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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Marie Soleil Harvey –Concordia University

POSTER #1

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
1		Clinical	Respiratory Health

ABSTRACT: The Effects of Smoking and Body Mass Index on the Dosage of Inhaled Corticosteroids in Patients with Physician-Diagnosed Asthma

Introduction: Asthma affects 2.2 million Canadians and is linked to about 500 deaths per year, the majority of which are preventable. Smoking and obesity are modifiable behaviours that have both been related to poorer asthma, they also tend to occur together. It is possible that these 2 behaviours may negatively affect inhaled corticosteroids (ICS), the medication used to treat asthma. The purpose of the current study was to see if there was a relationship between smoking, obesity, and the prescription of ICS in patients with asthma.

Methods: A total of 500 patients recruited at the Pneumology Department of the Sacré-Coeur Hospital in Montreal provided information on their smoking habits and their height and weight (which was used to calculate body mass index (BMI)). Patients also provided information on their asthma medications.

Results: There were 250 never-smokers, 125 light smokers, and 125 heavy smokers, based on lifetime smoking consumption, and 183 patients were normal weight, 192 were overweight, and 125 were obese. There was a significant effect of smoking on ICS ($F=4.24$, $p=.040$), such that the more people smoked the greater their level of ICS. There was not an effect of BMI on ICS ($F=0.53$, $p=.465$). Most interestingly there was a significant interaction between smoking and BMI on ICS ($F=3.36$, $p=.003$). In non-smokers, the higher a persons BMI the more ICS they were prescribed. However, this was not the case in those that smoked (both light and heavy), where BMI had no effect on ICS dose.

Conclusion: The results suggest that smoking is a more significant factor in affecting the dosage of ICS than BMI. However, the influence of being overweight and obese may be more important in a non-smoker than smokers. This study suggests that reducing smoking may be important in reducing ICS dosage in patients with asthma, and that in those people that have never smoked reducing their body weight may lead to a reduction in the need for ICS.

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ABSTRACT REVIEW

Poster Presentation Day 1

Amanda Rizk –Concordia University

POSTER #2

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
5		Clinical	Respiratory Health

ABSTRACT:

Acute Affective and Physiological Response to Exercise Training in Chronic Obstructive Pulmonary Disease (COPD): A Pilot Study

Purpose: Pulmonary rehabilitation (PR), which includes exercise training, is an important part of COPD treatment. Current PR guidelines suggest using high-intensity exercise (e.g., cycling at 80% of maximum capacity), as it seems to have the best benefits on patients' fitness level. However, this approach is believed to be unpleasant and hard to maintain for COPD patients. This belief needs to be verified. The main objective of this pilot study was to measure the affective response (i.e. pleasant versus unpleasant feelings) to high-intensity exercise training in COPD patients to determine if this approach is in fact perceived as unpleasant.

Methods: Individuals with COPD were recruited from an outpatient clinic at Hôpital du Sacré-Coeur de Montréal. Included subjects completed several baseline assessments as part of a larger study. For the present study, affective and physiological measures were taken during a single exercise bout. Patients were asked to perform 25 minutes of high-intensity exercise on a stationary bicycle. Affective response was measured using the Positive and Negative Affect Schedule (PANAS) and the Global Vigor and Affect Instrument (GVA) throughout the exercise session. In addition, many physiological measures (e.g., inspiratory capacity) were taken using a portable system.

Results: To date, 2 subjects have completed all assessments. Positive affect scores from the PANAS (indicating pleasant feelings) remained constant from rest to post-exercise for both subjects. Negative affect scores (indicating unpleasant feelings) dropped from rest to post-exercise in one subject (ΔNApost-rest = 10), but remained constant in the other. Global vigour (level of alertness) and global affect scores from the GVA were higher after exercise than at rest in both subjects (ΔGVpost-rest = 17; ΔGApost-rest = 17). However, global affect scores dropped midway through the exercise session in both subjects (ΔGAmid-start = 13.5). Inspiratory capacity (maximum amount of air that can be inspired) decreased progressively during the exercise session in both subjects.

Conclusion: Preliminary results from this ongoing study suggest that COPD patients have more unpleasant feelings and experience air trapping during a high-intensity exercise bout, but feel more awake and have more pleasant feelings afterward.

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Poster Presentation Day 1

Anastassia Voronova –University of Ottawa

POSTER #3

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
6	Student	Biomedical	Cardiovascular Health

ABSTRACT:

Characterization Of Gli2 Transcription Factor In Stem Cell Differentiation Programs

Purpose of the study: Heart muscle failure is an important cause of death in Canada yet an answer may lie in stem cell therapy to improve heart muscle fitness. Laboratory work has demonstrated that stem cells can be differentiated into cardiac muscle cells; however the detailed biochemical mechanisms regulating cardiac muscle development are still lacking and the method to obtain a pure cardiomyocyte population remains elusive. What is known to date is that Gli2 (glioma-associated oncogene homolog, a transactivator of sonic hedgehog [Shh] pathway) is involved in the cardiac muscle differentiation; however the process of regulation through this protein is barely understood. In order to optimize the development of cardiac muscle, there thus needs to be a better understanding of the orchestration of transcription factor networks by Gli2.

Methods: In order to study Gli2's role in stem cell differentiation programs we used the advantage of P19 embryonic carcinoma cell line, an established stem cell study model, which can be induced to differentiate into cardiac and skeletal muscle under dimethylsulfoxide (DMSO) treatment and neuronal cells under high concentrations of retinoic acid (RA) treatment.

Results: Previous studies have shown that Gli2 can induce cardiomyogenesis and skeletal myogenesis in P19 cells. To further understand the mechanisms by which Gli2 functions, P19[Gli2] cells were examined in greater detail. We found that, in addition to cardiomyogenesis and skeletal myogenesis, P19[Gli2] cells were able to undergo neurogenesis under DMSO treatment, conditions which do not normally support neurogenesis. In addition, Gli2 overexpression also was able to override the enhancement of low concentrations of RA during skeletal muscle differentiation, suggesting a mechanism for RA function. Moreover, Gli2 was found to interact with Mef2c (myocyte enhancer factor 2c), a transcription factor implicated in the differentiation of three lineages - cardiac and skeletal myogenesis as well as neurogenesis.

Conclusions and impact: Mef2c is an important transcription factor playing a major role in both cardiac and skeletal muscle development. By establishing a link between Gli2 and Mef2c proteins we hypothesize that both muscle development programs might be regulated via Gli2/Mef2c protein complexes. An increased understanding of Gli2's role in Shh signalling will bring us one step closer to muscle stem cell therapy.

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Poster Presentation Day 1

Arulmozi Kandasamy –University of Alberta

POSTER #4

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
9	Student / Postdoctoral Fellow	Biomedical	Cardiovascular Health

ABSTRACT:

Shedding light on heart cell death

Interruption of blood flow to the heart during a heart attack deprives the heart of oxygen and nutrients necessary for survival. As a result, heart cells begin to die. One enzyme that may be responsible for damaging heart cells during a heart attack is called matrix metalloproteinase-2 (MMP-2). Our lab has discovered that when the heart is deprived of blood, MMP-2 is activated within the heart muscle cells and can damage the protein machinery within which allows heart muscle to contract. Another enzyme that may be involved in heart cell damage is called glycogen synthase kinase-3beta (GSK-3beta). When GSK-3beta is activated, it also plays a role in heart cell death. Whether MMP-2 is involved in the activation of GSK-3beta is unknown. The goal of our research is to examine whether MMP-2 is directly involved in activating GSK-3beta and what role this may play in causing damage and/or death of heart muscle cells resulting from a heart attack.

We studied the mechanisms by which MMP changes the activity of GSK-3beta and further how this phenonmenon causes injury to the heart. We used test tube studies with purified proteins to test the action of MMP-2 on GSK-3beta. When MMP-2 and GSK-3beta are incubated together in these conditions, we found that MMP-2 cuts GSK-3beta into a smaller sized protein to cause its activation. When we block MMP-2 activity using MMP inhibitor drugs, GSK-3beta was not activated by MMP-2. Using other experimental procedures we discovered that MMP-2 activates GSK-3beta by cutting off a portion of the protein which regulates its activity. We also simulated conditions relevant to a heart attack in a petri dish using heart cells. In these heart cells, we found that MMP-2 activity is increased and that this, in turn, increases the activity of GSK-3beta. Blocking MMP-2 in the cells with inhibitor drugs prevents GSK-3beta activation.

An understanding of how MMP-2 can cause damage and/or death of heart cells can lead to a number of different treatments which may improve the survival rate and the lifestyle of those that are affected by heart disease which causes heart attacks. Ultimately, the development of drugs that are able to prevent or treat heart attacks hinges on an understanding of the processes that lead to the death and destruction of heart cells.

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Poster Presentation Day 1

Beatrice Tsai –McGill University

POSTER #5

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
10	Student	Social, Cultural, Environmental and Population Health	Cardiovascular Health

ABSTRACT:

Gender Identity as a Predictor of C-Reactive Protein Levels

Purpose: Inflammation is involved in the process of plaque build up in the arteries (atherosclerosis). C-reactive protein (CRP), a protein found in the blood which is an indicator of inflammation and a predictor of cardiovascular disease (CVD), has been found to be surprisingly high in women, compared to men. We are unsure why this is, and as such, we want to see if gender identity, i.e., levels of masculinity and femininity, are related to CRP levels.

Methods: A total of 587 cardiac outpatients in the Nuclear Medicine department of the Montreal Heart Institute (320 women and 267 men; Mean age = 65.1) underwent blood tests to assess their CRP levels. Masculinity and femininity were measured using the Bem Sex Role Inventory (BSRI). Patients also completed a detailed questionnaire assessing socio-demographic characteristics (e.g., education level) and health behaviors (e.g., smoking, alcohol consumption), and all patients had their waist circumference (WC) measured. Statistical General Linear Modeling analyses were used to 1) assess the association between masculinity and femininity as continuous variables on CRP, and 2) compare the CRP levels of the following four groups: masculine (those who have high masculinity and low femininity scores), feminine (low masculinity; high femininity), androgenous (high masculinity; high femininity), and undifferentiated (low masculinity; low femininity). WC, alcohol consumption, smoking sta tus, education, age and sex were included in both analyses as covariates to ensure that any effect found was not due to these variables.

Results: Higher masculinity scores were associated with lower CRP levels (F=6.00, p=.015). However, femininity was not associated with CRP (F=0.27, p=.601). Patients classified as 'masculine', 'feminine', 'androgenous' and 'undifferentiated' did not significantly differ in their CRP levels (F=0.31, p=.578).

Conclusion: Masculine traits (e.g. being more dominant, ambitious, and aggressive) are associated with less inflammation while feminine traits (e.g. being gentle, shy, and nurturing) are not. Identifying the psychosocial predictors of CVD risk factors may help us better identify those patients particularly at risk of developing CVD.

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Poster Presentation Day 1

Brianna McGrath –University of Ottawa

POSTER #6

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
11	Student	Biomedical	Blood and Blood Vessels

ABSTRACT:

A mechanobiological investigation of blood platelets

Platelets are components of blood that play a central role in normal (hemostasis) and abnormal (pathologic thrombosis) circulatory health. As much as cellular biochemistry is essential to understanding proper platelet function, another important aspect in the context of blood clot formation or thrombosis is cellular mechanics, as clearly established in studies of platelet activation triggered by their interaction with adjacent blood vessels and blood components (shear stress) in circulating blood. In addition to numerous biochemical triggers, excessive platelet activation causing strokes and heart failure has been attributed to a multitude of conditions related to variable blood flow environments; namely those induced by narrowed blood vessels and prosthetic heart valves that produce abnormal flow patterns, high shear stresses and ultimate blood clot formation. Although a significant body of knowledge has been gained from mechanobiological investigations led at the platelet population level, more work is needed to more thoroughly ascertain the mechanical properties and behavior of platelets at the individual level. Specifically, the research in question synthesizes existing knowledge pertaining to physiologically relevant mechanical stresses imposed on platelets using a technique called micropipette aspiration that probes the limitations of membrane resilience under a specific magnitude of suction or negative pressure. In essence, micropipette aspiration emerges as one proven technique that may be used to further probe the elastic and strength properties of the platelet membrane. This mechanism of mechanical stimulation will also attempt to verify whether these stresses play a catalytic role in possible platelet plasma membrane agitation causing platelet activation or platelet membrane rupture or lysis. Preliminary results reveal the unique behavior of platelet membranes in response to mechanical agitation, demonstrating a high resistance to membrane rupture and buckling indicative of acceptable membrane stiffness and tension necessary to conserve cellular integrity. In future work, one may relate this range of membrane tolerance to extreme conditions in which crushing of platelets can potentially occur between fixed and moving rigid parts of mechanical heart valves. Ultimately, the cumulative information regarding platelet activation, platelet deformation, and platelet membrane material properties amount to a more comprehensive understanding of platelet contributions to circulatory health that can possibly be exploited for the betterment of mechanical device designs.

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Poster Presentation Day 1

Bruno Hogue –Université de Sherbrooke

POSTER #7

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
13	Student / B.Sc.inf.	Biomedical	Critical / Intensive Care

ABSTRACT:

In the heart of fluid resuscitation: impact of fluids on endotoxinic myocardial dysfunction

Methodology Adult rats were equipped with a jugular vein catheter and a perfusion swivel harness system. Some group received a sub-lethal dose of endotoxin E-Coli lipopolysaccharide (LPS) intraperitoneally (055:B5 10mg/kg) and a normal saline 0,9%(NS) or albumin 5%(Alb) IV infusion (all volume adjusted with similar filling/oncotic propriety and indexed with weight). After baseline evaluation, a second echocardiography was performed at 6 or 24hr, and blood and organs were sampled. ERK and cardiac troponin I phosphorylations, iNOS-II and Heme-oxygenase I expressions, and caspase-3 activity were examined after heart tissue extraction. Interstitial space measurements of cardiac apex were analyzed. MicroPET scan imaging with acetate, aceto-acetate (11C) and FDG (18F) were performed. Preliminary Results Up to 20% drop in shortening fraction (FS) was observed 6hr after LPS challenge, with slow recovery at 24 hr. Ventricular tele-systolic volume (VTS) slightly increased with LPS challenge and further rose with saline resuscitation (2-2.5-fold) whereas Alb treatment normalized VTS at 6hrs ($p<0.05$ vs LPS alone). On the other hand, Ventricular tele-diastolic volume (VTD) at 6hr post LPS challenge exhibited differential profile whether saline or Alb was infused: 2-fold increased 1.5-fold reduction ($p<0.05$ vs LPS alone, respectively). In parallel, histological interstitial area ratio analysis showed reduction by 50% with Alb resuscitation ($p<0.05$ vs LPS alone), whereas saline infusion is reductive by only 25%. Pro-apoptotic Caspase-3 is differentially altered by fluid resuscitation, with saline-induced increased (1.5-fold) instead of a trend in Alb-induced decreased (0.3-fold) enzyme activity, and LPS challenged rats, exhibited a major switch/alteration of metabolism during PET sca n K1 analysis, favouring ketone bodies instead of glucose (at 6 hr post LPS challenge).

Conclusions: This study suggests a positive lusinotropic effect of albumin on myocardial function after short-term LPS challenge, with potential molecular and metabolic impacts.

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Poster Presentation Day 1

Candace Lee –Mayo Clinic College of Medicine

POSTER #8

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
14	Student	Biomedical	Cardiovascular Health

ABSTRACT:

Design, Synthesis and Cardiorenal Actions Of Two Novel Peptides Derived From Human B-Type Natriuretic Peptide

Background: Atrial natriuretic peptide (ANP) and B-type natriuretic peptide (BNP) are endogenous hormones that are produced by the heart in response to various physiologic and pathophysiologic stimuli. Both peptides exert favorable biological actions via the second messenger cyclic GMP, including augmentation of salt and water excretion, dilatation of blood vessels, reduction in cardiac filling pressures, enhancement of cardiac relaxation, and suppression of neurohormonal activation. In addition, urodilatin (URO) is a natriuretic peptide of renal origin which plays an important role in sodium regulation in the kidney. Both ANP and BNP have been developed as drugs for the treatment of acute heart failure, whereas urodilatin is in clinical development. All three peptides share a dose-limiting side effect of hypotension which may compromise renal function. We have designed two novel peptides based on human BNP by integrating key structural components from BNP, ANP and URO t o test our hypothesis that these two peptides (named BAA-NP and BUA-NP) would exert BNP-like actions but without excessively lowering blood pressure.

Methods: BAA-NP and BUA-NP were synthesized. BAA-NP or BUA-NP was tested as a 75 min continuous intravenous infusion in normal anesthetized dogs. Clearances are reported for baseline, 30 min and 60 min of infusion. Hemodynamic parameters were recorded via a femoral arterial catheter and a Swan-Ganz catheter. Glomerular filtration rate (GFR) was measured by inulin clearance. Proximal and distal fractional reabsorption of sodium (FRNa) was assessed by the lithium clearance technique. Renal blood flow was monitored by placement of an electromagnetic flow probe around the left renal artery. Cyclic GMP was quantified by radioimmunoassay.

Results: Both BUA-NP and BAA-NP significantly ($P<0.05$) increased plasma cGMP, urinary cGMP excretion, net renal generation of cGMP, urine flow, and urinary sodium excretion from baseline. Both peptides mildly reduced mean arterial pressure, preserved GFR and reduced proximal and distal FRNA. Similar cardiac-unloading actions were observed with BUA-NP and BAA-NP. When the two peptides were compared, significantly greater activation of cGMP, natriuresis and diuresis were observed with BUA-NP vs BAA-NP.

Conclusions: The novel designer natriuretic peptides, BAA-NP and BUA-NP, exerted cGMP-activating, natriuretic, diuretic, GFR-preserving, and cardiac-unloading actions without excessively lowering blood pressure. Their sites of actions in the kidney likely involve both the proximal and the distal nephron. Importantly, incorporation of a urodilatin-based amino acid sequence in natriuretic peptide design may confer superior renal actions.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Chao Deng –University of Ottawa Heart Institute

POSTER #9

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
15	Dr.	Biomedical	Cardiovascular Health

ABSTRACT:

An Injectable Collagen-Chitosan Hydrogel: Preparation, Physical Properties and Angiogenic Capacity

Purpose: Cell therapy for the treatment of heart disease has been hindered by low cell engraftment, poor survival, and inadequate phenotype and function. Chitosan, a natural polymer contained in the shells of crustaceans, is known to promote blood vessel growth in artificial skin and cornea tissue. In this study, we aimed to develop an injectable collagen-chitosan matrix to deliver endothelial progenitor cells (EPCs) and to promote revascularization of the ischemic myocardium.

Methods: We tested the addition of chitosan to a previously developed soft and degradable collagen type I matrix. Different ratios of collagen and chitosan were mixed and chemically cross-linked to produce hydrogels. Physical properties of the hydrogel matrices were characterized. The matrices were seeded with 4-day human EPCs and cultured for 1, 4 and 7 days. Cell viability and the expression of the surface markers CD133 (progenitor cell marker), and CD31 and VE-cadherin (endothelial cell markers) were examined. The in vitro ability of the matrices to support angiogenesis was also tested using human umbilical vein endothelial cells (HUVECs).

Results: Scanning electron microscopy revealed that chitosan was dispersed evenly within the matrix and provided stability to the gel structure. Compression tests showed that the modulus of collagen-chitosan matrices was higher than that of pure collagen hydrogel, and was greater with increasing chitosan concentrations. Swell and degradation results indicated that chitosan improved the stability of collagen matrix. In collagenase solution, pure collagen matrix was digested completely in 5 hours, whereas 10% of a 1:1 ratio of collagen:chitosan remained after 1 month. Collagen-chitosan matrices supported cell viability (about 80%) similar to that of pure collagen matrix, and were equal or better in their ability to support CD133+ EPCs and the differentiation of CD31+ and VE-cadherin+ endothelial cells. Formation of capillary-like structures was at least 4.5-fold greater on the 1:5 and 1:10 collagen-chitosan matrices compared to collagen-only.

Conclusion: Compared to collagen, the collagen-chitosan matrix may be a superior scaffold with increased durability and enhanced angiogenic capacity for heart tissue engineering applications.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Christina Pagiatakis –York University

POSTER #10

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
16	Student	Biomedical	Cardiovascular Health

ABSTRACT:

RhoA signaling regulates MEF2-dependent myocardin expression in vascular smooth muscle cells

PURPOSE: Contraction of vascular smooth muscle cells (VSMC) is triggered by an increase in cellular calcium. Once elevated, VSMCs regulate their calcium sensitivity through the RhoA signaling pathway. Interestingly, this RhoA signaling cascade has also been shown to regulate the production of smooth muscle contractile proteins. In addition, mice that habour a genetic mutation in the myocyte enhancer factor 2C (MEF2C) gene fail to form a proper vasculature and have decreased expression of smooth muscle contractile proteins. Therefore, we hypothesized that the RhoA pathway might regulate the activity of MEF2 proteins.

METHODS: To evaluate calcium-mediated signaling in VSMCs, we used a cell culture model treated with high levels of potassium chloride (KCl) to promote calcium entry, along with gene transfection techniques, and common pharmacological inhibitors that block specific signaling pathways.

RESULTS: KCl treatment of VSMCs increased the protein of level of the MEF2-target genes myocardin and c-Jun. Analysis of the gene regulatory regions for c-Jun and myocardin revealed that KCl induction requires the MEF2 binding site for increased expression. Interestingly, increased expression of myocardin was prevented by pharmacological inhibition of the RhoA and p38 signaling pathways; whereas, increased c-Jun expression was inhibited by blockade of the calcium/calmodulin pathway. We have previously identified protein phoshatase 1α (PP1) as a potent repressor of MEF2 activation that is regulated by p38 signaling to MEF2 proteins. In VSMCs, treatment with a PP1 inhibitor resulted in increased expression of myocardin. Consistent with our pharmacological findings, forced expression of PP1 could inhibit myocardin expression, and the RhoA-regulated PP1 inhibitor, CPI-17, could rescue PP1's repressive effects.

CONCLUSION AND IMPACT: These data provide evidence of a novel signaling pathway that links RhoA-mediated calcium sensitivity to MEF2-dependent myocardin expression in VSMC through a mechanism involving p38 and PP1α regulation of MEF2 proteins. This knowledge could have important implications for both vascular disease and birth defects associated with heart's outflow tract.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Claude Kauffman –Université de Montréal

POSTER #11

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
18	Student / Ph,D.	Biomédical	Santé cardio-vasculaire

ABSTRACT:

Suivi quantitatif des anévrismes de l'aorte abdominale par imagerie tomodensitométrique

Un besoin Clinique : Un anévrisme de l'aorte abdominale (AAA) est une dilatation localisée anormale et irréversible de la paroi artérielle. Si elle n'est pas traitée, la dilatation se poursuit progressivement jusqu'à la rupture, entraînant le décès dans 90 à 100% des cas. Le suivi clinique de l'AAA se fait par l'imagerie tomodensitométrique (TDM) à partir de laquelle, le diamètre maximal (D-max) de l'AAA est mesuré manuellement. Le D-max est utilisé pour estimer le potentiel de rupture de l'anévrisme en supposant que l'AAA se comporte comme un ballon dont le diamètre augmente proportionnellement avec la pression de l'air qui le fait gonfler. Le ballon éclate lorsque la tension de surface est supérieure à la résistance de la paroi. Il est aujourd'hui reconnu que le D-max est insuffisant pour prédire efficacement le risque de rupture et que la morphologie 3D personnalisée de l'AAA doit être considérée. Un problème stimulant et difficile : Cependant, la segmentation 3D de l'AAA reste un défi majeur en raison du très faible contraste entre le thrombus et les structures voisines comme la veine cave, les muscles et l'intestin. Notre objectif à été de développer une méthode reproductible, précise, sensible et rapide pour la segmentation 3D de l'AAA et permettre le calcul automatisé du D-max et du volume.

Méthode : l'outil développé permet l'extraction des parois de l'AAA par un processus collaboratif entre le clinicien et l'ordinateur conduisant à la reconstruction d'un modèle 3D personnalisé de l'anévrisme. Le D-max et le volume de l'AAA sont calculés automatiquement à partir de ce modèle. La méthode à été validée sur une base de 40 patients ayant eu chacun 2 examens CT à un an d'intervalle (soit 80 scans). Les 80 études ont été segmentées deux fois en utilisant l'outil logiciel et la valeur des D-max ont été comparés aux D-max de référence mesurés manuellement par 3 radiologues. Trois cliniciens ont utilisés le logiciel afin de valider la reproductibilité de la mesure des volumes.

Résultats : l'étude statistique menée démontre que notre méthode est parfaitement en accord avec celle utilisée en clinique courante et de plus, permet une mesure reproductible et précise de la volumétrie de l'AAA.

Conclusion : les résultats de cette cette recherche ouvrent de nouvelles perspectives pour le suivi quantitatif de l'AAA en clinique courante. La 3D représente un pré requis pour l'analyse morphologique et la modélisation biomécanique de l'AAA qui permettront une meilleure prédiction du risque de rupture.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Cristian Linte –Robarts Research Institute

POSTER #12

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
20		Biomedical	Cardiovascular Health

ABSTRACT:

Where Cardiac Surgery Meets Augmented Reality: Initiating Clinical Translation

Minimally invasive techniques allow therapy delivery with the same efficiency as conventional methods, but with fewer complications. However, in the case of heart surgery, minimally invasiveness has been hampered by the lack of adequate methods to perform surgery inside the beating heart. To reduce these complications, we have developed new methods to perform these surgeries, which allow surgeons to safely reach, 'see' and manipulate instruments inside the beating heart.

We replace the traditional view of the surgical field with a so-called 'virtual reality space' (fake space), which accurately resembles the 'real surgical space' - the heart chambers, structures of interest, and surgical tools. This fake space merges images of the heart gathered both before (pre-operative) and during the operation (intra-operative), as well as models of the instruments used in surgery. As such, surgeons have access to: a global 3D view of the heart from images taken prior to surgery; a detailed view of the specific location where the therapy is delivered from images taken during surgery; and the location of the surgical tools the surgeon manipulates.

We have initiated the translation of this work into the operating room and conducted preliminary studies on porcine models. Pre-operative information is supplied via subject-specific models of the heart generated from magnetic resonance images. These models possess a 2.8 mm average accuracy in identifying structures of interest (i.e. surgical targets) throughout the cardiac cycle. Furthermore, the models are merged with the intra-operative ultrasound data using a registration (mapping) technique that employs homologous anatomical features from both datasets. Our mapping technique proved suitable for use in the operating room and provided the desired anatomical alignment (within 4 mm) between the pre- and intra-operative anatomy in the region of interest. We further employed the surgical navigation platform to successfully guide typical intracardiac procedures on in vivo porcine subjects, including implantation of mitral valves and repair of septal defects.

The most significant characteristic of our novel surgical navigation system is its ability to enhance the visualization of the intracardiac anatomy, along with the position and orientation of the surgical tools relative to the targets, information not readily available in either the 2D or 3D US images. These novel approaches to surgery will maintain, and hopefully improve, the results of the treatment delivered using conventional methods.

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Poster Presentation Day 1

Darren Yuen –University of Toronto

POSTER #13

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
21	Student	Biomedical	Cardiovascular Health

ABSTRACT:

Bone Marrow Cells Attenuate Renal And Cardiac Injury In A Model Of Progressive Chronic Kidney Disease

Purpose: Despite current therapies, chronic kidney disease (CKD) is associated with a greatly increased risk of death, in large part due to an elevated risk of heart failure. In CKD, the heart and kidney undergo progressive scarring and loss of capillaries (small blood vessels), leading to decreased function. Bone marrow cells (BMCs) prevent capillary loss and preserve organ structure and function in other disease models, but to date have not been examined in CKD. We performed a study to test the effects of BMCs on kidney and heart injury in a model of CKD.

Methods: Subtotal nephrectomy (SNX) is a rat CKD model that, 4 weeks post-surgery, develops kidney and heart capillary loss, scarring, and dysfunction, analogous to human CKD. SNX Fischer 344 (F344) rats were randomized 4 weeks post-surgery to receive: (1) saline, (2) 1 million BMCs intravenously, or (3) 1 million BMCs intra-arterially. Sham-operated F344 rats (surgery but no kidney damage) served as controls. Kidney function was assessed with serial measurements of urine protein, blood creatinine, and blood pressure. Heart function was assessed with invasive hemodynamic measurements. Animals were sacrificed after 8 weeks for structural analysis.

Results: SNX animals developed significant kidney and heart dysfunction, as evidenced by elevated urine protein, blood creatinine, blood pressure, and left ventricular end-diastolic pressure volume relationship, a marker of impaired heart relaxation. BMCs significantly improved all of these parameters ($p < 0.05$ for all). Structurally, SNX animals demonstrated marked kidney and heart damage, with increased scarring and capillary loss. BMC therapy decreased kidney capillary loss, and improved scarring in both organs ($p < 0.05$ for all). All improvements were independent of BMC administration route.

Conclusions: This study is the first to document that intravascular BMC therapy preserves kidney and heart structure and function in a rat model of CKD, independent of BMC administration route. These findings provide preclinical evidence for the use of BMCs as a novel treatment for progressive CKD.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

DeniseDaley –University of British Columbia

POSTER #14

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
22	New Investigator	Social, Cultural, Environmental and Population Health	Respiratory Health

ABSTRACT:

Interaction between maternal distress and methylenetetrahydrofolate reductase (MTHFR) polymorphisms increase the risk for childhood asthma

Background: Single Nucleotide Polymorphisms (rs1801131 and rs1801133) within the methylenetatrahydrofolate reductase (MTHFR) gene result in lower serum folate levels and higher total homocysteine levels, which may increase susceptibility to many complex diseases including asthma, atopy, cancer, depression, anxiety, major mood disorders, and cognitive impairment. Maternal depression, stress, and cognitive impairment are risk factors for the development of asthma and allergic disease.

Objective: The aim of this study was to evaluate the relationship between maternal distress, MTHFR SNPs and risk for childhood asthma.

Methods:1,466 individuals from the Study of Asthma Genes and the Environment were genotyped for 13 MTHFR SNPs. Maternal distress was defined as a physician diagnosis of depression or anxiety, or prescription drug usage for related medications anytime from birth until child age 7-10, when asthma status was determined by a pediatric allergist.

Results: We found no evidence for primary genetic association with asthma or maternal distress; the interaction between maternal distress and asthma altered MTHFR risk estimates and direction of effects. In the absence of maternal distress the T allele of rs1801133 (OR=0.87) and the C allele of rs1801131 (OR=0.53) are protective. With child exposure to maternal distress, these same alleles increase the risk for asthma (rs1801133, OR=1.64, P= 0.00272 and rs1801131, OR=2.25, P=0.00001) when compared to the referent group (same allele, no maternal distress).

Conclusions: Maternal distress increases the risk for childhood asthma in children genetically predisposed to lower serum folate and higher total homocysteine..

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Derek Daniher –University of Western Ontario

POSTER #15

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
23	Student	Biomedical	Respiratory Health

ABSTRACT:

Lung surfactant-based inhaled aerosol drug delivery

Purpose: Inhaled aerosols can get drugs into the lungs without using pills, needles or liquid drug mixtures forced into the lungs. However, drug delivery efficiency in current aerosol therapy is low, especially in sick patients with under-inflated regions of the lung. We are trying to improve delivery to these regions so that drugs we already have can be more effective. Our approach is to fuse synthetic lung surfactant material and the drug into particles that can be inhaled.
Lung surfactant is a material made of lipids and proteins found naturally in healthy lungs. An inhaled surfactant particle may spread the drug on the lung surface after it falls from the air onto the lung wall. This is similar to how a drop of dish soap spreads when it is touched to a clean water surface. This can improve how well the drug can cover the lung surface area. Also, this can increase the amount of drug taken up by the lung tissue.

Our question is: does the process of making the aerosol damage the surfactant? So, we compared the function of aerosol samples to non-aerosol samples.

Method: A custom air-jet device was made to deliver powder aerosols to ventilated rats. This device was used to create the aerosol from the powdered surfactant. A sample of this aerosol was collected using a device, which traps particles like the small airways of the lung. This aerosol sample and the non-aerosol sample were mixed into saline, and injected beneath the surface a single air bubble. This bubble was expanded and compressed to simulate the motion of alveoli during breathing. Images of the bubble were analyzed to obtain surface tension at various stages of the breathing cycle.

Results: The results do not show a significant difference in the minimum surface tension and rate of spreading between aerosol and non-aerosol samples.

Conclusion and impact: This study confirms the air-jet process was not harmful to the surfactant function when using dry powder. The use of a powder is key, because it may be a more stable and effective form of lung surfactant, which itself is being studied for treating a variety of lung diseases. This research is an important step towards using lung surfactant-based aerosols to improve inhaled drug delivery efficiency.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Emily Wong –Robarts Research Institute

POSTER #16

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
28	Student	Biomedical	Stroke

ABSTRACT:

3-D blood flow patterns in the diseased carotid artery

Most strokes are caused by fatty deposits (plaque) that build up in major blood vessels. Plaque in the carotid artery may account for up to half of all strokes. If the patient has a plaque in the carotid artery with a rough surface or ulcer cavity, their risk of stroke may be doubled. Healthy vessels are like the highway, where vehicles move fast but orderly. We have recently shown that an ulcer in the plaque that is as small as the tip of a ballpoint pen can create chaotic blood flow downstream. Disorderly blood flow patterns increase the risk of stroke. This is similar to how disorderly traffic patterns increase the likelihood of accidents. Our goal is to learn how ulcers change the 'traffic patterns' in the carotid artery.

Computational fluid dynamics uses computers to create detailed simulations of blood flow patterns in three-dimensional models of blood vessels. We compared two realistic models of the carotid artery with the same vessel and plaque shape, one with a smooth plaque and one with an ulcer. We can then compare the flow in the two models using sophisticated analysis techniques. One way is to look at snapshots of the flow at any point in time, similar to a police person looking at traffic using a roadside photo radar camera. A second way is to follow the paths of individual blood cells, like a camera inside a police car tailing a speeding car.

We found that the ulcer cavity acts like a diversion on a highway. Blood cells in the outside lane exit into the ulcer to take a 'rest-stop'. However, these blood cells have problems when they get back onto the fast flowing highway. As they merge into traffic, they cause others to swerve and disrupt the main flow of traffic. Collisions and rapidly changing speeds between blood cells can cause dangerous clots to form. Our study gives us information on how clots may form in diseased carotid arteries with plaque ulcers.

An ulcer on the surface of plaque is a major risk factor for stroke. Understanding how ulcers change the blood flow patterns in the diseased carotid artery will help to improve the treatment strategies that are used and thereby improve patient outcomes.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Guillaume Marquis Gravel –Institut de cardiologie de Montréal

POSTER #17

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
33		Clinique	Santé cardio-vasculaire

ABSTRACT:

Chirurgie isolée de la valve tricuspide : résultats échographiques et cliniques

Objectifs: La chirurgie de la valve tricuspide est souvent effectuée de façon concomitante à une opération valvulaire mitrale dans le contexte d'insuffisance tricuspide (IT) fonctionnelle induite par une dilatation du ventricule droit et de son anneau auriculo-ventriculaire. Peu d'études se sont intéressées spécifiquement aux patients ayant subi une chirurgie valvulaire tricuspidienne isolée et sur les bénéfices échocardiographiques et cliniques à long terme d'une telle intervention en regard du risque opératoire. Les objectifs de l'étude sont d'analyser les caractéristiques pré-opératoires et les événements au suivi de tous les patients ayant subi une telle intervention dans un centre tertiaire de soins.

Méthode: Tous les cas de chirurgie valvulaire isolée de la valve tricuspide ayant eu lieu à l'Institut de cardiologie de Montréal entre janvier 1978 et décembre 2008 ont été révisés. Les données ont été obtenues à partir des dossiers médicaux des patients et des échocardiographies trans-thoraciques.

Résultats: Parmi les 878 chirurgies de la valve tricuspide pratiquées durant cette période, 124 ne concernaient que cette valve et ont été incluses dans l'analyse. Le suivi moyen des patients était de 4,1±4,1 ans, pour un total de 406 patients-années. Les femmes constituaient 59% de l'échantillon et 65% des patients se trouvaient dans une classe fonctionnelle NYHA ≥ 3. L'âge moyen était de 55±14 ans et les patients dont la chirurgie s'est avérée être un remplacement de valve tricuspide (RVT) étaient significativement plus jeunes que ceux ayant subi une plastie de valve tricuspide (PVT), soit 51±14 contre 59±13 ans, respectivement (p=0,002). Les maladies fonctionnelles de la valve tricuspide étaient préférentiellement approchées par une PVT, alors qu'une atteinte organique était traitée par un RVT (p<0,001). À l'analyse univariée, les patients ayant subi une RVT étaient davantage susceptibles d'avoir une classe fonctionnelle NYHA ≥ 3 au dernier suivi (p=0,002) et d e subir un événement cardiaque lors du suivi (p<0,001), mais leur fonction de survie sans apparition d'IT ≥ 3 était supérieure (p=0,002). Une pression artérielle pulmonaire systolique < 40 mmHg pré opératoire était associée à une survie sans IT ≥ 3 plus élevée (p=0,05) dans le groupe PVT.

Conclusion: Une CVTI est réalisée principalement pour des atteintes valvulaires organiques. À long terme, la PVT est associée à une meilleure survie sans complication cardiaque et à une meilleure survie globale qu'un RVT.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Helene Favreau –Hôpital du Sacré-Cœur de Montréal

POSTER #18

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
35	PhD student	Clinical	Respiratory Health

ABSTRACT:

Asthma medication, panic and suicidal ideas in patients with asthma

Background: Asthma sufferers presented high level of suicidal ideas, even without having depressive symptoms. Asthma medication (e.g. theophylline) can provoke intense feelings of anxiety in some individuals. These feelings of anxiety can look like panic attacks (e.g. dizziness, light headiness, nausea, tachycardia, hyperventilation, and agitation). Panic disorder (where people have, and worry about, a number of severe panic attacks) is the most common kind of anxiety disorder in patients with asthma. We currently do not know if asthma medication and panic symptoms may increase the likelihood of suicidal ideas in patients with asthma sufferers, which is what the present study assessed.

Methods: A total of 631 patients underwent a sociodemographic, psychiatric (PRIME-MD), and medical history interview on the day of their regular asthma clinic visit at HSCM. They also underwent standard asthma medical test (spirometry) and completed questionnaires (Beck Depression Inventory-II (BDI-II), and Asthma Control Questionnaire) to detect suicidal ideas, depression symptoms and asthma control.

Results: BDI-II results indicated that 12% of the patients reported having suicidal ideas. Statistical analysis indicated that asthma medication (theophylline) use was associated with a three-fold increase in the likelihood of having suicidal ideas (OR=3.0, 95%CI=1.1-8.4). When the presence, or not, of panic disorder was added to the statistical model, the variable theophylline was no longer associated with increased suicidal ideas (OR=1.8, 95%CI=0.7-4.7), but panic was (OR= 4.9, 95%CI=2.5-9.8). Both of these analyses included age, sex, smoking status, asthma severity, asthma control, and mood disorders (minor and major depression), to check that these were not the reasons for the findings.

Conclusions: These findings suggest that adult asthma sufferers taking the specific asthma medication theophyline were 3 times more likely to report suicidal ideas than those not taking the medication. Also, asthma sufferers with panic disorder were 5 times more likely to report suicidal ideas than those not having panic disorder. These findings indicate that physicians should be vigilant about the possible negative side effects of taking theophyline and having panic disorder in patients with asthma.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Jennifer Gordon –McGill University

POSTER #19

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
38	Graduate student	Clinical	Cardiovascular Health

ABSTRACT:

The Effect of Sex and Depression on Physical Activity, Smoking, Obesity and Alcohol Consumption

Purpose: Depression is generally associated with poor health behaviours. However, it is unknown to what extent this is true in both men and women. The purpose of this study was to determine whether major and minor depression were similarly associated with health behaviours (being physically active, smoking, drinking alcohol and being overweight) in male and female cardiac patients.

Methods: A total of 736 cardiology outpatients, 509 men and 227 women (average age=60) underwent a structured psychiatric interview to diagnose minor and major depression. Patients' waist circumference (WC) was measured and they were asked to complete a questionnaire about physical activity, smoking and alcohol consumption. Statistical analyses called General Linear Models were used to examine 1) the association between sex and depression and health behaviours; and 2) whether the association between depression and health behaviours is the same in men and women. Age, marital status, social status, and disease severity were included as covariates.

Results: Patients with major depression engaged in less exercise than patients with minor or no depression ($F=2.93$; $p=.055$). However, depression was not associated with WC ($F=0.43$; $p=.651$), smoking ($F=0.74$; $p=.477$) or alcohol consumption ($F=0.60$; $p=.547$). Men had larger WC's ($F=21.27$; $p<.000$) and smoked more than women ($F=7.22$; $p=.008$), but men and women did not differ in their level of physical activity ($F=0.20$; $p=.651$) or alcohol consumption ($F=2.99$; $p=.084$). Finally, the association between depression and health behaviours was not different in men and women.

Conclusion: Results suggests that individuals with major depression are more sedentary than individuals with no depression or minor depression, and that men smoke more than women. Poor health behaviours may therefore partly explain why depressed individuals and men are at an increased risk for cardiovascular disease.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Jonathon Yee –York University

POSTER #20

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
43	Student / Masters candidate	Health Services/Systems	Cardiovascular Health

ABSTRACT:

Physicians' Perceptions of Cardiac Rehabilitation Intake Summaries: Qualitative Evaluation of Summary Content and Utilization.

Heart disease is the number one cause of death in Canada. While family doctors or nurses oversee the long-term care of patients who have heart disease, these patients require specialized care provided by cardiac rehabilitation (CR) programs. These are programs where patients go weekly to do exercise and learn more about their heart condition. It is important that rehab programs and doctors communicate with each other about the patient's health to be sure they are getting the best care. This study used interviews to explore the views of doctors about CR summaries sent to the doctor at the beginning of the patient's CR program.

METHODS: Family doctors of heart disease patients enrolled in 6 rehab programs were identified. These programs send summaries to the patient's doctor at the time the patient enrols in the program. The summary includes information about the patient, such as test results and risk factors. Participating doctors were interviewed over the phone about what they thought of the summary that was sent to them. Interviews were typed out word-for-word and analyzed in a computer program called NVivo. Notes and memos were used to help categorize the key ideas, and a second reader was used to reduce the chance of bias.

RESULTS: To date, 6 doctors have been interviewed. Emerging themes include: 1) doctors said they wouldn't know if a patient signed up for the program unless they got the letter from the rehab program, 2) doctors were not satisfied with the way the letter was organized because they could not easily find the information they were interested in, 3) they already had some of the information that was in the letter, and 4) some doctors had opinions about whether they wanted to get the letter by mail, fax or electronically.

CONCLUSIONS: CR letters inform doctors that patients signed up for CR and prepares doctors for patient visits. Some of the content is the same as what is already found in the doctors' files, so it is not really helpful to them. Doctors want to get their letters from the rehab program in the same format that they store their patient records in their office. Doctors look forward to getting an update on their patient's progress in the next letter they will get from the rehab program.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Laura Todd –Hospital for Sick Children

POSTER #21

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
49	Student	Clinical	Cardiovascular Health

ABSTRACT:

Outcomes of Pediatric Heart Transplantation for Children with Congenital Versus Acquired Heart Disease

Background: Results for heart transplantation (HTx) have historically been reported to be worse for patients with congenital heart disease (CHD) than those with acquired heart disease (AHD) (cardiomyopathy (CM), tumors). We reviewed outcomes of a large, single pediatric HTx centre to ascertain perioperative and post-HTx outcomes for congenital versus acquired heart disease.

Methods: Retrospective review of the HTx database between January 1992 and June 2008 of de novo pediatric HTX recipients following institutional ethics approval. Data collected included demographics, pre-HTx medical characteristics (surgical history, HLA sensitization, days wait-listed), and perioperative and post-HTx outcomes including ICU time, ECMO use and survival.

Results: During the study period 199 patients underwent HTx, of whom 125 had CHD (74 male, 59%) and 74 had AHD (39 male, 53%). Of the CHD patients 19 (15%) were fetal listings and 64 (54%) had prior cardiac surgeries. Mean follow-up time of the groups was similar: 2.6 yrs (CHD) and 2.3 yrs (AHD). Kaplan Meier survival outcomes were better for AHD vs CHD ($p=0.03$) at 1 yr post-Htx: 88% vs 80%; 3 yrs: 86% vs 74.5%; 5 yrs: 73% vs 68.5%, although long-term survival advantage for the AHD group diminishes when comparing groups conditional upon 3 month survival ($p=0.46$)

CHD patients were more likely to be HLA sensitized (12% vs 5%, $p<0.01$), have younger age at HTx (0.8 yrs vs 8.3 yrs, $p<0.0002$), higher mean ischemic time (283 vs 177 minutes, $p<.004$), greater number of days in ICU post-transplant (11 vs 5, $p<.0001$) and significantly greater mortality (37 vs 11, $p<0.03$) than AHD patients.

Conclusions: Despite improvements in overall survival for pediatric HTx recipients, patients with CHD continue to have higher mortality after HTx, compared to those with AHD. The increased risk of allosensitization and prior cardiac surgeries likely contributes to the increased risk of death in patients with CHD. Although early death is observed to be higher in CHD patients, late survival and outcomes seem to be reasonably comparable between the groups.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Martha Mackay –St. Paul Hospital

POSTER #22

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
55	Student / Clinical Nurse Specialist	Clinical	Cardiovascular Health

ABSTRACT:

Gender differences in symptoms of acute coronary syndromes

Background and Purpose: All health professionals require better understanding of symptoms that may lead to heart attack to improve diagnosis and timeliness of treatment. Nurses are often the first to assess patients' symptoms, and are usually responsible for educating patients about management of symptoms. Thus this understanding is particularly important for nursing. Prior research has suggested there are gender differences in heart attack symptoms, but has been plagued by flaws in research methods. This study therefore sought to determine if gender differences exist in reported symptoms of heart attack, using angioplasty (PCI) balloon inflation to reproduce the reduced oxygen available to the heart muscle (ischemia), as occurs during a heart attack.

Methods: Consecutive patients having non-emergent PCI were prospectively recruited. Exclusions were unstable blood pressure, abnormal electrical activity in the heart, and complete blockage of the heart vessel being treated. Prior to the procedure, subjects answered open-ended questions about symptoms that had led to their referral for PCI. During the procedure, balloon inflation was maintained for 2 minutes or until the anything in the patient's condition necessitated deflation. During inflation, subjects were questioned about current symptoms. Electrocardiogram (ECG) data were collected prior to inflation and upon deflation to confirm ischemia of the heart.
Findings: The final sample was 305 (mean age 63.9 (+/-10.6); 39.7% women). Focusing on the 245 participants (83%) who had ECG-evident ischemia during inflation, there were even odds of having chest pain for women and men (49.5% versus 55.3%; odds ratio (OR) 1.26; 95% confidence interval (CI) 0.76-2.09) and of having what are widely considered to be 'typical' heart attack symptoms (64.1% versus 62.7%; OR 0.94, 95% CI 0.56-1.58). Women reported more symptoms (1.5 +/- 1.3, range 0-8, versus 1.2 +/- 1.0, range 0-5), but this finding may have been due to chance alone.

Conclusions: This prospective study with ECG-affirmation of ischemia suggests women and men have similar symptoms during heart attacks. However, women, perhaps due to psychosocial factors, report more symptoms. Reasons for this difference require further study. Health professionals must incorporate this knowledge into their assessment and also craft educational messages so that women (both with disease and those at risk), recognize that the classic symptoms of ischemia occur equally commonly in women and men.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Maxine Boudreau –Hôpital du Sacré-Cœur de Montréal

POSTER #23

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
56	Ph.D. Student	Clinical	Respiratory Health

ABSTRACT:

Do asthma patients with high anxiety sensitivity have more asthma triggers?

Asthma is a chronic disorder of the airways which is triggered by a variety of stimuli (e.g., pollen, animal hair, emotional stress, and exercise). We have previously reported that psychological factors have been associated with worse asthma control. However, there is limited data on the link between psychological factors and the number and kinds of triggers of asthma. Anxiety sensitivity, which is the fear of anxiety-related symptoms, may be particularly important in the study of asthma triggers.

A total of 642 patients with physician diagnosed asthma (60% women, mean (SD) age = 49 (14) years) were recruited. During a clinic visit, patients provided self-reported demographic and medical history information, including the number and kinds of asthma triggers, and completed the Anxiety Sensitivity Index (ASI) and asthma control questionnaires. All medical information was confirmed by chart review. As part of the clinic visit all patients underwent spirometry testing, which was used to help calculate asthma severity (using GINA guidelines).

On average patients reported having 6.4 (SD=2.1) asthma triggers (range = 0-11). General linear model analysis revealed that ASI was positively associated with the number of reported asthma triggers ($F=21.54$, $p<.001$), controlling for age, sex, severity, and control. Analysis of individual triggers revealed that ASI was related to asthma triggered by stress ($F=35.28$, $p<.001$), acid reflux ($F=16.35$, $p<.001$), and infections ($F=3.91$, $p=.049$), with a trend for exercise ($F=3.20$, $p=.074$).

These results suggest that patients with physician diagnosed asthma with higher levels of anxiety sensitivity reported having more triggers that those patients with lower levels of anxiety sensitivity. In addition, patients with higher anxiety sensitivity were more likely to report stress, acid reflux, infections, and exercise as triggers of asthma. Given this data it can be suggest that anxiety sensitivity as a significant impact on the number and kinds of triggers. Further research is needed to assess if it's the anxiety sensitivity that increases the number of triggers of asthma or it's the high number of triggers that increases anxiety sensitivity.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Nancy Low –McGill University

POSTER #24

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
62	New Investigator	Clinical	Sleep

ABSTRACT:

Physical symptoms and psychiatric disorders among adolescents in primary care settings

The expression of psychiatric syndromes through physical/somatic symptoms has been of longstanding clinical and theoretical interest. Improved knowledge of the specific physical symptoms and/or complaints associated with the initial presentation of underlying psychiatric disorders can improve current screening and detection before secondary disorders emerge. This study examined physical symptoms in association with psychiatric disorders in 632 adolescents from primary clinics. Subjects self-reported their physical symptoms leading to the clinic visit following which they were administered the PRIME-MD instrument to detect mood, anxiety, substance use and eating disorders. Logistic regression models were conducted with physical symptoms as outcomes and psychiatric disorders as the main effects. Models were adjusted for sex, age, ethnicity and source of sampling. Results show 24.8% of the adolescents had a current psychiatric disorder, with the most common being mood and/or anx iety disorders (17.6%). However, only 3.5% of the sample stated an emotional/stress problem was the reason for the clinic visit. Pain, trouble sleeping, and dizziness symptoms were related to mood [odds ratio range (ORs): 2.0-5.7], anxiety (ORs: 2.2-4.5) and eating (ORs: 2.9-6.5) disorders. Heart and breathing problems were additionally associated with mood (ORs: 2.2-4.1) and anxiety (ORs: 2.9-19.7) disorders, whereas eating disorders were associated with gastrointestinal complaints (OR: 5.0). No physical symptoms were related to substance use disorders. Since psychiatric disorders frequently begin in adolescence, these results underscore the potential utility of systematic inquiry for psychiatric symptoms in primary care services, a setting that may provide an opportunity for secondary prevention of these debilitating disorders.

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Poster Presentation Day 1

Santhosh Kallivalappil –University of Manitoba

POSTER #25

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
67	Doctor	Biomedical	Blood and Blood Vessels

ABSTRACT:

Mechanism of Action of Milrinone in Hypoxic PPHN: Desensitization of the Thromboxane Receptor

Rationale: Dysregulation of Thromboxane receptor (TP) is a major factor in pathophysiology of persistent pulmonary hypertension (PPHN) in neonates. Hyper-responsiveness of TP is reported during hypoxia-induced PPHN. Phosphorylation of the TP receptor causes desensitization and down-regulation of signaling. In specific, C-terminal phosphorylation of the receptor protein determines the binding kinetics of receptor ligands. In the present study we hypothesize [1] hypoxia will inhibit TP C-terminal serine phosphorylation by decreasing myocyte protein kinase A (PKA) activity and thereby enhancing TP affinity; and [2] this will be reversible by milrinone treatment, reactivating PKA-mediated TP phosphorylation

Methods: Primary myocytes from neonatal porcine were synchronized to contractile phenotype by serum deprivation and placed in hypoxia (10%O2) or normoxia (21%O2) for 72h. TP receptor was immuno precipitated and blots were probed with antibodies to phospho-serine. Cells were pre-treated with 10μM forskolin (AdenylylCyclase-activator) 1hr, 10-6 M H8 (PKA inhibitor) 1hr, or 5x10-8M Milrinone (phosphodiesterase-3 inhibitor) 15 min. Ca2+ mobilization was assessed by live cell calciometry using Fura-2AM.

Results: TP receptor serine-phosphorylation was significantly diminished ($p<0.05$) in hypoxic myocytes (HM). Forskolin increased TP-serine-phosphorylation in both HM and Normoxic Myocites (NM), ablating the difference between groups. Peak calcium response to U46619 was significantly higher ($p<0.01$) in HM. Forskolin decreased peak calcium response and ablated the difference between HM and NM, indicating the importance of PKA-mediated regulatory phosphorylation. Hypoxia left shifted TP dose-response curve. Forskolin normalized HM responses, superimposing the HM and NM dose response curves. H8 left-shifted the dose response of NM TP toward the HM curve, while forskolin right-shifted HM curve to resemble that of NM. Milrinone had no effect on TP dose response curve in NM. Milrinone right-shifted the TP dose-response curve in HM (HM EC-50 4.46X10-7M vs HM+Milrinone EC-50 1.30X10-6M, $p<0.005$)

Conclusion: Milrinone is known to increase intracellular cAMP. Previously our lab have demonstrated diminished intracellular cAMP level in HM. Present data shows, elevated cAMP enhances TP serine-phosphorylation, desensitizing TP receptor and completely normalizing its dose-response curve. PKA inhibitor made the NM dose response curve to superimpose with HM, indicating single point of regulation of TP affinity by PKA. We report, PDE-3 inhibitor milrinone desensitizes TP receptor, likely by increasing PKA-mediated serine-phosphorylation. Enhanced serine-phosphorylation of TP receptor could diminish the TP receptor hyper-responsiveness during hypoxia. This finding would have significance in the clinical management of PPHN.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Shamila Shanmugasegaram –York University

POSTER #26

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
71	Student	Health Services/Systems	Cardiovascular Health

ABSTRACT:

Barriers to Cardiac Rehabilitation Participation by Mode of Referral

Objective: Despite the benefits of cardiac rehabilitation (CR), it is significantly under-utilized. Research has shown that barriers at the level of the health system, notably type of CR referral, are significant. The objective of this study was to compare patients' perceptions of CR barriers following different means of referral: specifically, automatic referral (that occurs for all patients unless otherwise specified through a care map), referral by liaison (an allied health professional discusses CR with patients), and usual referral (that occurs at the discretion of the Cardiologist or other physician).

Method: 2675 cardiac patients (28.7% female; age 65.9±11.8) from 11 hospitals across Ontario completed a survey in-hospital. To date, 1193 patients completed a one-year follow-up survey which included the Cardiac Rehabilitation Barriers Scale (CRBS). Previous research has established the four-factor structure of the CRBS. The subscales are health care factors such as 'I think I was referred, but the rehab program didn't contact me', logistical factors such as 'distance to the CR program,' work/time conflicts, and comorbidities/functional status. The survey also assessed type of CR referral. Results: Analysis of variance revealed significant differences in total CR barriers between automatic and liaison types (1.92±.72 vs 2.07±.80; $p<.05$) and between automatic and usual types (1.92±.72 vs 2.22±.69; $p<.001$). When examining differences in CRBS subscales, there was a significant difference on the health care factors subscale between automatic and usual types (-.19±.91 vs .49±1.0; $p<.001$) and between liaison and usual types (.01±1.0 vs .49±1.0; $p<.001$). Finally, when comparing items by referral types, patients who had referral by liaison reported significantly greater barriers such as 'time constraints' ($p<.05$), when compared to patients with an automatic referral. Patients who had usual referral reported significantly greater barriers such as 'I didn't know about CR' ($p<.001$), 'I don't need CR' ($p<.001$), and 'my doctor didn't feel it was necessary' ($p<.001$), when compared to an automatic referral. Patients who had usual referral reported significantly greater barrie rs such as 'my doctor didn't feel it was necessary' ($p<.001$), when compared to liaison referral.

Conclusions: Results suggest that health system-level referral types influence patients' perceived barriers to CR participation. The potential of automatic referral to increase CR utilization needs to be further investigated.

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YOUNG INVESTIGATORS FORUM 2009

Poster Presentation Day 1

Sofia Ahmed –University of Calgary

POSTER #27

ABSTRACT ID #	CAREER STAGE	TRACK	RESEARCH AREA
75	New Investigator	Clinical	Cardiovascular Health

ABSTRACT:

Vitamin D status predicts plasma renin response to angiotensin II challenge in healthy humans

Decreased 25OH Vitamin D levels are associated with increased renal and cardiovascular risk, though the mechanism remains obscure. Animal studies suggest a link between Vitamin D and renin angiotensin system (RAS) activity, though the relationship between Vitamin D status and the RAS in humans is unclear. We hypothesized that 25OH Vitamin D levels would be negatively associated with systemic RAS activity.

Nine healthy humans (4 women, 5 men) were studied in high salt balance, a state of maximal RAS suppression. Circulating components of the RAS were obtained at baseline and in response to a graded angiotensin II (AngII) infusion (3ng/kg/min x 30 min and 6ng/kg/min x 30 min). Spearman correlations were used to evaluate the association between 25OH Vitamin D status and 1) baseline RAS activity and 2) the plasma renin activity (PRA) response to AngII challenge.

25OH Vitamin D levels and baseline PRA levels were highly positively correlated (R=0.78, p=0.01), though no association was observed between 25OH Vitamin D status and baseline angiotensin II (p=0.5) or aldosterone (p=0.8) levels. As anticipated, all subjects demonstrated a decrease in PRA in response to AngII challenge (p=0.008 at both 3ng/kg/min and 6ng/kg/min). 25OH Vitamin D level was associated with a greater change in PRA in response to AngII challenge (R=-0.86, p=0.003 at both 3ng/kg/min and 6ng/kg/min). Using linear regression analysis to control for the effect of gender, 25OH Vitamin D status remained a predictor of both baseline PRA (p= 0.07) and the PRA response to AngII challenge (p=0.02). No association was observed between 25OH Vitamin D status and the aldosterone response to AngII challenge. Mean arterial pressure was not influenced by 25OH Vitamin D level at baseline or in response to AngII challenge.

Contrary to our hypothesis, 25OH Vitamin D levels were positively associated with baseline PRA levels and a greater PRA sensitivity to the effects of AngII challenge in healthy humans. It is possible that increased 25OH Vitamin D levels are associated with decreased local tissue (i.e. renal or cardiac) RAS activity resulting in a nonsuppressed systemic PRA level, which would also explain a more sensitive systemic PRA response to AngII challenge. Further studies are needed to clarify this mechanism.