Effect of metformin on viability, morphology and ultrastructure of meibomian gland epithelial cells.

Dr. Swati Singh and Dr. Martin Schicht

Metformin, is a popular drug for the treatment of diabetes and a potentially useful therapeutic for the treatment of cancer. We will investigate whether metformin has cytotoxic effects in HMGEC cultures at concentrations of 1mM, 5mM, and 10mM, resulting in a decrease in cell proliferation and increase in cell death rate. In addition, morphological and ultrastructural studies will reveal possible cellular changes and we will analyze the expression of gene factor 2 (IGF2).
We believe, as already shown in other studies, that metformin may negatively affects the proliferation activity of the HMGEC studied and triggers the formation of autophagosomes and apoptotic bodies.

Work package

a. Detection of lipid accumulation in HMGECs after metformin stimulation
b. Quantification of phospho-AMPKα and mitochondrial signaling factors such as nuclear factor erythroid-2 related factor-2 (Nrf2), heme oxygenase-1 (HO-1), superoxide dismutase (SOD2)and insulin-like growth factor 1 with qRT-PCR and ELISA
c. Proliferation assay under Ki67 immunostaining
d. Apoptosis assay
e. Analysis of morphological changes of HMGECs after stimulation by TEM.

   number of lipid vacuoles and mitochondrial activity

Literature:

Effect of Metformin on Viability, Morphology, and Ultrastructure of Mouse Bone Marrow-Derived Multipotent Mesenchymal Stromal Cells and Balb/3T3 Embryonic Fibroblast Cell Line
Agnieszka Śmieszek 1 , Aleksandra Czyrek 2 , Katarzyna Basinska 3 , Justyna Trynda 4 , Aneta Skaradzińska 5 , Anna Siudzińska 3 , Monika Marędziak 1 , Krzysztof Marycz 1 Biomed Res Int. 2015 PMID: 26064951