IMPACT OF MITOCHONDRIAL BIOENERGETICS ON SKIN AGEING

Peloggia, J, Forni, MF, Kowaltowski, AJ
Departamento De Bioquímica, Instituto de Química, Universidade de São Paulo
São Paulo, SP, Brazil

Skin is an organ constituted by three tissues, the epidermis, dermis and hypodermis. During ageing, its regenerative potential declines, reducing the capacity to respond to damage or stress. The maintenance of tissue homeostasis is a highly energy-demanding process and mitochondria are the main organelle responsible for ATP production in mammalian cells. More importantly, mitochondrial dysfunction has already been characterized as a hallmark of ageing in many tissues but it hasn’t been clearly demonstrated for skin. Therefore, the aim of this work is to characterize the bioenergetic alterations related to skin ageing, comparing young (2-4 months) and old (12-18 months) C57Bl/6 male mice. To evaluate the bioenergetic profile in epidermis and dermis, primary cell cultures were plated on a SeaHorse XF24 (Bioscience) apparatus and O$_2$ consumption (OCR) and the Extracellular Acidification Rate (ECAR) were measured. Mitochondrial mass was estimated by citrate synthase activity (whole organ homogenate) and gene expression analysis was performed with qRT-PCR for some genes comprising metabolic pathways such as glycolysis, TCA cycle and components from the Electron Transport Chain in both the epidermis and dermis. Citrate synthase activity was higher in young animals ($p<0.01$), suggesting an increase in mitochondrial mass supported by a higher expression of TFAM mRNA and protein levels ($p<0.01$). Furthermore, increased rates of spare respiratory capacity and ATP production-dependent respiration in the young epidermal cells were observed. Altogether, these results suggest that there is a reduction of both mitochondrial mass and function in aged animals, supporting evidence that mitochondrial dysfunction may have an impact on ageing.

Keywords: ageing, mitochondria, skin

Supported by: FAPESP, CNPq, Guggenheim Foundation