, P-099, P-181 and P-208 were retracted.

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