increase from prior quarter). In contrast, the highest number of CITNs were observed early and significantly decreased over time (1st year-5, 2nd year-2, 3rd year-1, 4th year-1). The course of our AIR program began slowly, but as feedback to reporters increased, reporting and situational awareness increased exponentially. This result demonstrates the fruits of a successful AIR program in establishing situational awareness.

CONCLUSIONS: SPC analysis can be applied to anonymous incident reporting to study the progression of institutional situational awareness. Application of our model can give other institutions a method to evaluate not only their AIR program but also their situational awareness.

S. Kurapati: None. T. King: None.

QS28
Additive Drilling Significantly Improves Mechanically-Tested Bony Stabilization in Translational Spine Models

Fady G. Gendy, HSD1,2, Gregory Kurgansky, HSD3,2, Leyla Y. Cavdar, BA4, Christopher D. Lopez, BA5,2, Lukasz Witek, MSci, PhD2, Paulo G. Coelho, DDS, PhD5,2, Andrea Torroni, MD, PhD5

1Baruch College, Manhattan, NY, USA, 2Department of Biomaterials and Biomimetics, New York University College of Dentistry, New York, NY, USA, 3Macaulay Honors College at Hunter College, Manhattan, NY, USA, 4New York Medical College, Valhalla, NY, USA, 5Hansjörg Wyss Department of Plastic Surgery, New York University Langone Medical Center, Manhattan, NY, USA

STATEMENT OF PURPOSE: Surgical fixation of implants into bone to treat skeletal pathology has positively influenced the well-being of patients and continues to be the basis of orthopaedic rehabilitation. Surgical fixation is dependent on osseointegration, the anchorage of bone around implant. Osseointegration evolves with primary and secondary stability between implant and bone: the initial mechanical interlocking between bone and implant and subsequent bone growth through the healing chambers of the implant, respectively. Osseointegration is dependent on multiple factors such as implant macrogeometry, host bone quality, and drilling techniques. Implant geometries and bone quality have been well described, but different drilling techniques are not well explored. The traditional subtractive drilling techniques render the bony spicules excavated impractical, while additive techniques utilize them as nucleating surfaces for new bone. Therefore, we chose to investigate the effect of additive drilling on implant insertion.

METHODS: Utilizing a translational animal model, 64 implants were installed in the lumbar spine of 8 adult sheep (n=8/animal) bilaterally, with each pedicle screw measuring 4.5mm in diameter x 45mm length. The animals were separated into two time points, 6 and 12 weeks in-vivo. The left side of each lumbar vertebra underwent traditional subtractive drilling, while the right underwent additive drilling. The animals were sacrificed with anesthetic overdose, and the vertebrae were removed en bloc. Pullout strength was measured through mechanical testing using a universal testing machine. For histological analysis, non-decalcified histology was utilized. Biomechanical testing results were recorded and analyzed as mean values with the corresponding 95% confidence interval values (mean ± CI). Pull-out strength were compared using several factors of time in vivo (6- and 12-weeks) as well as surgical drilling method -subtractive and additive.

RESULTS: Mechanical pullout strength collapsed across all time points delineated no significant difference in outcomes between vertebrae. However, when comparing mechanical stability between additive and subtractive drilling at 6-weeks, there was significantly greater pullout strength for the additive group versus the subtractive group. The additive Group measured ~ 390 N, meanwhile the subtractive group only measured ~300 N. Furthermore, at the 12-week time point similar results were seen as the additive group had pullout strength of ~320 N and the subtractive group had ~230 N. All results were significant with \( p < 0.05 \). Demonstrates the initial histological evidence of increased bone growth in the additive group versus subtractive group.

CONCLUSION: Mechanical pullout testing demonstrated that additive drilling provides better implant anchoring and stability compared with the subtractive group. The trend that pullout strength was greater at 6 weeks than that at 12-weeks can be explained by the further development of secondary stability at the 12-week time point. Transverse histological sections of (left) subtractive and (right) additive drilling protocols. 1 Coelho PG, Jimbo R.

Osseointegration of metallic devices: current trends based on implant
hardware design. Archives of Biochemistry and Biophysics 2014;561:99–108.

F.G. Gendy: None. G. Kurgansky: None. L.Y. Cavdar: None. C.D. Lopez: None. L. Witek: None. P.G. Coelho: None. A. Torroni: None.

QS29

Study of the Retinochoroidal Circulation with Fluorescein Angiography in a Rodent Orthotopic Whole Eye Transplantation Model

Chiaki Komatsu, MD1, Jila Noori, MD1,2, Maxine R. Miller, MD1, Yong Wang, MD1, Touka Banaee, MD1, Bing Li, MD1, Joshua Barnett, BS1, Wendy Chen, MD, MS1, Kira L. Lathrop, MAMS2,3, Ian A. Rosner, BS1, Wensheng Zhang, MD1, Mario G. Solari, MD1, Joel S. Schuman, MD4, Andrew W. Eller, MD2, Kia M. Washington, MD5,6

1University of Pittsburgh Medical Center, Department of Plastic Surgery, Pittsburgh, PA, USA, 2University of Pittsburgh Medical Center, Department of Ophthalmology, Pittsburgh, PA, USA, 3University of Pittsburgh, Swanson School of Engineering, Department of Bioengineering, Pittsburgh, PA, USA, 4New York University Medical Center, Department of Ophthalmology, New York, NY, USA, 5University of Pittsburgh Medical Center, Departments of Plastic Surgery, Ophthalmology, Orthopedic, Pittsburgh, PA, USA, 6VA Pittsburgh Medical Center, Pittsburgh, PA, USA

PURPOSE: Whole eye transplantation (WET) could potentially provide a viable optical system to people worldwide with irreversible vision loss. As a first step toward realizing this goal, we have developed an orthotopic model for whole eye transplantation in the rat. Given that viability of the retina is crucial to functional visual return, we evaluated the structural integrity of the retinochoroidal circulation after transplantation using fluorescein angiography (FA), which is the gold standard to evaluate retinal circulation.

METHODS: Brown Norway rats underwent syngeneic whole eye transplantation (n=4). Animals were examined at post-operative week 1. Wide-field FA images and fundus photographs were obtained to evaluate retinochoroidal blood flow. Ocular examinations were performed by an ophthalmologist with retina specialization to evaluate the anterior and posterior segments of the eye. A second group of naïve Brown Norway rats (n=3) served as controls.

RESULTS: FA imaging revealed that two of four rats had transplanted eyes that exhibited normal choroidal flush and arterial and venous filling patterns, normal optic disc appearances, normal retinal vessel caliber and no retinal vessel leakage comparable to the eyes of control animals. Taken together with the results of ocular exams and interpretation of fundus photographs, it was confirmed that there were no signs of retinal ischemia, vessel narrowing or arteritis/phlebitis present in the eyes of these animals. The remaining two of four rats with transplanted eyes showed normal choroidal, arterial and venous filling patterns and no signs of arteritis/phlebitis or vessel leakage, however attenuated retinal vessels were seen on color fundus photographs and FA imaging in the study eyes. Correlated with ocular exam results and evaluation of the retina as captured on fundus photographs, there appeared to be decreased retinal perfusion in these animals as compared to controls.

CONCLUSION: FA results have confirmed that retinochoroidal blood flow can be established after WET in a rat model. Two of the transplanted rats displayed no difference in retinochoroidal circulation as compared to the eyes of control animals. The remaining two rats with transplanted eyes appeared to have decreased retinal perfusion. In all rats, the pattern of vascular filling was normal, and the absence of vessel leakage indicates that the structural integrity of ocular blood vessels can be maintained after WET. The etiology of vascular attenuation and presumed decrease in retinal perfusion will be investigated in future studies.

C. Komatsu: None. J. Noori: None. M.R. Miller: None. Y. Wang: None. T. Banaee: None. B. Li: None. J. Barnett: None. W. Chen: None. K.L. Lathrop: None. I.A. Rosner: None. W. Zhang: None. M.G. Solari: None. J.S. Schuman: Royalty income from IP licensed; Zeiss Optical.; Royalty income; The Massachusetts Eye and Ear Infirmary.; Royalty income; Elsevier.; Equity and royalty income from IP licensed; Ocugenix, LLC.; Equity; Opti-cent Health, IOP Medical Ltd.; Annexon Inc, Pfizer, Slack