

# Indocyanine green imaging

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**IMPACT PARAGRAPH**

The main theme of this thesis is the application of indocyanine green imaging in plastic and reconstructive surgery. As extensively described in this thesis, it is of utmost importance that a surgeon is able to adequately assess tissue perfusion intraoperatively during reconstructive flap surgery, and to effectively assess lymph vessels in order to stage and treat lymphedema. Clinical evaluation alone is found to be an unreliable predictor, and previous imaging techniques were found to be expensive, complex, time-consuming and unreliable. Therefore, Indocyanine green imaging is introduced in plastic and reconstructive surgery. Over the last decades, this imaging technique is increasingly used to improve postoperative outcome by lowering postoperative complications rates of tissue necrosis and to improve surgical precision by mapping lymphatic vessels. For example, the use of indocyanine green imaging can possibly lead to a shorter operation time and reduce rates of reoperation, reduce length of hospital stay, or decrease postoperative outpatient clinic visits. From a societal point of view, when indocyanine green imaging is used in an adequate manner, it can prevent additional health care costs. However, indocyanine green imaging is still in a developing phase with a lack of knowledge to fully realize its potential. Consequently, there is no consensus on use of the imaging technique in plastic and reconstructive surgery.

The work of Part I of this thesis provides a better understanding of the factors that influence indocyanine green imaging. If the identified factors regarding the dose of ICG, working distance, the angle of the imaging head, ambient light and the use of intraoperative vasopressors are considered and reported when using indocyanine green in future applications, it will optimize the use and improve the reliability of indocyanine green imaging. Furthermore, transparency in reporting methods will provide information for constructing uniform guidelines and lead towards consensus on the use of indocyanine green imaging. Eventually, this will assist clinicians in a better knowledge of the current evidence and lead to the implementation as a standard of care.

Postoperative complications related to tissue perfusion include partial flap necrosis or total flap failure, wound dehiscence, and infection. These complications may lead to longer hospital stay and more frequent outpatient clinic visits, which increases patient's discomfort. Although surgical techniques are continuously improving, these postoperative complications will always occur after surgery to a greater or lesser degree. As described in this thesis, there is a need to objectively assess tissue perfusion using indocyanine green imaging in order to minimize the risk of these complications and immediately intervene during surgery. This need for tissue assessment is not only confined to plastic and reconstructive surgery. Tissue debridement in trauma surgery and assessment of bowel

perfusion in gastrointestinal surgery are other examples of surgical procedures in which adequate tissue perfusion assessment is important.

The work of Part II of this thesis describes the feasibility of indocyanine green angiography to objectively assess tissue perfusion of the mastectomy skin flap, and free and pedicled flaps. The results of the performed studies suggest that the use of indocyanine green imaging in breast reconstructive surgery and abdominal wall reconstruction can reduce postoperative complications. This may lead to a shorter hospital stay, less frequent outpatient visits for wound problems and reoperations for necrosis or dehiscence. All of this could lead to an increase in comfort for both the patient and the physician. Consequently, it has a positive impact on both the patient, as well as the health care itself.

However, since the currently performed studies are predominantly small, non-randomised cohort studies, there is a lack of high evidence. For this reason, future high-quality randomised controlled trials that compare the use of indocyanine green imaging to clinical evaluation are needed to confirm the real impact of indocyanine green imaging.