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INTRODUCTION: Indeterminate burn wounds are problematic in burn excision. The accuracy of clinical assessment was as low as 50%–75%. The reduced accuracy in determining indeterminate burn wounds can be solved with indocyanine green angiography (ICGA), which was found to provide 100% accuracy, comparing to 50% of clinical assessment.1 Despite ICGA advantages, there are no data on how much ICGA can make a difference in burn excision comparing to clinical evaluation. This study aimed to evaluate the difference between burn excision from the clinical assessment method and ICGA guided method.

METHODS: This was a prospective, multicentered, triple-blinded, experimental study. This study was collaborated by Srinagarind hospital and Khon Kaen hospital in Thailand and the University of Wisconsin in the United States. Inclusion criteria were that patients must be admitted to the hospital with indeterminate burn wounds and were hemodynamically stable. Burn wounds with indeterminate depth were clinically assessed, and area to be excised was marked by (first) attending surgeon. The marked area was measured by a 3-dimensional wound measurement device, which was reported to yield high accuracy. ICGA marking was then performed by (second) blinded surgeon. Thirty-three percent of maximal perfusion was used as a cut-point between superficial and deep second degree burns.1–4 The deep burns with maximal perfusion of less than 33% were painted with methylene blue to indicate the area to be excised in the operating room.1–4 The 3-dimensional wound measurement device was later used to measure the painted area. Measurement of the marked area by using clinically assessed and ICGA was conducted by (third) blinded surgeon. After ICG angiography, the wounds were followed to determine the wound outcome on day 21.

RESULT: There were 20 burn sites included in the study. Over 150% difference was found between using ICGA and clinical assessment. Over 90% of the indeterminate burns, which were assessed by ICGA to be superficial burns but was evaluated by clinical assessment to be deep burns, were found to be completely healed on day 21.

CONCLUSIONS: ICGA contributes to a vast difference over clinical assessment in the excision of indeterminate burns. A lot of wounds can be assessed precisely and spared.

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Call to Action: Preclinical Students Benefit From a Plastic Surgery-focused Anatomy and Skills Training Curriculum

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PURPOSE: Digital technology is replacing cadaveric dissection in medical school anatomy curricula. Plastic surgeons therefore have a unique opportunity to provide hands-on learning experiences for students to explore the specialty. We developed and implemented a plastic surgery-focused anatomy and skills training curriculum to maximize hands-on training opportunities and provide early, longitudinal exposure for preclinical students.
METHODS: Preclinical students enrolled in semester-long, monthly, 2-hour educational sessions. The curriculum covered surgical anatomy, suturing, and clinical scenarios. Sessions explored topics in wound healing, surgical simulation, and microsurgery. In collaboration with the residency program, students participated in select cadaveric dissections of the head and neck, upper extremities, and abdominal wall. Sessions assessed knowledge and confidence in learning objectives and surgical skill. A validated survey tool was used to evaluate student satisfaction. Feedback was incorporated for course modification in subsequent semesters, which resulted in later implementation of direct observation, structured feedback, and proficiency assessment of surgical skills. The task-specific Objective Structured Assessment of Technical Skills modified from the American College of Surgeons and the Association of Program Directors in Surgery basic surgical skills curriculum was used.

RESULTS: The first course accommodated 12 preclinical students. Overall confidence in surgical skill significantly increased compared to baseline ($P = 0.003$). There was a significant improvement in knowledge with a corresponding large intervention effect size (38% versus 80%, $P < 0.001$, Cohen’s $d = 3.5$). This knowledge was significantly retained over the 5-month course, as reflected by performance on a cumulative exam (34% versus 54%, $P = 0.001$, Cohen’s $d = 1.6$). Students were eager to participate, reported high satisfaction, and recommended the course to others. Our experience with the first course revealed the importance of scaffolding learning objectives, timed lesson plans, and encouragement of independent deliberate technical practice. Success resulted in course renewal for an additional group of 15 students. Overall confidence in surgical skill ($P = 0.002$) and course knowledge (48% versus 80%, $P < 0.001$, Cohen’s $d = 1.8$) also significantly improved for this cohort. Significant knowledge retention was noted (58% versus 81%, $P < 0.009$, Cohen’s $d = 1.5$), and 64% of students achieved proficiency in simple interrupted suturing, 100% in 1-handed and 73% in 2-handed knot-tying.

CONCLUSION: Plastic surgeons have a unique opportunity to strengthen undergraduate medical education through early introduction of surgical concepts in the preclinical years. This study showed how preclinical students can benefit from a plastic surgery-focused anatomy and skills training curriculum.

Evaluating the Effects of Brain Death Physiology and Immunosuppression on the Muscle-derived Stem Cell Niche in a Large Animal Transplant Model

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BACKGROUND: Muscle-derived stem cells (MDSCs) have been shown to be robust mediators of tissue regeneration and mixed chimerism in small animal murine transplant models. The effects of transplant and brain death (BD) physiology on MDSCs are understudied in large animal translational models. Our study aim was to evaluate the viability, quantity, and stem cell differentiation of MDSCs under various conditions in a porcine vascularized composite allografts (VCA) model. We hypothesized that BD negatively affect the MDSC stem cell-niche in VCA.

METHODS: MDSCs were harvested from the hind-limbs of pigs under the following conditions: (1) pre-BD donor, (2) post-BD donor, (3) immunosuppressed transplanted donor VCA, and (4) immunosuppressed recipient muscle (contralateral leg). Stem cell markers were evaluated in all groups using flow cytometry with standard stem markers (CFS, APC, PERCP) and stem cell presence further confirmed in the pre-BD group with differentiation assays. Samples were harvested at the time of transplant and 7 days after transplantation. MDSC populations were isolated using a modified collagen-sorting preplate technique. Fluorescent and bright field microscopy was used at various time points (0–10 days) to evaluate cell expansion and growth. Images were analyzed for confluence and differentiation stains using ImageJ, and statistical analysis was performed using Mathematica.

RESULTS: Flow-cytometry demonstrated significantly higher population of stem cell markers PERCP (27% versus 7%), CFS (43% versus 14%), and APC (61% versus 12%) in pre-BD versus post-BD groups ($P = 0.001$). Differentiation assays confirmed stem cell presence in the pre-BD differentiation assays, with significantly increased differentiation with later pre-plates for osteogenesis, chondrogenesis, and adipogenesis ($P < 0.01$). Percent confluence at 10 days was greatest in the pre-BD and lowest in post-BD conditions (81% versus 39%; $P < 0.01$). The immunosuppressed transplant donor VCA showed greater percent confluence compared to the immunosuppressed recipient muscle (71% versus 55%; $P < 0.01$), although this remained at a lower level than the pre-BD condition (71% versus 81%; $P < 0.01$).