

## Invited Commentary

# Intraoperative Free Flap Monitoring Using Indocyanine Green

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**As experience and widespread use** of free tissue transfer has increased for head and neck reconstruction over the past 20 years, success rates have generally stabilized at well over 95% in most experienced surgeons' hands. Free tissue transfer has



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clearly been shown to be the standard of care in complex oromandibular reconstruction. However, it represents substantial use of financial and surgeon resources. Failure, although infrequent, is costly from all perspectives. As such, most microvascular surgeons have used various monitoring techniques after surgery, including visual examination and needle prick, Doppler (implantable and transcutaneous), laser Doppler, and surface temperature monitoring. Because of the low failure rate, plethora of monitoring techniques, and diverse surgeon training, it would be difficult to demonstrate a clinically relevant advantage of any one of these techniques over another.

Free flaps are rarely noted to fail when the patient is still in the operating room. These failures are often related to nontechnical issues, such as microcirculation-level ischemia or clotting disorder. The article in this issue of *JAMA Facial Plastic Surgery* by Beckler et al,<sup>1</sup> from an experienced group at the University of California, Los Angeles, attempts to quantify and explore an emerging technique that allows for intraoperative monitoring of skin flap perfusion using angiography that relies on the ability of indocyanine green to bind to plasma proteins.<sup>2,3</sup> This dye emits fluorescence when it is exposed to the 805-nm laser, providing the surgeon with a visual display of molecule distribution within skin flaps to facilitate clinical decisions regarding viability to be made during surgery. This technique has been used primarily in breast reconstruction until now but represents a potentially useful source of information in fibula skin paddle assessment, which has been frustrating on occasion in my experience and that of others. Partial skin paddle loss, which is not uncommon, exposes the underlying bone, risking total flap loss and usually resulting in prolonged hospitalization and

often a return to the operating room for alternative closure of the area of skin loss.

Although adverse reactions are rare, indocyanine green contains iodine, contraindicating its use in patients with iodine allergy.<sup>4</sup> In 2009, Pestana et al<sup>5</sup> reviewed initial experience with the use of this technology in a series of free tissue transfers, most of which were not bone bearing except for a single fibula flap. It is becoming an accepted means of determining tissue viability in tissue-sparing mastectomies, as well as in the musculocutaneous flaps used to perform reconstruction in these patients. The most widely available system is the SPY Elite Imaging System (Novadaq Technologies Inc), which is available at many institutions that perform large volumes of breast reconstruction. As such, applying its use to head and neck free tissue transfer should not be a significant added financial burden to many institutions that already have this technology.

Free tissue transfer reconstruction represents a reliable means of bringing large volumes of well-vascularized tissue to the head and neck region that has been compromised from a vascular perspective by radiation therapy or surgery. In most flaps, I believe that the use of this technology does not have a substantial application because the success rate is so high already, making any added benefit difficult to justify. However, the cutaneous paddle from fibula free flaps is a common source of healing issues that are unpredictable at times even in the best and most experienced of hands. Especially in osteocutaneous fibula flaps with generous skin paddles, this technique may present an option in paddle assessment during surgery. Further studies with greater numbers of patients are necessary to more accurately quantify false-negative rates and any potential added benefit of this technology before I would recommend it as a necessary standard in harvesting these flaps. I believe that we as surgeons need to simplify and not unnecessarily prolong or complicate these already extended surgical procedures in a generally unwell surgical population that is often older and less tolerant to prolonged anesthesia. I commend the authors on their excellent initial work in this field and look forward to its future expansion.

## ARTICLE INFORMATION

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