



The Academy NEWSLETTER

THE AMERICAN ACADEMY
OF
CARDIOVASCULAR PERFUSION
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WINTER 2012

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Ask yourself this; Why should I attend the AACP 2013 meeting?

When I was a young perfusionist one of my "big decisions" each year was choosing which meeting I was going to attend for continuing education. There were not as many choices as there are now. This was done by seniority and the AmSect meeting would fill up first. I found myself very often attending the American Academy of Cardiovascular meeting. I realized this was a different group of perfusionists. This was a group that was really dedicated to sharing science and participating in serious discussions about safety, new technology, student participation, and much more. The presenters were very passionate about their work and from my perspective; impeccable. As I reflect on those early years I must admit it was extraordinarily intimidating to walk to the microphone and even ask a question sometimes. Nevertheless, the AACP was getting under my skin and I wanted to become involved.

I was doing research that I could share and this would be a perfect forum for me to present my work. Soon I thought I would like to become a Fellow, and the rest is history. Now I spend my time introducing perfusionists to the AACP and hoping they too will share their techniques. Over the years I have been able to nominate others and meet and know so many wonderful perfusionists. My intent here is to hope that all of you reading this will be welcomed into our group. The American Academy is not a closed-community; it has an honored tradition of paving a road of scientific research specific to our perfusion profession. A simple case report can emit a plethora of information that a perfusionist can take back to their groups for dissemination.

I have asked two of my colleagues also Fellows of the AACP to give you a little insight to our program this year. First, James Beck, CCP, New York, New York explains: **AACP Fireside Chats.**

*"The **fireside chats** were a series of thirty evening radio addresses given by U.S President Franklin D. Roosevelt, between 1933 and 1944. However, according to Roosevelt's principal speechwriter, Judge Clinton Sorrel, FDR first used "fireside chat" in 1929 as Governor of New York. Roosevelt faced a conservative Republican legislature, so during each legislative session, he would occasionally address the citizens of New York directly. He appealed to radio listeners for help getting his agenda*

Continued from Page 1

passed. Letters would pour in following each of these "chats," which helped pressure legislators to pass measures Roosevelt had proposed. The term was quickly adopted by press and public.

At the American Academy of Cardiovascular Perfusion the fireside chats began as small groups emerged from the lecture hall to gather around the bar to share their experiences. Often, more was learned and a greater amount of clinical and theoretical experiences were shared in this format than at the lecture hall itself. This quickly became a highlight of the annual AACP seminar and its rich tradition carries on today. We have moved from the bar into small meeting rooms but still remain in small groups with a friendly open forum designed to engage everyone in the chat. Moderators are only present to guide the open discussion. This year's topics should prove to be stimulating and thought provoking. They include, computers and electronic data management in the OR, ECMO, troubleshooting difficult clinical challenges, safety techniques, the use of cutting edge technology, communicating with the generations, managing perfusion and more. These small and exciting groups fill up quickly so be sure to register early and grab all the American Academy has to offer."

Second, Kevin Charette, CCP, New York, New York discusses: **HEART ARREST 2013**

"In 1989 I observed my first open heart operation and was immediately impressed with the surgical team's ability to "stop" the heart in order for the surgeon to operate on a quiescent organ. Of course, I did not know what "quiescent" meant except for the fact that the heart was not moving and the ECG was flat. I was in cardiovascular technology school so a flat line meant no heartbeat, I knew that much! Even better than stopping the heart was the drama around getting it started again. An electrical shock or two later and voilà anti-quiescence! Most mechanics work on the engine while it is stopped so stopping the heart seemed to make sense. Therefore, a few things

were immediately obvious; stopping the heart was good for the surgeon, patient and my fledgling career as a perfusionist and perhaps the method of achieving electromechanical quiescence was also important.

In the years since that first observation day I have had the opportunity to participate in numerous heart stoppages with different techniques and approaches including; cold crystalloid, warm induction, cold blood with crystalloid (4:1, 9:1 and 1:1), Cold crystalloid with blood (4:1), fibrillatory arrest and ischemic arrest. Also, my mom tells me that I stopped her heart numerous times and I did not even need to go to perfusion school to do it! With all of this in mind, I am pleased that the next American Academy of Cardiovascular Perfusion meeting will host a panel of "heart stopping" scientists who will present compelling research on hyperpolarizing and depolarizing cardioplegia solutions and, with an historical perspective from Dr. Buckberg, this session is not to be missed! "

Finally, we are having a second Panel discussion, **ECMO UPDATE**, which is the hottest topic in the country right now for Perfusionists, Nurses, ECMO Specialists, and all Physicians interested in Medical ECMO. Drs. Bartlett, Brodie, Bacchetta, and D. Scott Lawson, MS, CCP will be a show stopper. I want to also take this opportunity to invite you all to this year's AACP 2013 meeting being held in Los Angeles, CA just prior to the STS meeting. So no excuses, your surgeons will be away too!

Sincerely and see you there,



Linda B. Mongero, CCP
President,
American Academy of Cardiovascular Perfusion

All About our Corporate Partners

Medtronic Gains FDA Clearance for New Infant and Pediatric Cardiopulmonary Bypass Surgery Oxygenation System

On October 26, 2012, Medtronic announced U.S. Food and Drug Administration (FDA) 510(k) clearance and the first U.S. clinical use of its new Affinity Pixie® Oxygenation System. “The system’s advancements offers a range of children for which it can be used, and make setup and use easier for perfusionists,” noted Denise Steinbring, Marketing Director, Medtronic Perfusion.

The Affinity Pixie® Oxygenation System was first used in the United States at Advocate Christ Medical Center in Oak Lawn, IL. It gained its CE (Conformité Européenne) Mark in May 2010 and is available in over 50 countries worldwide.

With a maximum flow rate of 2.0 L/min and a low oxygenator prime volume of just 48 mL, the Affinity Pixie® System can be used to support a broad range of the neonate, infant and pediatric population undergoing cardiopulmonary bypass. Both the oxygenator and reservoir are coated with either Carmeda® BioActive Surface, a non-leaching, End Point Attached heparin biosurface, or Balance® Biosurface, a hydrophilic biocompatible surface option without heparin. The system features the Affinity Orbit® Holder System for flexi-

bility in device positioning and port orientation to help reduce circuit tubing length and associated prime volume.

Approximately 25% of the 36,000 infants born each year in the United States with congenital heart disease require invasive treatment within the first year of life,¹ and some require additional procedures as they grow older. Due to advances in medical care, infants born with congenital heart defects are living longer and healthier lives. Today an estimated one million adults in the United States are living with a congenital heart defect.²

“Medtronic is committed to investing its resources to provide successful therapies to underserved populations, including pediatric patients,”

Affinity Pixie® Oxygenation System receives FDA clearance for infant and pediatric cardiopulmonary bypass surgery.



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Medtronic Gains FDA Clearance for New Infant and Pediatric Cardiopulmonary Bypass Surgery Oxygenation System

Continued from Page 3

said John Liddicoat, M.D., senior vice president, Medtronic and president of the Structural Heart business. "The Affinity Pixie® Oxygenation System is the latest innovation in Medtronic's expanding portfolio of products for pediatric cardiac patients, which includes transcatheter pulmonary valves, cannula products, arterial filters and temporary pacing leads."

The Affinity Pixie® Oxygenation System is another example of Medtronic's commitment to advancing the treatment of cardiovascular disease through collaboration with leading clinicians, researchers and scientists worldwide. For more information about the system, go to www.affinitypixie.com.

References

¹American Heart Association – 2012 Congenital Cardiovascular Defects Fact Sheet

²<http://www.cdc.gov/ncbddd/heartdefects/facts.html>

*Balance Biosurface technology is licensed under agreement from BioInteractions, Limited.

Carmeda is a trademark of Carmeda AB. Products are coated with Carmeda® BioActive Surface, which is licensed from Carmeda AB for use **only as part of an extracorporeal blood circulation system or circuit that includes an oxygenator or blood pump.

INSTRUCTIONS and INFORMATION

- o Complete each appropriate section of this form by printing or typing.
This form may be copied, but must include both pages.
- o Members must pay their 2013 Annual Dues along with their registration fees by completing that portion of the form.
- o You will receive acknowledgment of your pre-registration by January 15, 2013--bring it with you to the meeting.
- o No pre-registration will be processed after January 3, 2013.
-- **After this date you must register at the meeting.**
- o Your receipt and meeting credentials will be available for you at the Pre-Registration desk at the meeting.
- o There will be **NO ADMISSION to any Fireside Chat without proper admission credentials.**
- o If you are joining The Academy with your registration you must:
 - 1) complete appropriate areas of the form;
 - 2) you **MUST INCLUDE** the membership application form;
 - 3) include the \$25 filing fee;
 - 4) include \$145 for the 2013 Annual Dues;
(Your membership begins with the closing business meeting)
- o ONLY VISA/MasterCard credit cards are accepted - with VISA/MasterCard you may FAX your registration to (717) 867-1485
- o The AACP Federal Tax ID Number: 63-0776991 (for hospital use only)
- o Refund policy: Anyone that is pre-registered for this meeting and is unable to attend will receive a full refund minus \$50.00 for handling, mailing, and processing upon written request before January 12, 2013.
- o **Make checks payable to AACP (US dollars). Mail completed pre-registration form and check to:**

AACP
515A East Main Street
Annville, PA 17003

IF YOU HAVE QUESTIONS FILLING OUT THIS FORM, PLEASE CONTACT THE NATIONAL OFFICE (717) 867-1485.

- o If paying by VISA/MasterCard you may FAX this form to (717) 867-1485 or mail to above address.



PRE-REGISTRATION FORM
The 2013 Annual Meeting of
The American Academy of Cardiovascular Perfusion



MEMBER Registration Fee 2013 Annual Dues Adult Guest to Workshop	FEE	Amount	FIRESIDE CHAT REGISTRATION (make your first three choices each day) Thursday Sessions 1) _____ 2) _____ 3) _____ Friday Sessions 1) _____ 2) _____ 3) _____ Saturday Sessions 1) _____ 2) _____ 3) _____ Sunday Sessions 1) _____ 2) _____ 3) _____ Choices will be assigned in the order they are received. Each Fireside Chat is limited to 30 attendees per session each day.
	\$340.00	_____	
	\$145.00	_____	
	\$25.00	_____	
NON-MEMBER Registration Fee Adult Guest to Workshop	FEE	Amount	
	\$400.00	_____	
	\$25.00	_____	
STUDENT PERFUSIONIST Registration Fee Adult Guest to Workshop <i>*MUST include a letter from the school director with registration.</i> <i>**To take advantage of the waived Student rate, you must be a current Student Member of The Academy.</i>	FEE	Amount	
	\$30.00*	Waived**	
	\$25.00	_____	
FELLOW or SENIOR MEMBER Registration Fee 2013 Annual Dues Guest to Induction Dinner Adult Guest to Workshop	FEE	Amount	
	\$400.00	_____	
	\$170.00	_____	
	\$100.00	_____	
	\$25.00	_____	

PRINT OR TYPE

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

HOME PHONE _____ WORK PHONE _____ FAX _____

E-MAIL ADDRESS _____ (Required for confirmation)

ANTICIPATED ARRIVAL DATE IN LOS ANGELES _____

Please read all instructions and information before completing this form.

If you have questions completing this form, please call the national office. Hotel Reservations must be made separately through the hotel directly.

Total Amount of Payment \$ _____ METHOD OF PAYMENT: Check** ___ Money Order ___ Credit Card ___

VISA/MasterCard # _____ Exp. Date _____ 3-digit security code ___ _

Credit card billing address if different from above.

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Signature _____

**** There will be a \$25.00 service charge for any check returned for insufficient funds.**

2013 Annual Academy Meeting



Los Angeles, California
January 24 - 27, 2013

Thursday, January 24, 2013

9:00 AM – 1:00 PM	Council Meeting
10:00 AM – 3:00 PM	REGISTRATION
2:30 PM – 4:30 PM	Fireside Chats <i>Computers in perfusion, assisted bypass, electronic records & data management</i> <i>ECMO, the old, the new, the next generation</i> <i>"Students Only" Forum</i> <i>Troubleshooting venous return, VAVR, air & emboli, peripheral cannulation & more</i>
4:30 PM – 5:30 PM	REGISTRATION
5:00 PM	Opening Business Meeting <i>Fellow, Member, Senior and Honorary Members</i>
5:30 PM – 8:00 PM	Sponsor's Hands-On Workshop & Reception

Friday, January 25, 2013

7:00 AM	REGISTRATION
8:00 AM – 9:30 AM	Scientific Session
9:30 AM – 10:00 AM	Break
10:00 AM – 11:30 PM	Scientific Session
11:30 PM – 1:00 PM	Lunch
1:00 PM – 3:30 PM	Special Scientific Session (Panel) <i>Myocardial Protection</i> <i>Co-Moderators: James MacDonald, CPC (R) and Kenny Shann, CCP</i> <i>Myocardial Protection: Historical Perspective - Gerald Buckberg, MD</i> <i>Del Nido Cardioplegic Solution - Stacy O'Blenes, MD</i> <i>Hyperpolarizing Vs Depolarizing and Additive Effects -</i> <i>Geoffrey P. Dobson, MS, PhD, FAHA</i> <i>Methods and Techniques of Cardioplegia Delivery - Kevin Charette, CCP</i>



3:30 PM – 5:30 PM

Fireside Chats

Hemostasis management: blood use, anticoagulation, heparin resistance and more
Mechanical and assist therapies, VADs, nitric oxide, IABP
Pediatrics, is your circuit small enough, they are not just little people
Perfusion safety, implementing protocols, accidents and outcomes, disasters and anecdotes

6:30 PM

Induction Dinner

Fellow, Senior, Honorary Members & Guests

Saturday, January 26, 2013

7:00 AM

REGISTRATION

8:00 AM – 9:30 AM

Scientific Session

9:30 AM – 10:00 AM

Break

10:00 AM – 11:30 AM

Memorial Session

Update on GME - David Stump, PhD

Charles C. Reed Memorial Lecture

Dr. Vladimir Kucera - Czech Republic

Thomas G. Wharton Memorial Lecture

Linda B. Mongero, CCP - President, AACP

11:30 AM – 1:00 PM

Lunch

1:00 PM – 3:30 PM

Special Scientific Session (Panel)***ECMO Update***

Co-Moderators: John Toomasian and William Harris, CCP

ECMO Update:2013 - Robert Bartlett, MD

Cannulation and Anticoagulation - D. Scott Lawson, MS, CCP

Ambulatory ECMO - Matthew Bacchetta, MD

ECMO for Respiratory Failure: What's New? - Daniel Brodie, MD

3:30 PM – 5:30 PM

Fireside Chats

Communicating with the generations

Expanding the role of perfusion: Cath Lab, EP Lab, ER, etc.

Myocardial protection strategies

Women in Perfusion

5:30PM

Closing Business Meeting

Fellow, Senior and Honorary Members Only

Sunday, January 27, 2013

8:00 AM – 10:00 AM

Scientific Session

10:00 AM – 12:00 PM

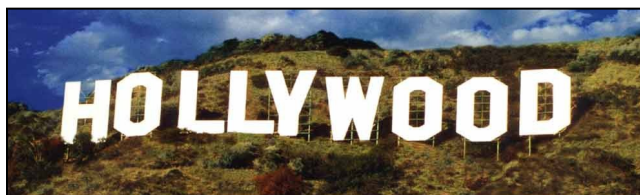
Fireside Chats

Budget management techniques, cost savings, administration

Managing perfusion, leadership issues, team building

Patient management, "What pressure, flow, temperature, etc. are we good?"

Publish or perish, reading the literature, preparing a presentation



Papers and Posters To Be Presented at the 2013 Academy Meeting

TOTAL ARTIFICIAL HEART IN A SMALL PEDIATRIC PATIENT WITH BIVENTRICULAR HEART FAILURE

Susan Park CPNP, Michele Osborn RN, BSN, D. Richard Southard, MD , D. Bradford Sanders CCP, Christopher Pierce, MS, CCP, John Nigro MD, Stephen Pophal MD

THE FAILING FONTAN: WHAT'S NEXT?

D Bradford Sanders, Susan Park, Christopher Derby, Christopher Pierce, Francisco Arabia, Brigham Willis, John Lane, Stephen Pophal, John J. Nigro

SICKLE CELL DISEASE AND COMPLEX CONGENITAL CARDIAC SURGERY: A CASE REPORT AND REVIEW OF THE PATHOPHYSIOLOGY AND PERIOPERATIVE MANAGEMENT

Sanders DB, Smith BP, Sowell SR, Nguyen DH, Derby C, Eshun F, Nigro JJ

VOLATILE ANESTHETIC INDUCED PRECONDITIONING

Trevor Swyers, Daniel Redford, Douglas F. Larson

IMMUNOMODULATORY EFFECTS AND ADENOSINE

Daniella Boros, Jess Thompson, Douglas F. Larson

GUIDANCE FOR IMPLEMENTING A COMPREHENSIVE MANUAL FOR VENTRICULAR ASSIST DEVICES TO IMPROVE CLINICAL MANAGEMENT

Stephanie Radford, Kristina Legg, William Harris

REAL TIME DATA ACQUISITION AND ALERTS REDUCE REACTION TIME AND IMPROVE PERFUSIONIST PERFORMANCE DURING CARDIOPULMONARY BYPASS

JR Beck, K Fung, H Lopez, M Brewer, SC Smith, LB Mongero

CASE REPORT: REMOTE MONITORING ALLOWS IMPROVED RESPONSE TIME AND IMPROVED QUALITY OF CARE FOR PATIENTS ON CARDIOPULMONARY SUPPORT

K Fung, JB Beck, HC Lopez II, LB Mongero

CHOOSING A PUMP FOR ADULT EXTRACORPOREAL MEMBRANE OXYGENATION

David A. Palanzo, Larry D. Baer, Aly El-Banayosy, Shigang Wang, Akif Undar, Walter E. Pae

EFFICACY AND SAFETY OF STRATEGIES TO PRESERVE STABLE EXTRACORPOREAL LIFE SUPPORT FLOW DURING HYPOVOLEMIA

Anouk A.M.A.Lindelauf, Antoine P. Simons, Yuri M.Ganushchak, Jos G. Maessen, Patrick W. Weerwind

TOWARDS PROACTIVE EXTRACORPOREAL LIFE SUPPORT: THE MAASTRICHT EXPERIENCE

Ajay S. Sharma, Patrick W. Weerwind, Yuri M. Ganushchak, Dirk W. Donker, Jos G. Maessen

MANAGING EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) CIRCUIT INTEGRITY AND SAFETY UTILIZING THE PERFUSIONIST AS THE “ECMO SPECIALIST”

Linda B. Mongero, James R. Beck, Kevin A. Charette

VV ECMO FOR THE TREATMENT OF RESPIRATORY FAILURE FOLLOWING THE SURGICAL REPAIR OF AN ACUTE TYPE-A DISSECTION OF THE AORTA

Joshua Walker, Adam Yamin, Jay Pal

ATTENTION DEFICIT/HYPERACTIVITY DISORDER AFTER NEONATAL HEART SURGERY- WHAT ARE THE RISK FACTORS?

Joseph J. Sistino

INITIAL CLINICAL EXPERIENCE WITH THE MEDTRONIC AFFINITY PIXIE OXYGENATOR

Allison Weinberg, Kevin Charette, Linda Mongero, James Beck, Emile Bacha

SUCCESSFUL USE OF LOW PRIME CARDIOPULMONARY BYPASS AND EXTRACORPOREAL OXYGENATION CIRCUITS ON A LOW BIRTH WEIGHT PREMATURE NEONATE WITH TRANSPOSITION OF THE GREAT ARTERIES

Michael Brewer, Kevin Charette, Stacey Brewer, Danielle Gottlieb, Alejandro Garcia, Linda Mongero, Emile Bacha

EFFECT OF SIMVASTATIN ON INTIMAL HYPERPLASIA

Amanda Best, Supannikar Tawinwung, Douglas F. Larson

PLASMA PROTEIN DENATURATION WITH GRADED HEAT EXPOSURE

Randy Vazquez, Douglas F. Larson

ASSESSMENT OF NON-TECHNICAL SKILLS FOR PERFUSIONISTS USING SIMULATION

Joseph J Sistino

ELECTRONIC RECORD KEEPING AND CARDIOPULMONARY BYPASS SIMULATION: THE STAGE IS SET FOR THE ELECTRONIC CHECKLIST

Kevin Charette, Linda Mongero, James Beck, Jan Quaegebeur, Jonathan Chen, Emile Bacha

A PERFUSION PROGRAM'S TRANSITION FROM PAPER TO ELECTRONIC DOCUMENTATION

Seana G. Hall, Douglas F. Larson

BLOOD VOLUMES IN CARDIAC SURGERY

Claire Jara, Trevor Smith, Daniel FitzGerald

PERFUSION AS A CAREER – SATISFACTION SURVEY OF PERFUSION SCHOOL GRADUATES

Gabe L. Compton, Stanley C. Durham Jr., Geoffrey J. Hall, Yana Ivasko, Alicia N. Sievert, Joseph J. Sistino

RESTORATION OF THE COAGULATION CASCADE ON CPB

Lilly KJ, Pirundini PA, Fox A, Body SC, Shaw C, Rizzo RJ

CARDIAC ROBOTIC SURGERY: INNOVATION OF PERFUSION TECHNIQUES

Andrew Berardi , Richard Chan and Fred Hill

The Student Section

Hyperthermic Intraperitoneal Chemotherapy: An overview of practice and its potential role in perfusion

Abstract

Hyperthermic Intraperitoneal Chemotherapy (HIPEC) is a new practice in which patients suffering from peritoneal carcinoma undergo cytoreduction surgery to remove large cancerous tissue from the peritoneal cavity. After this procedure, hyperthermic chemotherapy drugs are perfused throughout the cavity to attack the remaining cancerous tissue. This procedure marks an excellent opportunity to use perfusionists' skills and apply them to a new procedure. The combination of debulking surgery and HIPEC has shown improved patient outcomes and is considered to be the new standard of care for patients with peritoneal carcinoma.

Background

Peritoneal carcinomatosis, a widespread metasis of cancerous tumors in the abdomen, has, until recent years, shown very bleak outcomes. Initially, palliative chemotherapy was used to reduce symptoms and help the patient cope, while cytoreduction, or debulking surgery, was used in severe cases such as intestinal blockages (1). Debulking involved a lengthy procedure where the abdominal cavity was entered and the tumors were excised by the surgeon. This increased the positive outcome for patients; however, it was not always possible to remove all cancerous tissue in the abdomen, in these cases, the remaining tumors had the opportunity to metastasis and re-take over the abdominal cavity. The development of hyperthermic intraperitoneal chemotherapy (HIPEC), allowed

the abdominal cavity to be flushed with a cytotoxic chemotherapy solution that would aid in eradicating the tumors that were missed by the cytoreduction procedure (1). As this process is relatively new to the medical world, it is a great opportunity for perfusionists to step into the role of operating the HIPEC machines and deliver the chemotherapy solutions during surgery. Perfusionists' training and skills in patient management, fluid dynamics, and pharmacokinetics, make them ideal candidates for the job.

Surgery and Chemotherapy Administration

Cytoreduction surgery is no longer the end game of treatment for peritoneal carcinomas, but now half of a two-step process including the administration of HIPEC. The surgery begins by exposing the diseased area of the peritoneal space. Once exposed, it is the surgeon's goal to remove all visible disease in the affected and surrounding area. When complete, debulking is followed by the hyperthermic chemotherapy to remove any residual disease that was missed or too small to be seen (1, 2).

Before the abdomen is closed, an inflow cannula and at least one drainage cannula is positioned in the cavity. The surgeon inspects the integrity of the cavity, as it is not ideal to have communication between internal compartments, i.e. peritoneal and thoracic cavities, to reduce the risk of exposing non-diseased tissue to the cytotoxic drugs (2). Once the cannulas are placed and the cavity inspected, the abdomen is closed and the space is filled with at least 3 liters of a non-

Caleb Varner

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cytotoxic medium (saline or sterile water) to ensure a tight seal and to allow time for the solution to warm to 42-43 degrees Celsius (2, 3). As soon as the surgeon is satisfied with the seal and the appropriate temperature is reached, the administration of the chemotherapy drug(s) occurs. For the next 30-120 minutes, the drug is circulated using the HIPEC pump and the abdomen is manipulated or shaken to ensure an even circulation throughout the cavity (2). After the desired amount of time, the abdomen is drained and washed with another solution, such as sterile water, and discarded, thus ending the cytoreduction and HIPEC procedure.

The HIPEC pump, in its simplest form, consists of four components. First, a reservoir that holds the initial volume of at least three liters that is infused into the patient. While flowing, the reservoir is observed to maintain the proper volume in the patient. The chemotherapy drugs can be added here to be pumped into the patient, and will be returned through the drainage cannula back to the reservoir. Following the reservoir is a pump that delivers fluid to the patient through a heat exchanger, which is the third component. To aid in drainage, a second pump is used between the patient and the reservoir to ensure proper return. In all, these components should allow for complete circulation of the chemotherapy drugs through the infected area (4).

Common Chemotherapy Drugs Used

Mitomycin C is the most common cytotoxic chemotherapy drug used for HIPEC; regarded for its effectiveness as both an intravenous and topical chemotherapeutic drug. Mitomycin C works by specifically targeting DNA and creating crosslinks between complementary strands. These crosslinks lead to errors in replication which in turn leads to the eventual destruction of the effected DNA strands (5). At a common treatment dose of 15mg/m², it was 75% cleared from the abdominal space after 90 minutes (6).

An alternative to mitomycin C is Cisplatin, a commonly used intravenous chemotherapy drug that is given to patients presenting with solid malignancies. The mechanism of action of Cisplatin occurs when a chloride ligand is replaced by water making an aqua ligand which is easily displaced causing the platinum atom to bind to the guanine base of DNA. This leads to crosslinking between guanine in the DNA which causes apoptosis of the cell during mitosis, resulting in a reduction of the cancerous cell mass (7).

Delivery of the drug and the maintenance of the cavity of 42 degrees Celsius have two major effects on the system. First, the hyperthermic temperature has a cytotoxic effect in itself, aiding in killing tissues in the peritoneal cavity. Second, at the higher temperature, the drug is more easily absorbed into the tissues it contacts, causing it to have a greater and longer lasting effect on the tissues (2, 8).

Patient Outcomes

In general, the outcome for patients with untreated peritoneal carcinomas is very poor, showing a 5 year survival rate of less than 15% (3). The development of HIPEC and its combination with cytoreduction therapy has a promising future for improving the outcomes of patients versus no treatment or cytoreduction alone. Different studies show a hospital mortality rate from 0 - 9.5% and a morbidity rate of 33.3 - 39.5% for the combination of HIPEC and cytoreduction surgery (1, 3). A 5 year survival rate of 23% with a median survival of 11 months was also seen in patients, more than doubling the previous 5 year survival rate (3). Overall, studies show a positive trend for the combination of HIPEC with cytoreduction surgery as a safe and acceptable form of treatment for peritoneal carcinoma.

Perfusionist Roles

In recent years, perfusionists' futures have been questioned with the rise of off pump coronary artery bypass grafting and transcatheter aortic valve implantation surgeries, but perfusion has been able to rise above these obstacles. As a community, it is important to continually look for ways to solidify perfusion in the medical field as a whole, and go beyond cardiac surgery. Perfusionists have a great opportunity to do just that with HIPEC and move into the treatment of patients with peritoneal carcinomas as it becomes the standard of care for these situations (1). The training received and experience gathered by perfusionists over the years make them unmatched candidates for the job. Few will be as skilled or knowledgeable in the dynamics of flow, pressure drops, and drainage issues; all key factors in ensuring that the HIPEC machine is adequately delivering the chemotherapy solution. By taking the initiative and putting perfusionists into this role, it will not only improve the outcomes for those suffering from peritoneal carcinomas, but also employment outcomes for perfusionists.

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AACP Student Council

The AACP Student Society has selected the AACP Student Council for this year. The following students will make up the inaugural AACP Student Council, President - Seana Hall - University of Arizona, Vice President - Claire Jara - State University of New York, Secretary - Whitney Western - University of Nebraska Medical Center, Treasurer - Krishna Phifer - RUSH, Catherine Torma - Cleveland Clinic School of Perfusion, Michelle Palmer - Midwestern University (Glendale, AZ).

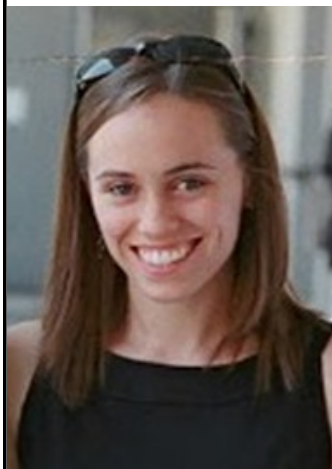
These positions will play an important role during the Student-Only Fireside Chat at the annual AACP Symposium.

Seana Hall - President



Seana is currently pursuing her Master's Degree in Medical Pharmacology while specializing in cardiovascular perfusion at the University of Arizona in Tucson, AZ. She also received her degree in physiology and a minor in chemistry while studying piano performance. Music has always been an important part of her life and she has been playing piano since she was five year old. She also enjoys long-distance running and staying active and healthy.

Claire Jara - Vice President



Claire Jara is a senior perfusion student attending SUNY Upstate Medical University in Syracuse New York. She has a BA in Exercise Science from Hope College in Holland, MI and has previously worked as an NYS EMT-B. She has completed clinical rotations at SUNY Upstate University Hospital, Syracuse NY, Brigham and Women's Hospital, Boston MA, St. Joseph's Health Center, Syracuse NY, and Maine Medical Center, Portland ME. She enjoys the challenge of thinking critically in the dynamic field of cardiovascular perfusion. And she looks forward to what the remainder of her senior year will bring.

Krishna Phifer - Treasurer



Krishna Phifer is a 23 year old Tennessee native. She is currently a second year student at Rush University Medical Center in Chicago Illinois, where she is seeking to obtain her Master's Degree in Perfusion Technology. Upon going into perfusion, Krishna received an undergraduate degree from Bethel College in North Newton, Kansas. It is there that she received a B.A. in Biology and a minor in

Chemistry. As the AACP Student Council Treasurer, Krishna is embracing the opportunity of growth and looking for creative ways to positively implement new ideas.

Whitney Western - Secretary



Whitney is from Kansas City, Missouri and in her second year of the Clinical Perfusion program at the University of Nebraska Medical Center. Before discovering perfusion, Whitney worked as a respiratory therapist for four years. Whitney is the student ambassador for her perfu-

sion class, Secretary for the AACP Student Council and has participated in many volunteer opportunities with the school of allied health at UNMC. Whitney is hardworking and energetic about perfusion and is enjoying gaining experience at her various clinical rotation sites.

AACP Student Council

Catherine Torma - Ambassador



Catherine Torma graduated from Butler University in 2011 with a Bachelor's of Science degree in Chemistry. Currently, she is enrolled at the Cleveland Clinic School of Perfusion and is set to graduate in May of 2013. At the Cleveland Clinic she is working in a clinical setting as well as conducting research. By becoming a student ambassador with the AACP, Catherine hopes to offer topics for discussion and gain insight into the world of perfusion.

Please feel free to contact **Richard Melchior**, AACP Student Liaison Committee Chairman, with any questions and/or concerns you may have regarding the programs at melchiorr@email.chop.edu or 267-973-1951.

Michelle Palmer - Ambassador



Michelle is currently a senior perfusion student at Midwestern University (Glendale, AZ) and just officially crossed the half-way point through her clinical year. She is currently at the Mayo Clinic (Rochester, MN), where she is completing both adult and pediatric rotations. Michelle loves working with the numerous

surgeons and perfusionists at the Mayo Clinic. Michelle feels the experiences at the Mayo Clinic has really helped her to develop preferences as a perfusionist and taught her to be very adaptable to any OR team. She is very excited about working with the AACP student programs and looks forward to meeting students from all over the country at the upcoming AACP Symposium.

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The Student Section

Hemodilution And The Risks Of Allogeneic Transfusion

Abstract: *A reduction in hematocrit during cardiopulmonary bypass is often inevitable. A significant reduction in hematocrit below 19% is associated with a large increase in morbidity. Hematocrits below 24% have increased morbidity as well as the need for additional interventions when compared to higher hematocrits. Transfusion of blood is also associated with risks. Transfusion of a single unit of red blood cells on pump is associated with a 30% increase in morbidity. Transfusion has been shown to cause immunosuppression and increase in-hospital infection. Antigen-antibody reactions can cause damage to various organ systems. Transfusion also carries a substantial monetary cost. The clinician must consider all of these factors while caring for a patient and further research in the area should be done.*

Hemodilution is an accepted part of cardiopulmonary bypass (CPB) surgery. Minimizing the circuit can reduce the volume of the circuit relative to the patient, thereby reducing the need to supplement a patient's own volume. Allowing blood from the arterial line to flow into the circuit to displace crystalloid before going on pump through retrograde autologous priming is also useful in reducing the amount of crystalloid that is ultimately infused into the patient.

Short of priming the entire circuit with blood, some degree of hemodilution is inevitable in the use of CPB for adult patients. Patients may arrive in the operating room with an already suboptimal hematocrit and/or do not have the volume onboard for both their vasculature as well as the CPB circuit. In these situations it is necessary for the clinician to add volume which may entail weighing the benefits of increased oxygen carrying capacity ver-

sus the risks inherent with transfusion.

The body is typically able to compensate for a decrease in oxygen carrying capacity of blood by increasing oxygen extraction. When compensatory mechanisms become insufficient, oxygen consumption becomes dependent on supply. Different organs also have different tolerances for hemodilution. Animal models have shown a decrease in micro vascular oxygen content to decrease at a hematocrit of 17% in intestinal tissue, and at 9% in cardiac muscle (1). Oxygen content reflects an imbalance between supply and demand. This same study found that in renal cells oxygen demand began to outpace supply at hematocrits below 46% (1). Numerous studies have been done in an attempt to establish a transfusion trigger, a hematocrit at which a patient should receive red cell mass. Studies which focused on the incidence of renal failure found an on pump hematocrit below 24% to result in renal injury. In the event of renal failure post CPB requiring dialysis, mortality is approximately 50% (2). A large-scale study of 6,980 patients receiving coronary artery bypass grafts (CABG) found hematocrits below 23% to increase risk of mortality (3). The study also found an association between lower hematocrits and the need for a postoperative balloon pump, as well return to surgery (3). The mortality rate for patients with a lowest hematocrit of 19% had a risk of in hospital mortality double that of patients with a lowest hematocrit of 23% on pump (3). Other studies have shown that a large portion of low cardiac output cases of heart failure following CABG occur in patients with small BSA; this has been attributed to an increased susceptibility to hemodilution (3, 4).

Unfortunately, transfusion comes

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with its own risks. Numerous surgical, critical care, and trauma settings have reported increases in morbidity and mortality in patients who receive one or more transfusions. For cardiovascular procedures, the administration of a perioperative blood transfusion was found to be the single factor most reliably associated with postoperative morbidity. Transfusion poses a risk to patient outcomes due to transfusion-transmitted infection, ABO incompatibilities, and immunosuppression (5). It has also been found that blood which has been stored over 14 days possess a significantly higher postoperative morbidity risk (6). The morbidity increases with transfusion have been shown to be dose-dependent. A patient receiving just one unit of packed red blood cells has an increased likelihood (odds ratio = 1.32) of morbidity as well as sepsis (odds ratio = 1.29); patients receiving two units have further increased risk (odds ratio = 1.38, 1.53, respectively) even when procedure type is taken into account (6, 7). Transfusions have also been shown to have a dose dependent effect on the incidence of myocardial infarction in patients with coronary artery disease (6). One of the most well-known transfusion studies found that a reduction of the transfusion trigger from 9-10g/dL to 7-8 g/dL had no significant negative effect on patient outcomes, and in some cases patient outcome was increased (3).

As cells are stored the levels of free hemoglobin, as well as lipids, such as prostaglandins, can accumulate and form micro-particles which are linked to chronic inflammation. Free hemoglobin has also been implicated in lung injury and thrombosis. Even blood which has been leuko-reduced and filtered carries with it factors which pose a danger to patient outcome. It is estimated that 50% of transfusion related fatalities are due to transfusion related acute lung injury (TRALI) which occurs in 1:5000 transfusions. TRALI is the result of interaction between donor antibodies and recipient leukocytes causing damage to cellular membranes and endothelial surfaces, especially in the lungs (8). The presence of antigen-presenting cells in stored blood reduces the responsiveness of T cells and causes immunosuppression at a time when the patient is in a vulnerable state. The use of blood transfusion in cardiac surgery doubles the odds of in-hospital infection, and increases the odds of in-hospital mortality 4.7 times (9).

Not only does transfusion pose a risk to patient outcomes, but it can also greatly affect the overall cost of healthcare. The cost of a single unit of red

cells will cost the patient around \$1,000 when including the additional costs of administration, testing, and monitoring. There is also a potential four-fold increase the entire cost of their hospital stay in the event of infection (9).

The administration of blood is clearly a double edged sword. While an appropriate hematocrit is necessary for proper perfusion, transfusions carry many risks. In addition, studies which have been done are confounded by the fact that patients who receive blood products end up receiving them because they are high risk patients with more complicated surgeries. These factors make it difficult to determine a precise trigger point at which transfusion is necessary. It is for this reason that blood conservation remains an area of continued study and debate among clinicians.

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