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The design and properties of synthetic tissue/organ models

Surgical stuff-in-training necessitate practice to improve their skill sets and the shift towards simulation-based trainings enables trainees to learn at their own pace and experience custom-based cases rather than responding to the immediate needs of the patients. Oncoplasty for breast cancer encompasses tumor removal and subsequent breast reconstruction; and there are several oncoplastic techniques to master for proper treatment of the patients. For training purposes, closest media to reality, fresh cadavers, are hard to obtain due to their price and/or unavailability. There is a need for a sustainable, reliable, and affordable platform to diffuse simulation-based trainings to medical curricula and provide trainings even in resource-limited settings. Silicone-based composite models can be designed and manufactured to fulfill the necessities of breast surgery such as precise incision, epidermal undermining, suturing, and resisting suture tension after excision of a considerable mass. We have shown the performance of such a stand-alone breast model for two oncoplastic techniques, “Batwing Mammoplasty” and “Modified Inferior Flap Rezaï”. This model can be used in settings where it is difficult and/or expensive to find fresh cadavers. This cost-effective and practical solution also eliminates the need for chemical/cold storage and risk of infections/molding, thus making it a preferable tool for teaching hospitals and also for individual practice. In addition, the model is suitable to be used in self-diagnosis trainings, as well as a communication platform between medical staff and patients.

Biography

Ozge Akbulut is an Assistant Professor at Sabanci University since February 2012. She received her BS in Materials Science and Engineering at Sabanci University in 2004 and her PhD from Massachusetts Institute of Technology (MIT, 2009) focused on cost-effective fabrication of biomolecular devices and surface science. She continued her studies as a Post-doctoral fellow in the Whitesides Group at Harvard University (2009–2011) on developing tools/techniques for resource-limited settings. Her main research interests include rheology modifiers and silicone-based composites. She also founded a company, Surgitate, on tactile surgical training platforms, in 2014.

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