oVio® and THE FUTURE OF SKIN IMAGING

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As personalized medicine continues to expand, most aspects of patient care are impacted. In the field of dermatology and aesthetic medicine, personalization has always been at the core of both diagnostics and therapeutics. While Jim Thrall's 2004 statement that "each individual is now an '*n*' of one" was somewhat premature when relating to traditional medicine, it was very timely as it related to technologies and opportunities that were quickly entering the field of skin care[i]. From new devices to injectable therapeutics to new non-invasive methods of skin analysis, personalized medicine has proven to be one of the the central tenets of this industry, for more than 20 years.

In the field of dermatology, anatomical imaging has been at the core of achieving diagnostic accuracy and timely therapy for skin cancers, to name a few. While new technologies spanning confocal microscopy (Astner et al 2008)[ii] to high frequency ultrasound (Diller Muller et. al)[iii] are on the horizon for skin diagnosis, the capacity to catalogue lesions systematically and track their changes has remained very effective for individualized care. We believe imaging systems remain the backbone of not only current care, but also represent the future as it relates to new Artificial Intelligence algorithms in this space[iv]. As dermatology meshed with aesthetics, the same discipline of imaging became the focus of how new technologies were evaluated and the marketplace created.

Such imaging's contribution to personalized medicine cannot be overstated, in our view. Ensuring the right treatment is being performed at the right time in the right location could not have been possible without the advent of digital photography.[v] Standard photography was necessary as dermatologists catalogued ailments and provided training for future generations of doctors. When digitization came into the industry, the quality improvement and cost reduction changed the entire practice from communication to medical records. In the field of aesthetic medicine, photographic standardization and morphing of outcomes. From the first digital camera produced[vi] in 1973 until today, the growth of the aesthetic industry has paralleled the cost reduction and availability of digital imaging systems. Imaging systems abound in terms of their availability and scope in this industry today.

The future of such photographic skin imaging has changed little in terms of trying to improve diagnostics and longitudinal patient tracking. What has changed however is the demand that surface imaging improve to the extent that each pixel can be tracked in space so that one day, such data can be used to drive automated therapeutic and aesthetic devices. Besides the ability to create 3-dimensional skin maps, the future of such imaging has the potential to intersect the burgeoning field of medical robotics and its demands for accuracy. We believe the field of dermatology and aesthetic medicine will be revolutionized by such automation, and imaging advances could usher in this possibility.

The oVio360 system, invented by Gregory Mueller, M.D. FACS in Beverly Hills, California (oVio Technologies, Newport Beach, California www.ovio360.com), is one new imaging device that encompasses what is currently possible for the skin care industry, spanning aesthetic medicine to dermatology. Contemporary photographic systems allow for 3 dimensional morphs, using stationary SLR cameras that span a narrow field around the face or body. Such systems have inherent errors in that there is no centralized frame of reference for patient head centering. Thus, when one looks at the morphs, the head position of the initial photographic sets varies between different sessions. In contrast, the oVio360 system takes 360 images rotating the camera around the patient while a centering camera, and

photographic lighting ensures that each image is properly centered, and lit, reducing session variability. The 3D maps tend to be very accurate, and the pixels can be tracked in space with depth cameras, such that the image of items on the skin like wrinkles and lesions can be tracked very accurately.

For skin lesions, the images are not one dimensional, but rather represent 60-degree arc images spanning the lesion's borders and morphology completely. As groups seek the ability to use AI algorithms to provide predictive models for lesion identification, the ability to create sweeping maps represents a significant technological advance embodied in the oVio360 system. The ability to sweep a lesion and create a 3D map of the lesion and track over many years represents a great opportunity for current clinical care protocols, as well as opening the door to using such high resolution images to create predictive diagnostic algorithms. The oVio360 system is able to also integrate distance cameras to further the accuracy of lesion tracking.

To the best of our knowledge, oVio360 is currently the only patented system that allows accurate live facial motion imaging for aesthetics. This unique ability allows physicians to not only document physical shape of the face and body, but also the actual movement of the muscles, fatty tissue, and overlying skin. Hence results from all cosmetic technologies can be objectively captured and assessed. Viewing outcomes in motion gives important feedback regarding skin elasticity, texture, nerve function and muscular movement. From improved outcomes to sales and marketing, oVio360 has established itself as a premier imaging system for aesthetic medicine. It has been proven effective for clinical studies as well as tracking procedural advances. Beyond this current use however, lies the ability to accurately create 3D facial and body maps, the first step in the development of automated aesthetic systems. The continued international demand for aesthetic and functional medical therapies mandates the development of automated systems and robotics. The oVio360 system is currently being positioned to be utilized in research on the development of such automated systems. The dermatologist of the future may be able to use a single image map for both therapeutic automations as well as aesthetics, and represents one of the best opportunities for creating the proper foundation for this future.

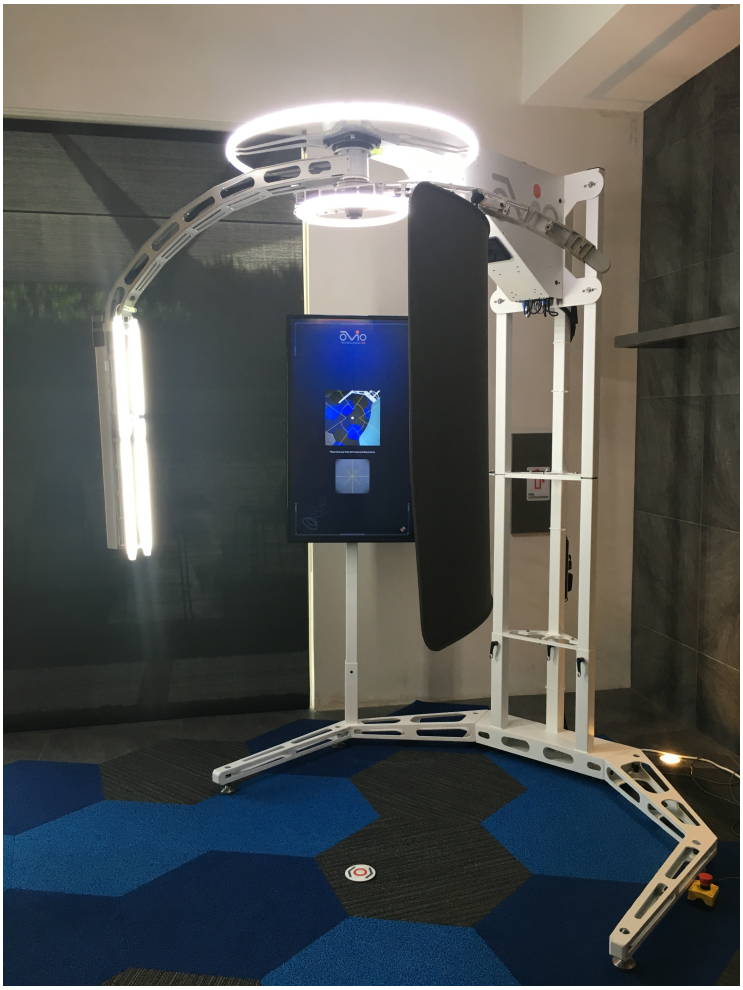
In summary, personalized medicine has always been part dermatology and aesthetic medicine. Such personalization could soon yield to robotics and automation. In our view, the oVio360 imaging platform represents a frontier technology to bridge how we can image faces and bodies to bring the future into fruition.

ABOUT THE AUTHOR

Dr, Farhan Taghizadeh completed his ENT training at the University of Rochester, and thereafter journeyed to Switzerland for a fellowship specializing in facial cosmetic surgery. His intensive specialized training only deepened his understanding of the complexity of the facial structure and fostered an in-depth understanding of the head and neck. Honing his diverse and extensive technical skills, he has become a recognized global authority delivering reproducible outcomes only possible with someone with skill and expertise.

Over the course of his extensive ENT and cosmetic surgery training, he has performed more than 3,500 facelifts. Offering the latest procedures and techniques available in the medical cosmetic industry, Dr. Taghizadeh frequently interfaces with many of the world's most prominent cosmetic device and product manufacturers to stay on top of the newest devices and treatments on the market and find new,

innovative ways to deliver results with unsurpassed satisfaction by his patients, their friends and their loved ones.



Footnotes:

[i] Thrall JH (2004) Personalized medicine. Radiology 231:613–616. doi:10.1148/radiol.2313040323

[ii] Astner S, Dietterle S, Otberg N, et al. Clinical applicability of in vivo fluorescence confocal microscopy for noninvasive diagnosis and therapeutic monitoring of nonmelanoma skin cancer. J Biomed Opt. 2008;13:014003

[iii] Dill-Muller D, Maschke J. Ultrasonography in dermatology. J Dtsch Dermatol Ges. 2007;5:689–707

[iv] https://news.stanford.edu/2017/01/25/artificial-intelligence-used-identify-skin-cancer/

[v] Papier, A., Peres, MR., Bobrow, M., Bhatia, A. (2000). The Digital Imaging System and Dermatology. International Journal of Dermatology. 2000;39:561-575.

[vi] https://lens.blogs.nytimes.com/2015/08/12/kodaks-first-digital-moment/

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