312 Glaucoma Surgery I
Tuesday, May 03, 2016 8:30 AM–10:15 AM
Exhibit/Poster Hall Poster Session
Program #/Board # Range: 2923–2956/A0272–A0305
Organizing Section: Glaucoma

Program Number: 2923 **Poster Board Number:** A0272
Presentation Time: 8:30 AM–10:15 AM
Cell adhesion and protein adsorption studies of 3D printed photopolymers
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Purpose: 3D printing technology has the potential to develop personalised ophthalmic devices or organs with improved cost effectiveness and productivity. Limited experimental data exists as to the biocompatibility response of 3D printed photopolymers. We performed cell adhesion and protein adsorption studies of 3D printed photopolymers and materials used in current ophthalmic devices (Silicone, Polytetrafluoroethylene (PTFE) and Poly (methyl methacrylate) (PMMA)).
Methods: Poly(ethylene glycol) diacrylate (PEGDA) (Sigma, MO, USA) and proprietary photopolymer ('Clear' and 'Flexible' resin, FormLabs, MA, USA) sample discs (n=6, 5mm diameter) were developed using a high-resolution, desktop stereo-lithography (SLA) 3D printer (Form 1+, Formlabs). Materials used in current ophthalmic devices (Silicone, PTFE, PMMA) were punched out with similar dimensions to the 3D printed discs. Protein adsorption was quantified using fetal calf serum (Invitrogen, CA, USA) with a micro bicinchoninic acid (Micro BCA, ThermoFisher, MA, USA) protein assay kit and direct assessment of fluorescein-conjugated bovine serum albumin (FITC-BSA, Sigma) adsorption. Discs were seeded with monocytes and incubated for 24 hours at 37^{o}C. Quantification of cell metabolism and cytotoxicity were performed using Alamar Blue and Live/Dead (ThermoFisher) assay kits respectively. Readings were recorded using a plate reader (Fluostar Optima, BMG Labtech, Buckinghamshire, UK). Data were compared using a two-tailed unpaired t-Test.
Results: 3D printed photopolymers demonstrated similar cell adhesion and protein adsorption compared to materials used in current ophthalmic devices. There were no statistically significant differences in measurements observed between 3D printed materials ($P>0.05$).
Conclusions: 3D printed photopolymer material demonstrated a similar biocompatibility response to currently used materials and may allow for the development of customisable ophthalmic devices or organs.
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Program Number: 2924 **Poster Board Number:** A0273
Presentation Time: 8:30 AM–10:15 AM
Conjunctival tissue proteome demonstrates abnormal expression of wound response proteins in glaucoma patients
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Purpose: Medically uncontrolled glaucoma is usually treated surgically. Postoperative scarring and fibrosis often occur as adverse outcomes requiring additional treatment and cause surgical failure. Using a novel proteomic analysis conjunctival health was evaluated in conjunctival specimens of glaucoma patients at the time of operation and compared to healthy conjunctiva.
Methods: Conjunctival tissues (1×2-5mm) were collected from 34 glaucoma patients undergoing glaucoma surgery after long-term (2-21 years) use of topical antiglaucoma medication. Conjunctival tissues of 8 strabismus surgery patients were used as controls. Proteins derived from conjunctival tissues were analyzed for library generation using UniProtKB/SwissProt database. Relative quantification of protein expression levels in 4 µg of each biopsy sample was done by NanoLC-MSTripleTOF using SWATH acquisition. Statistical and MS data analysis were performed with extensive software by Sciex and David Bioinformatics.
Results: A protein identification library consisting of >1800 proteins (FDR 1 %) was established. In total >1550 proteins were identified and quantified in each sample. GO analysis of the conjunctiva proteome revealed 85 wound response associated proteins of which 48 were differentially expressed ($p\leq0.05$) between glaucoma and control patients. A number of proteins were under-expressed in glaucoma, such as complement factors (≥1.5 fold), fibrinogens (≥2 fold) and serpinase family proteins (≥1.6 fold). Known tear fluid function-related proteins such as lysozyme decreased 2-fold and a plasma protein clusterin was up regulated 1.5-fold in conjunctival tissue from glaucoma patients.
Conclusions: Proteomic analysis of conjunctiva demonstrates protein profile of >1800 proteins and offers a powerful tool to further analyze processes like inflammation and wound healing in glaucoma patients who may be at risk from chronic use of glaucoma medications. It will also give an opportunity to further analyze the role of pathogenic mechanisms leading to failure in glaucoma surgery and to develop novel therapies for glaucoma patients.
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Collagen VIII and XI as Biomarkers for Post-operative Conjunctival Fibrosis
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Purpose: Collagen, in particular collagen I, is the major extracellular matrix responsible for the development and persistence of fibrosis.