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The phenomena of ectopic melanin synthesis in adipose tissue has great potentials and promises in relieving oxidative stress before obesity complications

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The worldwide spread of obesity has become a global health subject. It has many related complications such as cardiovascular disease, insulin resistance and non-alcoholic fatty liver disease. Ectopic melanin synthesis in adipose especially in obese individuals is still a Pandora box. While there is a very strong correlation between obesity complications, oxidative stress and inflammation in adipose tissue, the molecular mechanisms of the potential function of ectopic melanin involved are still unknown. A better understanding of the relationship between the oxidative stress and inflammation biomarkers in the adipocytes treated with melanin and its precursors may shed some light on the mechanisms that give rise to the inflammatory process and ultimately, would lead to intervention strategies. As melanin is considered to have both antioxidant and inflammatory characteristics, we hypothesize that melanin and its metabolite intermediates could intervene in the adipose oxidative stress and inflammation status, *in vitro* and *in vivo* cultures. As there is no one definitive measure of oxidative stress and inflammation, multiple biomarkers such as protein carbonyl, malondialdehyde (MDA), glutathione oxidation, adiponectin and TNF-alpha and many other adipocytokines can be measured. We believe that melanin and or its precursors can block the lipids' peroxidation process through scavenging the reactive oxygen species (ROS) such as hydroxyl radical that oxidize lipids in adipocytes or/and prevent the lipid peroxidation byproducts such as MDA and 4-hydroxy-2-nonenal (4-HNE) from exerting their destructive impact on adipose cells. In addition, as a long-term strategy of prevention, adipose tissue in obese individuals get rewired and readapt to oxidative stress and inflammation by launching rejuvenation program. Such activities could be in parallel or lead to stimulation of melanogenesis through intersecting signaling network. Some of newly discovered type of mesenchymal stem cells (MSCs), multilineage-differentiating stress-enduring (Muse) cells could be triggered to differentiate to melanocyte-like cells and reactivating melanogenesis enzymes. Even though some of the recent research has shed more light on possible preventive or therapeutic role of melanin in preventing obesity complications, lots of more research still needed to explain the mechanism of such new phenomenon of ectopic melanin synthesis in adipose tissue. Testing melanin in obese animal models and *in vitro* cell culture systems are paramount measures before clinical trials.

Biography

Mohammed Jarrar has worked as an Associate Professor of Biotechnology and Medical Technology at the American University of Ras Al Khaimah and Assistant Professor of Bioscience at George Mason University. He has also worked as Clinical Laboratory Scientist at Johns Hopkins Hospital, Laboratory Medicine, USA, Senior Research Associate at Kennedy Krieger Institute, Baltimore, USA and Adjunct Research Professor in Translational Research Institute and The Betty and Guy Beatty Liver and Obesity Program, Inova Fairfax Hospital, Fairfax, VA.

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