ASSESSING THE EFFICACY OF EXOGENOUS MITOCHONDRIAL THERAPY AND TRANSCRANIAL PHOTOBIOMODULATION IN THE TREATMENT OF EXPERIMENTAL FIBROMYALGIA SYNDROME

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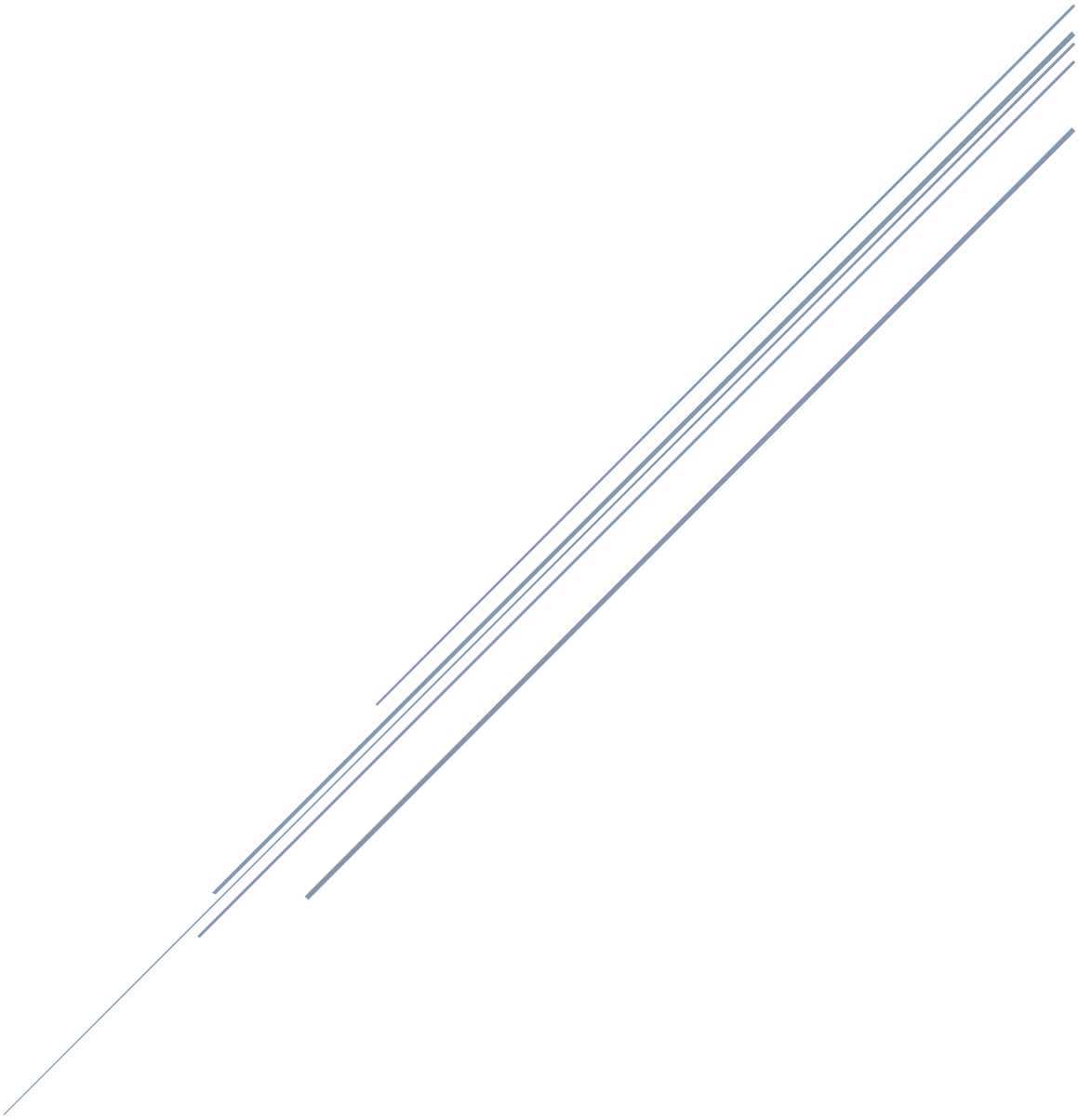

The Sixth Youth Research Forum 2024 on 6 March 2024

Assessing the Efficacy of Exogenous Mitochondrial Therapy and Transcranial Photobiomodulation in the Treatment of Experimental Fibromyalgia Syndrome

Fibromyalgia syndrome (FMS) is characterized by widespread pain, muscle tenderness to pressure stimuli, and morning stiffness. FMS is also associated with pronounced fatigue, sleep disturbances, and psychological disturbances [1-3].

FMS affects 2-8% of the population and middle-aged women (30-50 years) without sufficient treatment or management as each treatment helps with one or more symptoms but is not a permanent solution [2,3]. Mitochondrial abnormalities in FMS patients were reported especially in muscles and neural cells as they normally need a high level of ATP and oxygen [4].

Artificial mitochondria transfer (AMT) is a promising and challenging technique for the treatment of mitochondrial dysfunction-related diseases which comprises transferring exogenous isolated mitochondria from donor cells to recipient cells [5,6]. Studies reported the effectiveness of AMT with many diseases [5,6]. To the best of our knowledge, no study evaluated the efficacy of AMT on FMS yet.

The transcranial low-level infrared laser technique (LLLT) is also a promising technique for the treatment of mitochondrial dysfunction by exposing the target cells or tissues to low levels of near-IR from lasers. It is a safe non-invasive technique to regulate the functions of damaged cells [7,8]. This laser interacts with cytochrome-c oxidase as a laser chromophore, which is an important terminal enzyme in the mitochondrial respiratory chain to balance the energy level and stabilize the mitochondrial functions and cellular metabolism by increasing mitochondrial membrane potential, increasing levels of adenosine triphosphate, and cyclic adenosine monophosphate (cAMP) [8,9].

The study aims to investigate the potential therapeutic efficacy of AMT, LLLT with 830-nm low-power laser, or both on the in-vivo animal model of FMS. We successfully isolated viable mitochondria and validated that with flow cytometry and transmission electron microscope. We did many pilot experiments to select effective safe doses. Nowadays, we are working on animal behavior and pain threshold tests, muscles examination, oxidative stress markers, and neurotransmitters measurement.

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