We are very pleased to have the lead article in this issue by our incoming ISHRS President, Dr. Sharon Keene. This article is the first of her three-part series on low level laser light therapy (LLLT): Part 1, “The Science of LLLT,” Part 2, “Regulation of LLLT Devices from a U.S. and International Perspective,” and Part 3, “Controlled Trials and Understanding the Methods for Accurate Hair Counts.” —RHT

The Science of Light Biostimulation and Low Level Laser Therapy (LLLT)

Sharon A. Keene, MD, FISHRS Tucson, Arizona, USA drkeene@hairrestore.com

The use of light therapy from the sun can be seen illustrated long ago in ancient Egyptian hieroglyphics. Today, the critically important process of photosynthesis, or ability of sunlight to induce chemical changes in plants to consume carbon dioxide and produce water and oxygen, is considered basic science, and taught in elementary school classes. The concept of light-induced cellular chemical reactions is not new—but the acceptance of laser light to induce therapeutic chemical changes in human cells has been slow and gradual.

In the early 1960s, only a few years after their discovery, lasers were first introduced to the medical field for their ability to ablate, dissect, cauterize, or vaporize tissue. It was a serendipitous discovery in 1967 when Dr. Endre Mester, a Hungarian physician and surgeon, first observed the biostimulating or photomodulating effects of low level laser light on tissue. Dr. Mester applied a ruby laser beam of 694nm to the backs of shaved mice, seeking to raise critical questions of their validity and claims, and the correct method to gather and analyze this data will be reviewed. Issues pertaining to dosing or application of particular wavelengths and timing/frequency with a conclusion. Importantly, some of these studies appear to have substantive flaws in hair counting methodology and these will likely be used for marketing purposes, so doctors need to be familiar with them and their reported conclusions. Importantly, some of these studies appear to have substantive flaws in hair counting methodology—raising critical questions of their validity and claims, and the correct method to gather and analyze this data will be reviewed. Issues pertaining to dosing or application of particular wavelengths and timing/frequency with a view to encouraging member participation in future clinical trials will also be discussed.

Low Level Laser Light and Mechanisms of Cell Biostimulation

Low level laser light is defined in part by its wavelength which is visible light in the 500nm-1100nm wavelength range, and this determines its properties of tissue absorption. The other characteristic is low power and low power density. 1mW-500mW (5W) and 1mW-500mW/cm², respectively, ensure a low thermal output and prevent tissue heating. Studies have shown a minimum of 13 W/cm² is required to cause first degree skin burns, and 24 W/