

# Permanent Laser Hair Removal With Low Fluence High Repetition Rate Versus High Fluence Low Repetition Rate 810 nm Diode Laser— A Split Leg Comparison Study

Martin Braun MD

Vancouver Laser & Skin Care Centre, Vancouver, BC, Canada

## ABSTRACT

High fluence diode lasers with contact cooling have emerged as the gold standard to remove unwanted hair. However, laser hair removal is associated with pain and side effects, especially when treating dark or tanned skin. A novel diode laser with low level fluence (5–10 J/cm<sup>2</sup>) with a high repetition rate at 10 Hz (Soprano XL in SHR mode, Alma Lasers, Chicago, IL) using multiple passes in constant motion technique was compared to traditional one pass high fluence (20–50 J/cm<sup>2</sup>) diode laser (LightSheer ET, Lumenis, Santa Clara, CA) in a prospective, randomized split-leg study on 25 patients with Fitzpatrick skin types I–V. Hair counts were done six months following the fifth treatment and were found to be comparable with a 86–91% hair reduction. There was one superficial burn with the high energy diode treatment. The rapid, multiple pass in-motion technique was faster and associated with significantly less pain. Multiple passes of diode laser at low fluences but with high average power results in permanent hair removal with less discomfort and fewer adverse effects, especially on darker skin.

## INTRODUCTION

Laser hair removal has enjoyed substantial popularity, and is presently the second most popular non-surgical cosmetic procedure in the U.S. following botulinum toxin injections.<sup>1</sup>

Laser and light-based techniques rely on the process of selective photothermolysis.<sup>2</sup> The selective absorption of red and near-infrared wavelengths by melanin in the hair shaft and follicular epithelium confines thermal damage to the hair follicles and, to a point, limits the untoward diffusion of excess thermal energy to the surrounding tissue. Laser hair removal was first described in 1987 in an experiment to remove rabbit eyelashes with an argon laser.<sup>3</sup> Subsequently, physicians used the Nd:YAG laser<sup>4</sup> and the ruby laser<sup>5</sup> to remove hair. The alexandrite laser<sup>6</sup> and diode followed;<sup>7</sup> all have been thoroughly described and reviewed.<sup>8</sup> All of these laser systems used the highest fluence possible without damaging the tissue surrounding the hair follicle with a single pass.

The approach of using low fluences with repetitive millisecond pulses to achieve heat stacking in the hair bulb and bulge represents a paradigm shift in laser hair removal methodology. This study compares efficacy, safety and treatment speed of a new low fluence rapid pulse with multiple passes 810 nm diode hair removal modality with a traditional high powered single pass 810 nm laser diode system.

This is the first study designed to evaluate the hypothesis that low level fluences done repetitively on a hair follicle will produce permanent hair removal with less discomfort and fewer side effects than a single high fluence pulse.

## MATERIALS AND METHODS

This prospective single-center, bilaterally paired, blinded, randomized comparison study was conducted in accordance with recognized Good Clinical Practice (GCP/ICH) guidelines and applicable regulatory requirements. Thirty-three (33) female subjects (skin types I–V) with hair on the legs who in the opinion of the investigator were viable candidates for laser hair removal were enrolled in the study. These patients were offered five complimentary laser hair removal treatments on their legs as an inducement to enroll in the study. Alma lasers partially funded the cost of the study.

Subjects were to be between 25 and 65 years of age, in good general health with no known photosensitivity or use of medication with photosensitivity as a side effect, no obvious skin disease or history of chronic skin disease other than moderate facial acne vulgaris, no history of keloid or hypertrophic scar formation, and no tattooing in the treatment area. Subjects were excluded if they were pregnant, nursing or unwilling to use birth control during the study period if of childbearing age; had waxed the lower legs or undergone therapy with any radiofrequency or light source; used prescription or over-the-