phosphoprotein-signaling substantiating the chemotherapeutic efficacy of systemic D_2O administration targeting human malignancy in relevant murine models.

Keywords: deuterium oxide, water-isotopologue, cancer therapeutic
Supported by: NIH (National Cancer Institute)

SP-10.03 - Wavelength, dose skin type and skin model related radical formation in skin

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The exposure to sun radiation is indispensable to our health, however, a long term and high exposure could lead to cell damage, erythema, premature skin aging and promotion of skin tumors. An underlying pathomechanism is the formation of free radicals which may induce oxidative stress at elevated concentrations. Different skin models, such as porcine-, murine-, human- ex vivo skin, reconstructed human skin (RHS) and human skin in vivo, were investigated during and after irradiation using X- and L-band EPR spectroscopy within different spectral regions (UVC to NIR) [1,2]. The amount of radical formation was quantified with the spin probe PCA and the radical types were measured ex vivo with the spin trap DMPO. The radiation dose influences the types of radicals formed in the skin. While reactive oxygen species (ROS) are always pronounced at low doses, there is an increase in lipid oxygen species (LOS) at high doses. Furthermore, the radical types arise independent from the irradiation wavelength, whereas the general amount of radical formation differs with the irradiation wavelength. Heat pre-stressed porcine skin already starts with higher LOS values. Thus, the radical type ratio might be an indicator of stress and the reversal of ROS/LOS constitutes the point where positive stress turns into negative stress [3]. Compared to light skin types, darker types produce less radicals in the ultraviolet, similar amounts in the visible and higher ones in the infrared spectral region, rendering skin type-specific sun protection a necessity [4]. References [1] Albrecht, S., Meinke M. C. et al. (2019). "Quantification and characterization of radical production in human, animal and 3D skin models during sun irradiation measured by EPR spectroscopy." Free Radic Biol Med 131: 299-308. [2] Zwicker, P., Meinke M. C. et al. (2021). "Application of 233 nm far-UVC LEDs for eradication of MRSA and MSSA and risk assessment on skin models." Scientific reports submitted. [3] Lohan, S. B., Meinke M. C. et al. (2021). "Switching from healthy to unhealthy oxidative stress - does the radical type can be used as an indicator?" Free Radic Biol Med 162: 401-411. [4] Albrecht S, Meinke M. C. et al. (2019) Skin type differences in solar simulated radiation-induced oxidative stress. Br J Dermatol. 180(3):597-603.

Keywords: Electron paramagnetic resonance (EPR), spectroscopy, reactive oxygen species, lipid oxygen species
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SP-10.04 - Low power light triggers opposite effects on stem cells: influence of the wavelength and culture conditions

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INTRODUCTION
Photobiomodulation (PBM) has been gaining importance in a wide range of medical fields in the past few years, particularly in stem cell-based regenerative medicine. Improving in vitro cell proliferation, differentiation and viability are ways where PBM could play a pivotal role optimizing biotechnological and bioengineering applications.

OBJECTIVES
Here we investigated whether different wavelengths (blue, green and red) would promote distinct outcomes in human adipose-derived stem cells (hADSCs) cultured in regular and supplemented media for tenocyte differentiation.

MATERIALS AND METHODS
Freshly isolated hADSCs were cultured in a specific stem cell medium (MSCGM, Lonza), DMEM or a tenogenic medium (TEN-M: DMEM supplemented with growth factors and ascorbic acid). Cells were irradiated every 48 h (23.28 mW/cm ^{2}, 17 min 10 s delivering 24 J/cm ^{2} per session) using a LED irradiator (LEDbox, BioLambda). MTT and crystal violet assays were used to evaluate cell metabolic activity and proliferation.

DISCUSSION AND RESULTS
Red wavelength (660 nm) significantly increased metabolic activity after five irradiations, but only for cells cultured in TEN-M. Oppositely, blue (450 nm) and green (520 nm) light decreased both cell proliferation and metabolic rate, with more pronounced effects for blue light in TEN-M. Considering these findings, we examined whether irradiating only the media would

generate toxic compounds that could impair cell viability. We therefore assessed reactive oxygen species (ROS) production by p-nitrosodimethylaniline/histidine assay while irradiating the three different media under the same conditions as mentioned above. Immediately after blue and green light exposure, an increment in ROS production was observed for DMEM and TEN-M, that continuously increased until reaching between 4.5 and 7.1 µM one-hour after irradiation – with higher values for TEN-M exposed to blue light.

CONCLUSION
Since no significant ROS formation was observed following red light exposure, we concluded that medium composition was responsible for the different effects on metabolic activity and proliferation observed after irradiation with different wavelengths.
Keywords: oxidative stress, culture media, photosensitivity
Supported by: CNPq

SP-11. Microbiomes: human and enviromental

SP-11.01 - Studies of the human microbiome in health and disease

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The Centre for Translational Microbiome Research (CTMR) started in 2016 as a collaboration between Karolinska Institutet, Science for Life Laboratory and Ferring Pharmaceuticals. Since then, a broad technical, biological, clinical and epidemiological platform for studying complex microbiological communities in well-defined human materials has been established. CTMR aims to better understand the contribution of the human microbiome to physiology and pathophysiology with the goal to open opportunities for development of novel therapies in the area of cancer, gastroenterology and reproductive health. The talk will present details on CTMR´s efforts to define what is healthy in the human gut and vaginal microbiome based on samples obtained in hospital and population-based studies. Furthermore, approaches to develop therapies or lifestyle interventions to change a dysbiotic profile back to normal again will be presented.
Keywords: Human microbiome, Dysbiosis, Intervention

SP-11.02 - Metagenome-assembled genomes and their contribution to microbiome studies

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Metagenome-assembled genomes (MAGs) are microbial genomes reconstructed from metagenome data. In the last few years many thousands of MAGs have been reported in the literature, for a variety of environments and host-associated microbiota, including humans. These MAGs have helped us better understand microbial populations and their interactions with the environment where they live; moreover most MAGs belong to novel species, therefore helping decrease the so-called microbial dark matter. However, not much effort has been invested in the quality of these reconstructions, which means that many of the reported MAGs may be artefacts. This talk will be a MAG survey, in which some key issues and specific examples will be presented.
Keywords: Metagenome-assembled genomes, microbial genomes, microbiome

SP-11.03 - Microbiome studies of the built environment: from commensals, to cancer & COVID-19

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The cost reduction recently seen for large-scale sequencing allowed the implementation of new, ambitious projects that have provided information that are impacting our lives will allow a better understanding of the life in the planet. One of these projects started in 2015 with the creation of the MetaSub consortium (www.metasub.org), which aimed to provide the first detailed map of the microorganisms that inhabit the built environment around the globe. The recent publication of the first article from this consortium - based on about 5,000 samples collected over a three-year period across 60 cities in 32 countries and six continents – allowed a detailed map of the distribution of microorganisms, including hundreds of new bacteria and viruses, as well as the mapping of antimicrobial resistance genes and microorganisms relevant for human health. This includes microorganisms of interest, such as Helicobacter pylori, a carcinogen type-1 according to the World Health Organization, related to gastric cancer. The metadata collected in these cities, including temperature, humidity, surface type and others may be used to better design public transportation systems and hospitals, helping to control the survival and spread of contagious agents. The protocols validated in the project have been used during the current COVID-19 pandemics, revealing the distribution of SARS-CoV-2 in different cities and providing the basis for a global genomic surveillance.