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Aiming to personalized laser therapy for Nevus of Ota: Melanin distribution dependent parameter optimization**Bin Chen***Xi'an Jiaotong University, China*

Statement of the problem: Nevus of Ota is a kind of dermal melanocytosis caused by the incomplete migration of melanocytes between the neural crest and epidermis during embryonic development. Laser has been the standard treatment, but parameters are not optimized for different morphological distribution of melanin, and the cure rate is not high.

Methodology & theoretical orientation: Aiming to the personalized laser therapy of Nevus of Ota (NO), a local thermal non-equilibrium model was employed to optimize laser wavelength, pulse duration and energy density under different melanin depth and volume fraction.

Findings: According to our simulation, the optimal pulse duration is between 15 to 150ns to limit heat transfer inside the hyperplastic melanin, and 50ns is recommended to decrease the energy absorption by normal melanin in epidermis. Correlations of the minimum and the maximum energy densities are proposed with respect to melanin depth and volume fraction for the 755nm and 1064nm lasers.

Conclusion: For the same NO type, the therapy window of the 755nm laser is larger than that of 1064nm. For NO with shallow depth or low volume fraction, the 755nm laser is recommended to make the treatment more stable owing to its larger therapy window. For deeper depth or higher volume fraction, the 1064nm laser is recommended to avoid thermal damage of epidermis. Through comparison with clinical data, the optimized laser parameters are proved practicable since high cure rate can be achieved when energy density falls into the range of predicted therapy window. With developing of non-invasive hyperspectral imaging technology of melanin content and distribution, personalized treatment of NO maybe possible in near future.

Biography

Dr. Bin chen completed his doctorate in thermal engineering at the Xi'an Jiaotong University in 2002. After his postdoctoral studies supported by the Japan Society for Promotion Science on numerical and experimental investigation on microbubble dynamics in drag reduction, he came back to the Xi'an Jiaotong University and is now the vice director of State Key Laboratory of Multiphase Flow, a national innovation in China. Since then, his research focused on the heat transfer and personalized treatment in laser dermatology and ophthalmology. He has published more than 100 papers in reputed journals and has been serving as editorial board member of several International Journals.