BACKGROUND: Previously we have shown the utility of Laser Assisted Indocyanine Green Angiography (LA-ICGA) in microsurgical and pedicle flap breast reconstruction. Through retrospective analysis we have also demonstrated the ability of LA-ICGA to predict mastectomy flap necrosis in immediate breast reconstruction with 100% sensitivity and 91% specificity. In this study we continue our previous work now using LA-ICGA imaging to guide intraoperative decision-making with the goal of reducing mastectomy flap necrosis in immediate breast reconstruction.

METHODS: Following IRB approval, we collected data on 20 consecutive breast reconstructions performed by the senior surgeon. Included were women over the age of 21 undergoing immediate unilateral or bilateral mastectomy for breast cancer. Mastectomy flap imaging by LA-ICGA was performed immediately following the ablative procedure. Based on the LA-ICGA images, surgical options included: tissue expander placement, debridement of non-viable portions of the flap and tissue expander placement, or deferral of reconstruction. Following surgery, the clinical course of each subject was documented by medical record and digital photographs.

RESULTS: Twenty breasts in 12 consecutive patients undergoing immediate breast reconstruction were included. In all cases, reconstruction was accomplished by placement of an unfilled tissue expander and biologic material. The average age was 50.8 years (range: 22-66 years) and average BMI was 25.8 kg/m^2 (range: 20.5-36.1 kg/m^2). No patients were diabetic and none were smokers. However, two patients were former smokers who quit more than 1 year previously. None of the patients had a history of breast irradiation or chemotherapy. None of the reconstructions were deferred; however several underwent intraoperative flap debridement as guided by LA-ICGA. In all 20 reconstructions, there was no postoperative flap necrosis. Other complications noted included 1 (5%) late infection unrelated to flap integrity requiring removal of the expander and 1 (5%) wound delay which was self limited.

CONCLUSION: LA-ICGA can be helpful in detecting sub-clinical levels of mastectomy flap ischemia that will progress with reasonable certainty to flap necrosis. Use of this modality as described can provide the surgeon with critical information allowing them to debride flaps or defer reconstruction as indicated. As the technology and associated software matures, the subjective nature of the images can be improved upon by providing numerical benchmarks (or ranges) predictive of flap necrosis or survival in this respect.