# Undergraduate Research Symposium May 18, 2018 Mary Gates Hall

# Online Proceedings

## POSTER SESSION 1

**Commons East, Easel 61**

*11:00 AM to 1:00 PM*

**Investigation of Indoor Environment Quality (IEQ) during Construction and Renovation**

*Casiano S. Atienza, Senior, Civil Engineering*
*Mentor: Amy Kim, Civil and Environmental Engineering*

Indoor Environment Quality (IEQ) is a vital topic to address in today's studies as it presents a significant role to the overall well-being of professionals who work indoors. IEQ adheres to overall human reactions to cleanliness/dirtiness, surrounding temperatures, and other irritants that may exist. While studies of IEQ in office environment have been well documented, less is known about IEQ during construction of an interior renovation. There are numerous possibilities of exposure to contaminants and pollutants both during construction and renovation to workers and building occupants, whom become vulnerable to the dusts and odors from construction. Currently there are no enforceable indoor air quality (IAQ) standards targeted specifically for office environment, so it is vital to address these topics and increase awareness, advocate the practice of applying minimal toxic materials, and prevent health concerns. In order to promote productivity and bridge the gaps in awareness concerning IEQ and health in office buildings, this three-phase project at the University of Washington Tower (UW Tower) aimed to addressed and advocated the importance of providing satisfactory IEQ, sustainable renovated workspaces, and shared IAQ strategies that could be implemented during indoor construction and renovation projects. Overall, three phases were implemented in this project. Phase-One took place four weeks before retrofitting. Phase-Two occurred during the construction. Phase-Three occurred after moving to the retrofitted workspace. This project involved collecting and analyzing IEQ data as well as surveying employees at the UW Tower to assess their psychological state, regarding each individuals enjoyment, well-being, at their workspace before and after construction. Future investigations should be directed at understanding what types of construction practices should be used to reduce pollutants, airborne toxins to maintain satisfactory IEQ.

## POSTER SESSION 1

**MGH 241, Easel 159**

*11:00 AM to 1:00 PM*

**Comparing the Role of Arhgaps in the Anterior Migration of Mesodermal Cells during Zebrafish Posterior Body Development**

*Jenan Alsarraf, Senior, Biochemistry*
*Mentor: David Kimelman, Liberal Arts*
*Mentor: Natalie Smith*

During the formation of the early embryonic zebrafish body, bipotential neuromesodermal progenitor cells (NMPs) that are located at the posterior end begin to differentiate via regulation of the Wnt pathway. Relatively higher Wnt-signaling activates the expression of the tbx16 gene, which in turn inhibits the neural fate and commits cells to a mesodermal (muscle) fate. The aim of this study is to understand the downstream effects of tbx16 on the rate and mechanism of anterior migratory transitions of mesodermal cells as they leave the progenitor region and travel to the somite-forming mesoderm region. We have previously shown that successful anterior migration and differentiation of mesodermal cells is dependent upon tbx16 downregulating the expression level of two Arhgaps, a Rho GTPase-activating protein. Hence, we heat shock hsp70: Arhgap29 and hsp70: Arhgap35 zebrafish transgenic lines at early somite stages in order to compare and contrast the effects of sustained Arhgap activation during the critical period of mesodermal cell anterior migration. At 24 hours post-heat shock, embryos are sorted by wild-type and transgenic, with transgenics having severe defects in their posterior somite formation. Followed by immunocytochemistry for a muscle antibody, confocal imaging on whole-mount embryos captures the shape and number of somites from each transgenic line. My results show that while Arhgap29 affects both the number and morphology of somites, Arhgap35 only affects their morphology. This suggests that these two Arhgaps do not have overlapping roles in the control of mesodermal cell migration. I am currently performing a separate in-situ hybridization experiment to help me understand the role of these Arhgaps on the essential genes involved in muscle cell differentiation. This study contributes to understanding early vertebrate development as a model for human embryogenesis.

## SESSION 1N

## MCNAIR SESSION - USING RESEARCH TO AMPLIFY THE VOICES OF MARGINALIZED AND VULNERABLE POPULATIONS

*Session Moderator: Carmen Gonzalez, Communication*
**MGH 287**
*12:30 PM to 2:15 PM*

* Note: Titles in order of presentation.

**Strip Club Safety: A Qualitative Study on How Exotic Dancers Experience Occupational Violence**
*Harley Paulsen, Senior, Social Work, Portland State University*
*McNair Scholar*
*Mentor: Ericka Kimball, Portland State University*

Portland, Oregon takes the lead in the highest strip clubs per capita, however, strip clubs in Portland have gone unregulated, allowing for poor management and oversight of health and safety issues. When violence and exploitation occurs, exotic dancers have scarce resources to turn to due to the continued stigma of being a sex worker. Past research has explored limited issues related to exotic dancers, including drug use, sexually transmitted infections, and mental health problems, but few have questioned what safety measures are needed to protect women in this industry. This study aims to explore the exploitation and abuse that exotic dancers experience in order to improve the laws and regulations of strip clubs. Through this qualitative study, I will use semi-structured interviews in order to better understand experiences of interpersonal violence against exotic dancers including various forms of violence from clients, employees and law enforcement in Portland. Data will be analyzed using thematic analysis in order to establish working themes. The anticipated results of this study is that the interviewed participants will express various experiences of interpersonal violence and that there may be common variables to violence experienced in strip clubs such as race, age, structural safety features in clubs, and the availability of outside resources to report violence. It is also expected that violence perpetrated by clients and club managers will be among the highest reports by the participants. Lastly, it is hypothesized that women who have not experienced abuse and exploitation (or limited amounts) while at work will still fear experiencing it, which is still a cause for concern. This study provides a platform for exotic dancers' voices to be heard, while also attempting to improve better working conditions of adult entertainment establishments.

## POSTER SESSION 2

**MGH 241, Easel 154**
*1:00 PM to 2:30 PM*

**Ultrasmall Nanoparticles for Targeting Latent HIV Reservoirs in Lymph Nodes**
*Sarah Danielle Slack, Junior, Bioengineering*
*Mary Gates Scholar*
*Mentor: Kim A. Woodrow, Bioengineering*
*Mentor: Shijie Cao, Bioengineering*

Antiretroviral therapy (ART) is the standard of care for treating human immunodeficiency virus (HIV) infection and suppresses virus levels but cannot eliminate latent HIV reservoirs. Latently infected cells are a barrier to HIV cure. "Shock and kill" is a strategy that uses latency-reversing agents (LRAs) to reactivate latently infected cells under suppressive ART, making the cells vulnerable for removal by host immune responses or other strategies. However, "shock and kill" fails in clinical studies due to the low potency and high toxicity of LRAs. Here we have developed a lipid-polymer nanoparticle platform that addresses "shock and kill" limitations by incorporating multiple LRAs to increase potency and to reduce toxicity by targeting HIV reservoirs in lymphatic tissues. We have shown that ˜200nm nanoparticles sustain LRA release and induce latency reversal in a human T-cell line *in vitro*. To target lymph nodes, we have synthesized nanoparticles smaller than 100nm in diameter, which literature shows enhances lymph node targeting following subcutaneous injection. By adjusting the polymer and lipid concentrations as well as the organic to aqueous solvent ratio during formulation, we obtained an ultrasmall particle of ˜100nm. *Ex vivo* organ imaging from mice subcutaneously administered these ultrasmall particles shows successful targeting to draining lymph nodes as well as other HIV reservoir locations, including the spleen and the gut-associated lymphatic tissue. The ultrasmall nanoparticles also show similar drug release and latency reversal properties as our previous formulations. The nanoparticle platform demonstrated here is able to target latent HIV reservoirs in multiple areas of the body, which is crucial for eliminating latent HIV reservoirs and achieving a cure.

## SESSION 2C

## TISSUE ENGINEERING, BIOMATERIALS, AND REGENERATION

*Session Moderator: Ying Zheng, Bioengineering*
**MGH 231**
*3:30 PM to 5:15 PM*

* Note: Titles in order of presentation.

**Engineering Human Neuromuscular Junctions for Modeling Axonal Neuropathy**

*Atrina Gharai, Senior, Bioengineering, Neurobiology*
*Mary Gates Scholar, NASA Space Grant Scholar*
*Mentor: Deok-Ho Kim, Bioengineering*

Peripheral neuropathies involve the destruction of peripheral nerves, which leads to impairment of the neuromuscular junction (NMJ). This is the area where the nerve transmits information to muscle. NMJ breakdown will cause this synapse to degrade, generating symptoms such as reduced muscle contraction, respiration, and movement. The problem is that current efforts to develop treatments against peripheral neuropathies are severely dampened by having a lack of human-based models of synapses. Therefore, there is a need for a non-invasive method to explore and characterize synaptic function for future treatments. This research study offers a novel system to investigate the differences in neuromuscular junctions between healthy and disease states by utilizing induced pluripotent stem cells (iPSCs) to derive an *in vitro* NMJ. Procedures involving the differentiation of healthy-state iPSCs into motor neurons have been optimized. The iPSC cultures were matured until day 45 after induction towards a neural ectoderm lineage, and were analyzed using immunocytochemistry, imaging, patch-clamp electrophysiology, and flow cytometry. Differentiated neurons stained positive for neuronal marker p75, Islet-1 and choline acetyltransferase (ChAT). Electrophysiology data showed neurons were capable of high degrees of repetitive firing sequences, while flow cytometry showed neuronal purity in culture was roughly around 97%. Human skeletal muscle myoblasts have also been differentiated into myotubes-the precursors for muscle tissue-and imaged for acetylcholine receptor clusters. The culture medium was supplemented with various additives in order to determine which medium promoted greatest acetylcholine receptor (AChR) cluster density and size. It was found that AChR clusters are more prominent and enlarged when the muscle cells are cultured with Agrin supplement. Ongoing studies are looking at combining these cell types into a novel contractility assay in order to investigate NMJ function *in vitro*. The establishment of this system will enable more effective applications for novel therapeutics and disease progression studies.

# SESSION 2C

## TISSUE ENGINEERING, BIOMATERIALS, AND REGENERATION

*Session Moderator: Ying Zheng, Bioengineering*
**MGH 231**
*3:30 PM to 5:15 PM*

* Note: Titles in order of presentation.

**Engineering 3D Skeletal Muscle Tissue with Controllable Architectures for Study of Structure-Function Relationships**

*Marcus Rhodehamel, Senior, Bioengineering*
*Mary Gates Scholar*
*Mentor: Deok-Ho Kim, Bioengineering*
*Mentor: Nisa Williams, Bioengineering*

Modern disease research utilizes two-dimensional (2D) stem-cell tissue culture models, simplified 3D engineered tissues, and animal organisms to study microenvironments and human physiology. However, *in vitro* platforms often oversimplify the physical tissue niche and animal models do not always accurately represent the function of human tissues. For instance, 2D tissue platforms used to study cardiac biology are limited because they cannot accurately recapitulate the pumping motion of the human heart which is responsible for the circulation or blood. Furthermore, animal models have an under-representative cardiovascular physiology making them inadequate systems for studying human cardiac biometrics. As such, we propose to develop a 3D tissue culture system that can accurately mimic the hierarchical organization of different human tissues. Using our novel flexible cell-sheet stacking technique, we can precisely stack layers of organized cell-sheets to create 3D laminar tissues. Then, these organized laminar tissues can be manipulated by the flexible scaffold into complex 3D tissue shapes using custom-made molds. For example, the human heart is helically aligned cardiac tissue throughout its structure that allows for the generation of intraluminal pressure during ventricular contraction. Inspired by the intricate architecture of human myocardium, this project aims to analyze how varying degrees of cell orientation can influence intraluminal pressure generating function. To account for the hollow and conical nature of the human heart architecture, we have designed a model for casting closed 3D hydrogel scaffolds with a hollow lumen that allows for intraluminal pressure measurements. The proposed model will allow for the determination of the optimal angle of cell alignment that produces the greatest intraluminal contraction. We will validate this platform using a contractile mouse skeletal muscle cell type. This approach can be adapted to model the organization of any contractile muscle tissue and

be used to study the function and microstructure of human tissues.

## SESSION 2C

## TISSUE ENGINEERING, BIOMATERIALS, AND REGENERATION

*Session Moderator: Ying Zheng, Bioengineering*
**MGH 231**
*3:30 PM to 5:15 PM*
* Note: Titles in order of presentation.

**Expansion Microscopy for Evaluation of Sub-Sarcomeric Structures in Nanopattern-Based Engineered Cardiac Tissue**
*Grant Joseph Tremel, Senior, Bioen: Nanoscience & Molecular Engr*
*Mentor: Travis Moerk, Bioengineering*
*Mentor: Deok-Ho Kim, Bioengineering*

Stem-cell derived engineered cardiac tissues are a promising avenue for the research of heart disease, enabling disease-specific modelling and drug screening. However, their validity as a model hinges on the similarity to native cardiac tissue, both in super- and sub-cellular structure and organization. When cultured on nanopattern substrates, myocytes orient the sarcomeres along a similar axis, allowing for greater force production and higher similarity to native cardiac tissue, though the evidence of the finer details are obscured by the diffraction limit of light. Super-resolution microscopy has opened the door to the analysis of diffraction-limited biological structures, and one such recently developed super-resolution technique, Expansion Microscopy (ExM), has made this analysis more accessible. By embedding the fluorophores from an immunostained sample into an expandable hydrogel, sub-diffraction details are physically enlarged and made measurable on standard fluorescence microscopy equipment. In this work, expansion microscopy was performed on engineered cardiac tissue to evaluate the effect of the nanopattern substrate on sub-sarcomeric structure and organization. As expected, it was found that the sarcomeres were more aligned within the cardiomyocytes, and the length between the z-lines were increased when cells were cultured on the nanopattern substrate as compared to the flat substrate. In addition, the width of the Z-disks were significantly different in nanopattern cultured cardiomyocytes as compared to myocytes cultured on flat substrate. The transverse tubules, responsible for a unified action potential, were larger in diameter and better localized with the Z-line, and the myosin heads were closely localized with the actin filament. When examined with super-resolution microscopy, the engineered cardiac tissues display sub-sarcomeric organization that allows for greater and more efficient force production, further demonstrating the efficacy of nanopattern substrates in cardiac cell differentiation and maturation. Though ExM needs further validation, it has proved a powerful sample-side tool for probing diffraction limited features.

## SESSION 2C

## TISSUE ENGINEERING, BIOMATERIALS, AND REGENERATION

*Session Moderator: Ying Zheng, Bioengineering*
**MGH 231**
*3:30 PM to 5:15 PM*
* Note: Titles in order of presentation.

**3D Printed Microphysiological Model of a Human Myocardium Using an Electroconductive Matrix Bioink**
*Rakchanok (Som) Chavanachat, Senior, Bioengineering*
*NASA Space Grant Scholar*
*Mentor: Deok-Ho Kim, Bioengineering*
*Mentor: Jonathan Tsui, Bioengineering*

Current drug testing methods are unable to accurately predict and study the effects of drugs on human myocardial tissue. These methods are unable to accurately mimic the physiology and maturity of native cardiac tissue, and as a result, the tissues are unable to react to cardiotoxic drugs the same way that native cardiac tissue. Therefore, there is a need for physiologically accurate and mature tissue constructs in order to test clinical drugs for effectiveness, cardiotoxicity, and arrhythmic effects. To fulfill this need, we will use an electroconductive bioink containing decellularized extracellular matrix (dECM) from porcine cardiac tissue, reduced graphene oxide (rGO), and incorporated human induced-pluripotent stem cell (hiPSC)-derived cardiomyocytes to develop a more physiologically accurate cardiac tissue construct. This will result in more adequate cell maturation, and therefore, more accurate preclinical drug screening. The success of this project would lead to the development of high throughput production of biomimetic cardiac tissue models for use in accurate drug screening, along with improving the understanding of cardiac maturation.

# SESSION 2P

## KOREAN PENINSULA AND MIDDLE EAST: HISTORY AND PRESENT CHALLENGES

*Session Moderator: Yong-chool Ha, the Henry Jackson School of International Studies*

**JHN 022**

*3:30 PM to 5:15 PM*

* Note: Titles in order of presentation.

**The North Korean Nuclear Crisis and its Solutions**

*Yean Kim, Sophomore, Pre-Social Sciences*
*Mentor: Clark Sorensen, Jackson School of Int'l Studies*
*Mentor: John Work, Jackson School of International Studies*
*Mentor: Kim Sung Uk, corporation Korea Liberty Union*

The North Korean nuclear crisis is severe, with North Korea having developed missiles potentially armed with nuclear weapons that can reach the continental US. However, the international response has mainly been ineffective in stopping North Korea. Additionally, South Korea's new attitude going towards negotiation with North Korea is an important game-changer. Through this research, I plan to explore the questions of why the international sanctions have been ineffective, how South Korea's changing attitude can influence this issue, and what can be done to solve this issue completely. For this research, I have collected information from many sources both from the US and in Korea, including books, journals, and newspapers. Some of my findings are that there are loopholes to the sanctions, especially China not enforcing the sanctions and trading key goods with North Korea, especially oil. Additionally, the Moon Jae-In administration's new strategy towards the issue, going more towards negotiation, may be catastrophic and must stop immediately. To solve this issue, South Korea must stop doing peace talks with North Korea, as such talks were catastrophic during the past, and stay on the same page with the US to motivate China from not trading with North Korea, especially oil which is crucial to its survival, as North Korea cannot produce its own oil. This may be enough to force North Korea to denuclearize. A better solution is to assassinate the dictator of North Korea, Kim Jong Un, which will lead to disorder in North Korea as Kim Jong Un does not have a successor currently, and South Korea and the US can use this opportunity to destroy the weapons of mass destruction in North Korea. This research is crucial for maintaining the peace and security not only in the East Asia region, but also for the entire world.

# SESSION 2Q

## ASTRONOMY AND ENGINEERING

*Session Moderator: Suzanne Hawley, Astronomy*

**JHN 026**

*3:30 PM to 5:15 PM*

* Note: Titles in order of presentation.

**Investigation of NMR-Based Surface Area Measurement as a Quality Monitor for Nanoparticle Silica Abrasives**

*Olga (Graduated in Spring/2018) Samsonenka, Senior, Chemical Engineering*
*Mary Gates Scholar, UW Honors Program*
*Mentor: Andy Kim, Chemical Engineering*

Silica nanoparticles are extensively used in semi-conductor industry as abrasives in various polishing steps. It is important to be able to conduct rapid, robust surface area measurements of the dispersion that do not require dilution and drying. The focus of this research is to explore nuclear magnetic resonance (NMR) technique as a means for determining surface area of silica nanoparticles and its sensitivity to temperature and trace level contamination. NMR is a technique that can be used for determining the surface area of silica particles in dilute and concentrated solutions. After application of large magnetic field, water protons in the vicinity of nanoparticles relax faster than protons in the bulk liquid. Thus, the average relaxation rate of the sample is proportional to the particle loading, particle surface area, and a proportionality constant, specific surface relaxivity, that is unique for different materials. Silica nanoparticles of sub 100 nm size are studied. Specific surface relaxivities for the materials are found and the effect of various contaminants active in NMR are studied. The lowest limits of detection for possible industrial contaminants are obtained. The interaction of surfactants with silica particle surface are studied using NMR technique. The gelation process of silica nanoparticles and its relationship with relaxation time is investigated by time-resolved dynamic light scattering (DLS) and NMR. Only recently has NMR become available as a bench-top instrument targeting widespread adoption for process control and monitoring. This study advances the knowledge on the various ways this relatively new technique can be applied to the characterization of sub-100 nm silica particles, what is useful for semi-conductor industry and nanoparticle slurry manufacturers.

## POSTER SESSION 3

**Commons West, Easel 20**

*2:30 PM to 4:00 PM*

**Testing a Protein Degradation System for Use during *Drosophila melanogaster* Spermiogenesis**

*Adriana Perez Solorio, Senior, Biology (Physiology)*
*Mary Gates Scholar*
*Mentor: Barbara Wakimoto, Biology*

The acrosome is a sperm-specific organelle required for the fertilization of the ovum in most animals. However, the molecules required for its formation during development are largely unknown. Toward identifying the function of candidate proteins, we are testing a system known as deGradFP in *Drosophila melanogaster* which targets fluorescently-tagged fusion proteins for degradation. This system depends on the ubiquitin-tagged proteasomal degradation pathway. Currently, we are testing whether this system works at different stages of spermatogenesis by targeting Yellow Fluorescent Protein (YFP) tagged *Rabs*, a small GTPase required for vesicular trafficking. Our preliminary results suggest successful targeting of the YFP-tagged *Rab6*. We are currently testing additional YFP-tagged *Rabs*, as well as sperm-specific proteins. The results should reveal whether the proteasomal pathway is working in all stages of spermatogenesis and aid in the understanding of proteins required in the acrosome biosynthesis pathway. Overall, our findings will expand our knowledge of sperm formation and function.

## POSTER SESSION 3

**MGH 241, Easel 130**

*2:30 PM to 4:00 PM*

**The Effects of Insulin on the Macrophage Activation States**

*Alex Tzu Hao Tang, Senior, Biochemistry*
*Mentor: Francis Kim, Medicine*
*Mentor: Ryan McMahan, Medicine-Cardiology*

Diabetes is increasingly prevalent in the world, and there are currently over 29 million people in the United States with diabetes. Type 1 diabetic patients depend on insulin injections to maintain their blood insulin within a certain level so that their cells are getting enough sugar for energy production. Type 2 diabetic patients mostly rely on diet treatments and combinations of insulin and other drug treatments to avoid hyperglycemia. Moreover, type 2 diabetes often leads to different complications such as cardiovascular disease, blindness, and kidney failure. The goal of our study is to investigate insulin effects on the activation of macrophages, which are immune cells with important roles in inflammation. Since a pro-inflammatory state of macrophages can enhance insulin resistance and lead to cardiovascular diseases, it is crucial to understand if insulin changes the macrophage activation states that can cause off target effects leading to other medical complications. The experiments for this project are performed using RAW 264.7 cells, an immortal cell line derived from mouse macrophages. A dose experiment of insulin stimulation was performed to test if phosphorylated STAT1 (pro-inflammatory or M1) and phosphorylated STAT6 (anti-inflammatory or M2) were detected via western blot. Additional experiments determined the intensity of the macrophage response by measuring downstream signaling proteins (PI3K or IRS2) via immunoprecipitation and western blot. Also, RNA extraction and qPCR were performed to see if the gene transcription of macrophage polarization is activated by the above transcription factors. For example, TNF$\alpha$ and IFN$\gamma$ were measured for M1 polarization and IL-4 and IL-10 were measured for M2 polarization. Finally, NF-$\kappa$B, another transcription factor was measured to determine if phosphorylation occurred, which should lead to M1 gene transcription. Together, these experiments revealed whether insulin affects key pro-inflammatory and anti-inflammatory signaling pathways in macrophages.

## POSTER SESSION 4

**Commons West, Easel 12**

*4:00 PM to 6:00 PM*

**Stimuli-Responsive Properties of F127-DMA Hydrogels for use in 3D Printed Shape-Morphing Structures**

*Anuradha Seshan, Senior, Chemical Engineering*
*Mentor: Alshakim Nelson, Chemistry*

Patterned stimuli-responsive hydrogels appeal to many biotechnology applications, including tissue engineering. Direct-write 3D printing is a method wherein a printable ink is dispensed from a syringe with a nozzle as it is directed across a surface. Our group utilizes direct-write 3D printing to create shape-morphing structures using thermo-responsive hydrogels, such as F127-DMA. One objective of our work is to understand how the swelling-induced shape-morphing behavior of the printed objects, change with structure, temperature, and print speed. CAD (Computer-Aided Design) software such as Solidworks and Slicer were used to optimize and build a variety of patterned structures (grid, ribbons, and flower-shaped) with a range of print speeds from 5mm/s to 25 mm/s. Our investigation of the swelling behavior of these structures at different temperatures displayed significant changes in behavior. We determined that as the print speed in the structure was increased, less hydrogel was extruded, leading to a lower radius of curvature when the hydrogel was placed in water. In addition, as the temperature was increased, a higher radius of curvature was observed. These studies may be utilized to advance the 3D printing of complex soft objects with curved surfaces, which could be useful in future applications related to printed organs and anatomical models.

## POSTER SESSION 4

**Balcony, Easel 91**

*4:00 PM to 6:00 PM*

**What Goals Do Youth with Type-2 Diabetes Choose, and Do They Associate with Glycemic Control?**

*Makayla Deann Nez, Senior, Biology (Physiology)*
*Mentor: Joyce Yi-Frazier, Seattle Children's Research Institute*
*Mentor: Grace Kim, pediatrics*
*Mentor: Allison Laroche, Pediatrics*

Prevalence of youth with Type-2 Diabetes (T2D) is increasing. Youth with T2D are at risk for cardiovascular disease and are advised to take on lifestyle change behaviors to improve outcomes, such as exercise, improving diet, and managing stress. The process of goal setting includes determining what needs to be accomplished and creating a plan to achieve this result. Goal setting has been found to help create healthy habits that can aid in the management of disease. While previous work outlines the importance of goal setting in T2D, little is known about the goals set by youth with T2D and whether they influence one's health. For this study, we sought to examine the content of goals amongst youth with T2D and to examine whether the type of goal is associated with glycemic control. One hundred and seven youth with Type-2 Diabetes completed a clinical intake survey during their clinic visit at Seattle Children's Hospital in 2017. The goals were categorized into altering blood sugar and blood glucose intake (N=27, 25.32%), changing eating habits (N=20, 18.69%), insulin management (N=15, 14.02%), improving or decreasing exercise (N=12, 11.21%) and decreasing highs or lows through exercise (N=5, 4.67%). Our next step (currently in progress), is to examine the association of these goal categories with A1C to better understand whether the type of goal relates to concurrent glycemic control. We anticipate that those with higher A1C may choose goals related to exercise and eating habits more than those who have lower A1C and are in good control. These results will inform future interventions to use goals within this population to provide tailored education to improve outcomes in youth with T2D.

## POSTER SESSION 4

**MGH 206, Easel 166**

*4:00 PM to 6:00 PM*

**Reversible Confinement of Cell Seeding Area for High Throughput Antimigratory Cancer Drug Screening**

*Ziwen Wang, Senior, Bioengineering*
*Mentor: Deok-Ho Kim, Bioengineering*

Development of traditional anti-cancer drug has suffered from low success rate to difficulties in engineering approaches and clinical trials. Since metastasis is the major cause of cancer death, the current trend has been shifting towards a combined therapy of traditional cancer drugs and anti-migratory therapy. Cell migration assays provide straightforward visual and efficient quantitative analysis on cell migration distance and pattern. To implement these assays, one of common approach is to apply an elastomer block and create a cell-free area into which adjacent cells can migrate without damaging the cells. Our lab's current cell exclusion migration assay is limited by uncontrolled barrier block adhesion to the substrate surface and to the well wall due to hand cutting and placement of the block. Therefore, to improve the usability and reproducibility, an accurate migration assay is developed to integrate an approach of controlling the geometry of the barrier block and confining the cell seeding area against cell penetration under the block. Our proposed barrier block fabrication utilizes laser-cut acrylic molds, which produce barrier blocks consistently in the same geometry. The block-placement device is optimized by designing a row of handles, which allows for placement of multiple blocks into the multi-well tissue culture plate at once and adjusts their positioning and adhesion precisely. Block-controlled migration is validated using a multi-well cell migration assay with respect to its ability to consistently confine cell seeding area and efficiency of use. The success of this method enables a more efficient method of anti-migratory drug screening and *in vitro* migration pattern analysis.