Purpose: Single stage procedures in breast reconstruction following skin sparing or nipple sparing mastectomy with free DIEP flap usually do not require a large skin paddle. The majority of the flap is thus de-epithelialized and placed under the native conserved skin. We hypothesized that the conservation of an intact dermis and it subdermal plexus plays a critical role in the overall flap perfusion, through the recruitment of indirect linking vessels. The goal of the study was to investigate and compare the vascularity of DIEP flaps harvested with intact dermis versus de-epithelialized DIEP flaps.

Methods: Twelve hemi-DIEP flaps were harvested on six fresh adult cadavers acquired through the Department of Anatomy at Mayo Clinic, Rochester MN. After flap dissection, the perforator was canulated using a 24-gauge butterfly catheter (0.7-mm diameter) (BD Insyte; Becton Dickinson S.A., Madrid, Spain). The flaps were de-epithelialized using face-lift scissors (ASSI Face Lift Supercut scissors; New York, NY).

10 flaps were flushed with warm heparinized saline. The flaps were then scanned through a 64-slices CT-Scanner (Siemens) after injection of 5cc of contrast agent (Omnipaque 180). The contrast agent was flushed out with heparinized saline and the dermis was removed from the flap with the same face-lift scissors. The flaps were then rescanned after injection of 5cc of contrast agent (Omnipaque 180).

The second phase consisted in scanning the flaps through a micro-CT scanner, with a resolution allowing the visualization of subdermal plexus. 1 flap was injected with 15cc of Microfil ((Flow Tech Inc., Carver, MA), stored at 4°C during 48 hours and subsequently scanned with a micro computed tomography (micro-CT) scanner, which generates three-dimensional (3-D) images. 1 flap was processed in the same way after the dermis was removed. The three-dimensional reconstructions were then compared.

Results: CT-Scanner injections studies showed a significant decrease in flap perfusion after removal of the dermis. Micro-CT Scanner images showed the importance of the subdermal plexuses

Conclusion: The dermis plays a significant role in enhancing the overall DIEP flap perfusion through the preservation of indirect linking vessels. Preservation of the DIEP flap dermis and its subdermal plexus should be considered after skin sparing mastectomy and nipple sparing mastectomy in order to potentially decrease the partial flap necrosis and flap ischemia.