THE AMERICAN ACADEMY
OF
CARDIOVASCULAR PERFUSION
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Fall 2020

The Academy Newsletter

Inside this issue

As fond as I am of talking to students about the non-technical "art" of Perfusion and its place in cardiac surgery there isn't much we do these days that can't be traced back to some level of evidence, experience and data. The science of operating a heart lung machine to appropriately maintain the physiologic needs of our patients through cardiopulmonary bypass involves an ever-evolving set of universally applied (accepted?) practices. We typically have confidence in our "next steps" during CPB because we studied evidence based practices in school and throughout our careers, we have been in that particular situation either firsthand or studied someone else's experiences, and we know the extent and capability of our equipment and technology. We use *evidence, experience and data*.

Organizing and hosting an international professional conference is a monumental compilation of tasks and a sheer mountain of work in the best of circumstances. The annual symposium of the American Academy of Cardiovascular Perfusion (AACP) is certainly no exception and David and Jill Palanzo have given immeasurable time and effort into the AACP as the Executive Directors over the past 19 years. In many ways (and with a bit of creative imagination) the entire exercise of planning and executing such a meeting could be compared to a cardiac surgical case - a group of people bringing their own set of talents and training to work toward a common goal. Any "next steps" tend to fall into place because of the hard work and dedication and direction of the Palanzos, the AACP Council, committee members and officers. We have *evidence* of what worked (and didn't work) during past events, the collective *experience* of centuries across AACP membership and reams of meeting *data* constantly collected and processed through the years.

Gambling, taking chances and leaving things to fate have never appealed much to me… if you saw me on the casino floor in Reno it was exclusively for the social aspect and free entertainment. I don't necessarily go out of my way to avoid unknown or risky situations but I'm far from a daredevil –

Bill Riley
President, AACP

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more so with every passing decade! I suppose my everyday life as an active, mid-40s, *relatively* healthy husband/dad/perfusionist comes along with enough intrinsic risk to keep that part of my brain (the part that lights up on MRI when stimulated in such a way) satisfied. To the gamblers and risk-takers out there, I truly believe that studying (*evidence*), practice (*experience*) and deep understanding of the situation at-hand (*data*) very likely help the winning chances of people who bring those advantages to the table.

Enter COVID-19… and hasn't 2020 been one craps table of a year???
Next year, for the first time since 1980 the American Academy of Cardiovascular Perfusion will NOT be hosting an in-person meeting. Many hours of consternation and consideration amongst some of the most experienced members of the AACP went into this difficult but eventually obvious decision. Our pro/con list (had we all actually consolidated our notes into one) would have looked something like this:

PRO	**CON**
Keep our friends and colleagues safe	No handshakes, hugs or time with AACP friends
Show off new-found virtual meeting skills	Depend on new-found virtual meeting skills
Make the event accessible to literally everyone	No idea how many people will participate
Sponsors may use multi-media platform	No sponsors reception (no great food)
The President will oversee 2021 & 2022 meeting	Wait, did I really agree to that???
Ability to invite all disciplines to participate	Loss of the intimate feel of the meeting (see top)
Spread the meeting out over a week	Contend with work and family obligations
Reduced meeting cost = reduced registration fee	Not sure how many will register
Lots of virtual meeting so it will be familiar	Lots of virtual meetings = competitive market
Able to attend in slippers and pajamas	No (legit) reason for racing gear or zoot suits

As you can see, our decision to embark on this virtual journey for 2021 was born from our concern for the safety of our attendees despite the presence of unlimited variables and unknowns. To that end, please consider the following:

We have little *evidence* that our typical AACP format will translate well to the virtual world – SO we are heavily vetting our options by testing and evaluating available technology for proof of concept and first-hand user interaction.

Most of us representing AACP have little *experience* in running an entire meeting in the virtual world – BUT we do have expert guidance and support from our chosen AV partner who has years of experience with our meetings and a short but intense experience with virtual platforms.

We are diving deep into our *data* from past AACP meetings to focus on what has worked well and perennial favorites that keep members returning year after year – WE HOPE attendees to this virtual event will be greeted with as many of the sights, sounds and "feels" associated with AACP as we can possibly muster.

Conversations with committee members, AACP sponsors and other Perfusion organizations have reinforced the notion that our concerns are valid and the virtual platform is a sound option for the coming year, with or without racing gear on…. We hope to see you the week of February 6-13, 2021!

All the best to you and yours,
Bill

JIM BEAVERS RETIRING FROM CORPORATE LIFE, BUT NOT PERFUSION — YET

Passionate. That's how Chief Emeritus Terry Crane from the School of Perfusion Technology at the Texas Heart Institute describes Jim Beavers. "He has a passion for patient care beyond most people I know. It's more than a job for him."

Terry is describing Houston-based Medtronic Clinical Specialist Jim Beavers, who will be retiring from Medtronic on Sept. 1, 2020 after 13 years. He's not hanging up his scrubs, however: He wants to reach 45 years as a perfusionist — which will be in two years — and will do so as a per-diem perfusionist at the Texas Heart Institute. He plans to continue providing academic and clinical training to perfusion students there as well.

Jim graduated from the Texas Heart Institute School of Perfusion Technology in 1977, where as a student, he and his classmates participated in more than 4,000 combined adult and pediatric procedures during their clinical rotations. He then spent his next 30 years doing pediatric open-heart cases. Jim says he still gets Christmas cards from children he's been able to help, who are now in high school or college.

Prior to joining Medtronic in 2007, Jim began teaching part time at his alma mater. As he considered the opportunity at Medtronic, he told them he had two requirements: to stay certified and to continue teaching. He says Medtronic agreed because education is one of their values.

Erica Reyes, a former perfusionist who is now a sales rep for Medtronic says Jim was her instructor before they became colleagues at Medtronic. "He teaches his students and our customers the importance of putting the patient first," she explains. "He's very powerful with his words, and it all comes from truth and experience. His knowledge doesn't compare with anyone else in the world."

Terry concurs: "Jim's an expert in both techniques and technology. Working with Medtronic, he's picked up knowledge from around the world that he shares with his students and with Medtronic customers. He's made a difference in perfusion education and in patient outcomes."

That passion can also turn to impatience at times, admits Jim. "At first, I was not accustomed to corporate life and I had to get used to the idea that things are going to take more time. I can be very vocal. I had no idea of the many, many steps and important quality checks it took to get products I use every day into the marketplace." All in all, however, Jim says he can't say enough good things about Medtronic. "They really care about patients," he says.

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"Perfusion is just the start of a career. There is so much medicine to learn. It's a life-long process. Go on grand rounds, ask questions, learn from other specialties what's important to them. You'll be a better perfusionist by broadening your perspective."

Jim Beavers

Continued from Page 3

As for Erica, she says she will miss Jim's sense of humor most of all. "He's hilarious. And he knows how to make people comfortable, even when they're doing something scary and new. He just has a way with people."

Medtronic would like to thank Jim for his unending dedication to the field of perfusion and for his service to thousands of patients over the years. We wish him well as he retires from corporate life.

COVID-19: The Impact on Perfusion Students and Programs

Molly Bryant

AACP Student Liaison Committee Chair

As perfusionists, we have all been impacted by COVID-19 in our personal and professional lives. Professionally, we have seen decreases and increases in cardiac cases, along with ECMO. Some have been financially impacted with furloughs, salary cuts, or temporary salary reductions. COVID has changed our workflow, PPE requirements, and staffing plans. Perfusionists that don't work directly with students may not be aware of the impact that COVID-19 has had on new graduates, students, and perfusion programs.

The new graduates from 2020 were released from clinical rotations in March due to the rise of COVID-19. Programs scrambled to determine the next steps for learning opportunities when it became apparent that they would not be returning to clinical rotation sites prior to graduation. Programs finished up classwork and learning requirements virtually through ZOOM calls. Some programs moved graduation dates up in order to allow their students to enter the work force early. However, some students were in the middle of interviews or hiring processes when COVID hit. This caused delayed or cancelled interviews due to travel bans and hiring freezes. Majority of interviews became phone or virtual based interviews. Some students may have not met their case requirements for graduation. Several students missed out on rotation opportunities such as pediatric rotations, busy centers, program type, etc. Depending on when their rotation ended and their start date for their job, students likely had between 6-10 weeks without building, priming, or pumping cases. New grads could have issues with taking their board exams if testing centers are overwhelmed with others who rescheduled exams that were cancelled in the spring. They could also struggle with trying to achieve their 40 pump cases prior to fall board exams. The graduates from 2019 had their spring board exams cancelled due to testing centers being closed.

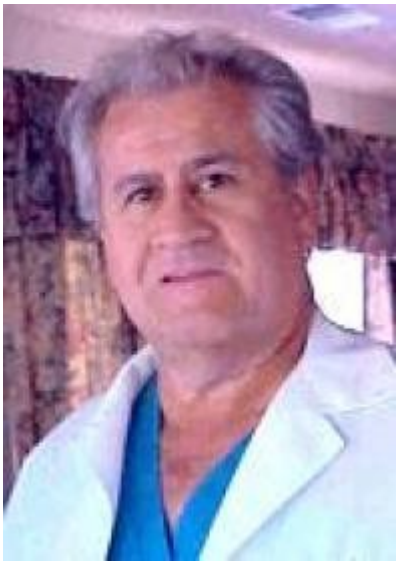
Current perfusion students (2021 graduates) were impacted by switching their classroom lectures to being virtual. In-person simulation labs were cancelled for weeks to months. Observation rotations were cancelled or limited. On top of hands-on opportunities being limited, clinical rotations were delayed for students for two to three months. This may impact students being able to meet their case requirements prior to graduations, especially if there are any further shut downs. Incoming perfusion students (2022 graduates) were impacted by COVID with delayed program start dates and/or beginning their program virtually. Students in general were all impacted with libraries being closed, travel bans, quarantine requirements, curfew laws (in some places), and issues with finding housing for school or rotation sites.

Perfusion programs have had to adjust their teaching structures to a virtual format, or divide their program up into smaller groups for lecture. This has put added stress and strain on programs and volunteer professors by teaching students in an alternative format or repeating the same lecture more than once to ensure that the entire class has received it. Simulation labs were or still are cancelled. This makes it difficult for schools to provide their students with hands-on opportunities to prepare them prior to sending them on rotation sites. This may mean that students are not as clinically strong or require more basic training at the start of their clinical rotations.

The full impact of COVID-19 on new graduates, students, and perfusion programs is still to come. The main objective is to keep perfusion students and programs safe while ensuring that the students receive the best education and opportunities possible. Clinical rotation sites need to be aware of these changes and impacts to adjust their teaching strategies to students who may have had limited exposure to hands-on training, equipment, and learning opportunities.

Passing of Frank Delgado

Frank Delgado, C.P.P. Emeritus



On July 14, 2020 we lost Frank Delgado to Covid-19. After Frank retired from clinical perfusion, he and his wife, Tere, spent most of the year in Guadalajara, Mexico.

Frank started his career at the University of Colorado Medical School as a Surgical Research Technician. In 1968, Frank moved from the laboratory to the clinic becoming the "Pump Tech" at Denver General Hospital when the person hired by the hospital decided to resign just before the program's first case. In 1974, Frank was one of the founding partners of Rocky Mountain Perfusionists, Inc. After leaving Rocky Mountain he worked in both California and Pennsylvania. He was a Member and Fellow of the American Society of Extra-Corporeal Technology since 1970. Frank was a Charter Member of the American Academy of Cardiovascular Perfusion. In 1999, Frank served as President of the American Academy of Cardiovascular Perfusion. Frank's retirement was short lived, however, because his once-a-week coffee with his xpats buddies was not enough for him. He started stem cell consulting at different hospitals in the area.

For those of you who didn't know Frank you missed a one of a kind.
Frank loved life and his moto was "win, lose or draw, celebrate".

PEER REVIEW IS YOUR CHANCE TO LEARN AND PROMOTE THE PROFESSION

Mark Kurusz and
John M. Toomasian

Perfusion
Section Editors

Reprinted from the Spring 2014 Newsletter of the American Academy of Cardiovascular Perfusion

For nearly 20 years, papers presented at the Academy's annual meeting have been sent to the journal *Perfusion* whereby they undergo peer review before being accepted for publication. This is a well-established process used by journals to reasonably ensure what is being published meets certain standards and can be trusted as reliable. In the medical field, peer review has added importance because clinical practice may be influenced by articles appearing in the scientific literature. The peer review process can be daunting, particularly to those with little or no authorship experience, but the ultimate result in most cases is an improved manuscript that will serve the profession.[1] An additional benefit is that virtually all reviewers learn something useful by participating in the process.

Academy members are often invited to review papers submitted for publication to *Perfusion*. In fact, Academy members are encouraged to participate. There is a well-functioning system established by the publisher SAGE and the journal's editorial offices in London that allows peer review to be conducted electronically. *Perfusion* maintains a database of potential reviewers drawn from a list of authors who have either published or been reviewers in the past. The editor may also solicit the opinion of an outside expert. Each reviewer describes their area(s) of expertise and a grading system is maintained internally that helps the editor to decide who to invite for any given manuscript. The reviewers' identities are not known to the authors whose papers are undergoing peer review; similarly, the authors' names on papers are de-identified to the reviewers. Both of these aspects of the process are intended to eliminate or minimize bias as a paper is objectively judged by its merits.

A good reviewer should approach every paper with some skepticism. It is the authors' job to convince the reviewer and editors that the paper deserves to be published. Questions that should be answered include: Is the paper well written in simple, understandable language and does it "flow" logically and clearly? Did the authors follow the journal instructions for things such as formatting the references in the required journal style? Are the references pertinent to the topic and up-to-date? Have they been cited properly in the text? Does the paper appear to have been proofread to eliminate typographical errors or problems with syntax? More important, have the authors provided enough detail for the reader to understand what is being presented so a logical conclusion can be

made? For example, if the study involved an experiment, could one replicate the conditions and perform a similar study? Similarly, if the paper is describing a perfusion technique or device, is there sufficient detail for the reader to make a judgment on the validity and reliability of what is being reported that might someday be used in their own clinical setting? Does the paper have a scientific or a marketing tone?—the latter is not appropriate for a medical journal. If the paper is a case study, is there sufficient background information to put the case in context with other similar cases that may have been published before? Are the conclusions supported by the methodology and results described? Finally, has the author made a worthwhile contribution to the body of knowledge?

These are a few of the considerations reviewers should be looking for when invited to review a paper. It may take two or more readings to arrive at an assessment as to its acceptability. No one person is an expert on all aspects of perfusion. However, any perfusionist can critique a paper based on his or her training and experience, and that is the main objective that the editor asks from each reviewer.

A reviewer has a few obligations when accepting the responsibility to review a paper: confidential comments are made to the editor that include a recommendation for four possibilities: (1) accept as is; (2) accept pending minor revision; (3) do not accept without major revision; and (4) reject. As one might expect, very few papers are accepted without any request for either a minor or major revision. Those papers having serious deficiencies generate specific comments and questions that are conveyed to the author who is asked to revise the manuscript or to clarify a point. One of the benefits of peer review is to improve the final version that eventually is published. Papers are not usually rejected unless there are egregious or non-salvageable flaws. The reviewer does not make a recommendation as to acceptability directly to the author—that is the editor's role.

The time to do a review typically takes a few hours—not always easy to fit into a schedule for busy perfusionists. However, there are some rewards such as seeing new work in the field before it appears in print. A second reward is being able to view your review in the context of other de-identified reviews, which serves as a sort of benchmark and certainly affords a reviewer to consider the paper from a different perspective. Often the perspectives and opinions of different reviewers can be quite diverse. Another reward is intangible but no less important: you have promoted both the profession and your peers so that the larger body of clinicians worldwide may gain important insights that should improve patient care. Another important benefit of being a reviewer is that it is quite likely you will learn something you may not have known. Being a reviewer also provides great experience in the peer review process, especially if one chooses to author their own work.

Someone once wrote that most writing is the art of persuasion . Edward R. Murrow, who was a master at communication, wrote "To be persuasive we must be believable, to be believable we must be credible, and to be credible we must be truthful." Think about it, and when invited to be a reviewer you will reap rewards far beyond the time entailed to do a credible job.

Reference

Toomasian JM. Editorial: The gauntlet of peer review. *Perfusion* 2013;28:376.

The journal *Perfusion* is looking for a few good reviewers. If you are interested, please contact the National Office at OfficeAACP@aol.com or Office@TheAACP.com.

Remembering the Landé-Edwards Membrane Oxygenator

Kelly Hedlund, MS, CCP

The University of Kansas Health System

HaysMed

Hays, Kansas

The late Richard Jensen, a pioneer perfusionist from Minnesota, called it the "battery". Others preferred the acronym "LEMO". Offering an industrial design and block shape, the Landé-Edwards Membrane Oxygenator was arguably the first compact, totally disposable, commercially available membrane device manufactured on a large scale (see Figure 1).

Figure 1. Landé-Edwards Membrane Oxygenator (adult version 3.0 m2)

Kolff and Clowes are rightfully credited with conceptualizing membrane oxygenation in the 1950s. Subsequent trial and error with various hydrophobic plastics led investigators to discover the superior gas transfer properties of silicone rubber. In 1963, a young physician/inventor named Dr. Arnold Landé (see Figure 2) teamed up with Dr. C. Walton Lillehei at the University of Minnesota to build an efficient yet simple membrane lung. Progress came quickly, as the silicone fan-folded sheets aligned perfectly within the square molded housing to form precise parallel channels. A patent was filed in 1966 by Landé, and the results of numerous dog studies (perfused for up to 48 hours) were submitted and reviewed by the National Institute of Health's Artificial Heart Program. In 1967, Lillehei introduced the prototype oxygenator to attendees at the 16th Annual American College of Cardiology meeting in Washington (see Figure 3). Later that same year, Lillehei left Minnesota for Cornell University in New York. To his credit, Landé accompanied Lillehei so as to continue the promising research of a truly workable membrane oxy-

Figure 2. Dr. Arnold Lande (photo taken June 2015)

Figure 3. Dr. C. Walton Lillehei at the American College of Cardiology meeting in Washington, D.C. in 1967 showing a prototype version of the Landé-Edwards Membrane Oxygenator

genator. To this point, the rudimentary device was known simply as the "Landé-Lillehei" lung.

At Cornell, refinements continued to be made. Most notably, the device would be fashioned in two sizes (1 sq. meter and 3 sq. meters) to appeal to both adult and pediatric users (see Figure 4)
A partnership with Edwards Laboratories, formalized in late 1968, prom-

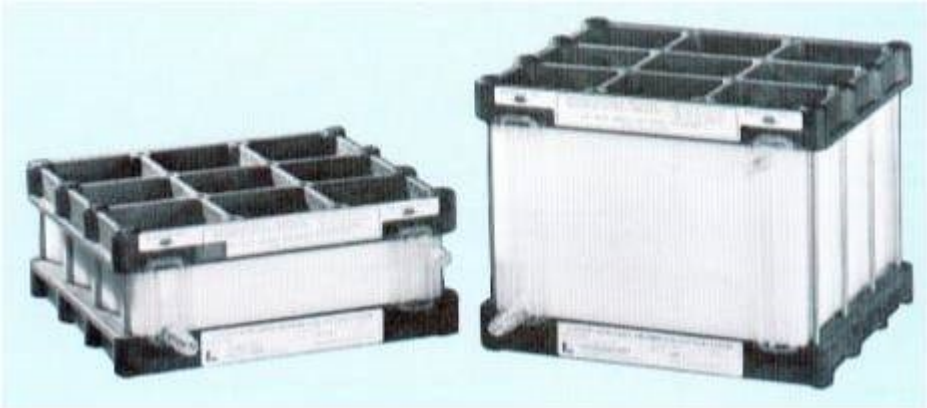


Figure 4. Adult (3.0 m2) and pediatric (1.0 m2) versions of the Landé-Edwards Membrane Oxygenator

ised quality control, sterilization, and distribution. In 1972, an article appeared in the *Journal of ExtraCorporeal Technology* touting the simplicity of the LEMO by reporting that six different surgeons and five different perfusionists successfully used the device to support 100 patients undergoing open-heart surgery. The remarkably low pressure drop afforded by the LEMO permitted gravity drainage through the device. This, in turn, allowed perfusionists to run a single-pump system. The device did not include an integral heat exchanger – an obvious inconvenience by today's standards. In addition, during assembly the silicone sheets were dusted with dry sodium chloride to prevent the membrane channels from sticking. During setup, this powder would dissolve into the prime, thus producing a hypertonic solution which had to be rinsed from the circuit. For patients weighing less than 80 kilograms, two LEMOs were connected in parallel. Three or more LEMOs were commonly used for larger patients (see Figure 5).

The LEMO enjoyed nearly a decade of success, especially in children and long-term applications. In the mid-1970s, Dr. Landé relocated to the University of South Carolina to teach. He then joined the University of Texas Medical School in Houston to pursue artificial heart research. Along the way, he invented a wearable artificial kidney, and patented the idea of artificial gills to mitigate the bends during deep-water diving. Nowadays, at the age of 88, he is living in Michigan and pursuing an artificial pancreas that can be worn on a diabetic patient's arm.

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Though the LEMO has been relegated to the dustbin of history, it was Professor Kenneth Taylor who stated in 1986 that "… it is most unfortunate that this excellent, well designed and popular device is no longer available …".

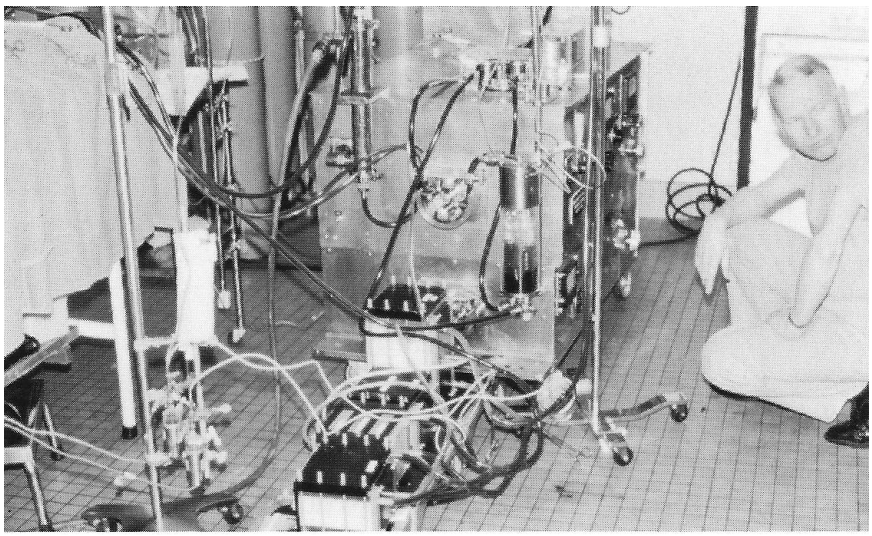

Figure 5. A young Jeri Dobbs conducting a laboratory evaluation of several Landé Edwards Membrane Oxygenators connected in parallel

References

Jensen R. History of Perfusion. JECT. 2003;35:270-273.

Carlson RG, Landé AJ, Landis B, Rogoz B et al. The Landé-Edwards membrane oxygenator during heart surgery. J Thorac Cardiovasc Surg. 1973;66:894-905.

Landé AJ, Dos SJ, Carlson RG, Perschau RA et al. A New Membrane Oxygenator-Dialyzer. Surg Clin North Amer. 1967;47:1461-1470.

United States Patent Office. Patent no. 3,396,849. Arnold J Landé and Clarence Walton Lillehei. Membrane Oxygenator-Dialyzer.

Hegyeli RJ (ed.) Proceedings of the Artificial Heart Program Conference June 9-13, 1969 Washington, DC. National Institute of Health Artificial Heart Program.

New York Times News Service. Revolutionary Artificial Heart Development Told. San Bernadino Sun February 18, 1967 edition p. 28.

Wright JS, Fisk GC, McCulloch CH, Torda TA et al. Pediatric application of Landé-Edwards membrane oxygenator. J Thorac Cardiovasc Surg. 1973;65:503-510.

Housman LB, Braunwald NS. Experimental Evaluation of the Travenol and Landé-Edwards Membrane Oxygenators for Use in Neonate Perfusions. Ann Thorac Surg. 1972;14:150-158.

Carlson RG, Landé AJ, Twitchell J, Baxter J et al. The Landé-Edwards Membrane Oxygenator. J ExtraCorp Technol. 1972;Spring Issue:16-26.

Product Insert. Landé-Edwards Membrane Oxygenator. 1972 #104374.

Nosé Y. The Oxygenator, Manual on Artificial Organs Volume II. Saint Louis: The C.V. Mosby Company, 1973.

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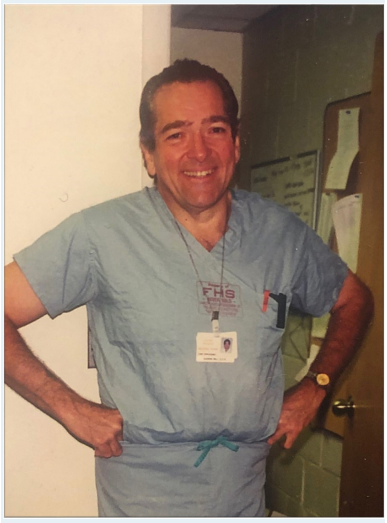
Important Academy Dates

The ACADEMY ANNUAL MEETING DEADLINES

ABSTRACT DEADLINE	**October 15, 2020**
MEMBERSHIP DEADLINE	**December 10, 2020**
PRE-REGISTRATION	**January 15, 2021**
2021 ANNUAL MEETING	**February 6-13, 2021**

Aaron G. Hill Research Grant



Aaron G. Hill was a pioneer in clinical perfusion and heavily involved in the establishment of the profession. He was truly a good friend, colleague and mentor to many of us in the field of Perfusion. A research grant has been established in his name.

If you are interested in applying for a research grant, click on this link.

Aaron G. Hill Research Grant Application

Purpose: To help support perfusion-related research

Requirements: Grant recipients are required to present their research findings at an Academy meeting. This includes submitting an original manuscript that can be sent to the journal *Perfusion* for possible publication.

Name: _____

Address: _____

Phone: _____ Email: _____

Institutional Affiliation: _____

Are you a Perfusionist or a Perfusion Student? _____

Does this investigation involve patients or patient data? YES or NO

If YES, do you have documented institutional IRB approval? YES or NO

IRB Number: _____

Estimated budget for your study: _____ Amount Requested: _____

On a separate sheet, give a short, detailed summary of your study, including the following: (1) title of your study; (2) an assessment of originality and how the study will contribute to the scientific literature; (3) expected start and finish dates for the research project; (3) names of co-investigators or senior advisors including their anticipated roles; (4) specifically, what will the grant award be used for such as laboratory supplies.

(NOTE: travel expenses are not covered by this grant)

I am the principle investigator on this project and I understand that if awarded a grant, I must present my research at an Academy meeting at my own expense and submit a manuscript suitable for potential publication in the journal Perfusion.

_____ _____

Print Name Signature

Donations to this fund can be made by:

- mailing a check to the National Office (AACP, 515A East Main Street, Annville, PA 17003). Please make the check out to the AACP and write AG Hill Fund on the memo line,

- or by going to our website and clicking on the form.

Extracorporeal Cardiopulmonary Resuscitation: From Cannulation to Discharge Home

Nicholas Mesisca BSN RN CCRN

Thomas Jefferson University

Perfusion & Extracorporeal Technology Program

Class of 2021

Extracorporeal Cardiopulmonary Resuscitation (ECPR) is defined as the implantation of veno-arterial extracorporeal membrane oxygenation (VA-ECMO) in a patient who experienced a sudden and unexpected pulseless condition attributable to cessation of cardiac mechanical activity.[6] The goal of ECPR is to improve cardiac output, as well as to restore oxygenation and perfusion during the low flow phase of cardiopulmonary resuscitation (CPR) in the setting of cardiac arrest (CA).[3] Although it was first implemented in 1976, ECPR has only begun to be more frequently utilized for a variety of resuscitation efforts within the last two decades.[6] It is important for ECPR to be discussed, not only because of the dire situations in which it is utilized, but also due to the advantage it holds over conventional CPR (CCPR), which may only be delivering 30-40% of normal blood flow to the brain.[7] ECPR has demonstrated evidence of higher survival rates to discharge and also at 6-12 months post-discharge from the hospital.[3]

As the technology of ECPR continues to advance and gain attention, there is still much to learn and understand about its relevance to practice. However, it is evident that ECPR is changing and improving how we resuscitate patients who are unresponsive to CCPR suffering from refractory cardiac arrest, both inside and outside of the hospital.[7] When a patient is in CA, the standard cannulation strategy, which can be seen in Figure 1, involves peripheral femoral-femoral cannula placement with the option of adding in a distal limb perfusion cannula based on the program's protocols.[2] If the patient still has an open sternum post-operatively, it is most feasible to cannulate centrally, otherwise peripheral cannulation is preferred considering it can be performed with minimal interruptions in chest compressions, limiting the low/no flow states.[3] Once inserted, the cannulae are connected to an extracorporeal circuit, that contains a mechanical blood pump which sends deoxygenated blood to a gas exchange device and then the oxygenated blood travels to the arterial vessel.[2] Cannulae that are chosen should be able to support 3.5-5L/min of flow in adults and 120-150mL/kg/min in smaller children.[3] There is also an option of placing an additional drainage cannula if flow is insufficient due to inadequate cannula size.[3] Thus, ECPR or extracorporeal membrane oxygenation (ECMO) can be used as a rescue therapy for supporting the patient when suspected etiology of their arrest may be reversible with interventions such as coronary angiography or percutaneous coronary interventions can be performed.[2] While ECPR holds a great capability to save lives, it is important to ultilize ECMO on the right patient and in the right setting to be able to see positive outcomes.

There are still many areas of uncertainty that exist within implementation of ECPR in patient care.[6] When a patient goes into cardiac arrest, whether it be outside of hospital cardiac arrest (OHCA) or inside hospital cardiac arrest (IHCA), and CCPR is initiated, there is one goal, to get a return of spontaneous circulation while minimizing low-flow states and maintaining the integrity of main organ function, especially the brain. Before the decision for ECPR can be initiated, there has to be realistic criteria that needs to be considered, such as the proximity to a hospital that has an ECPR program if an OHCA has occurred, if the cause of the CA is reversible,

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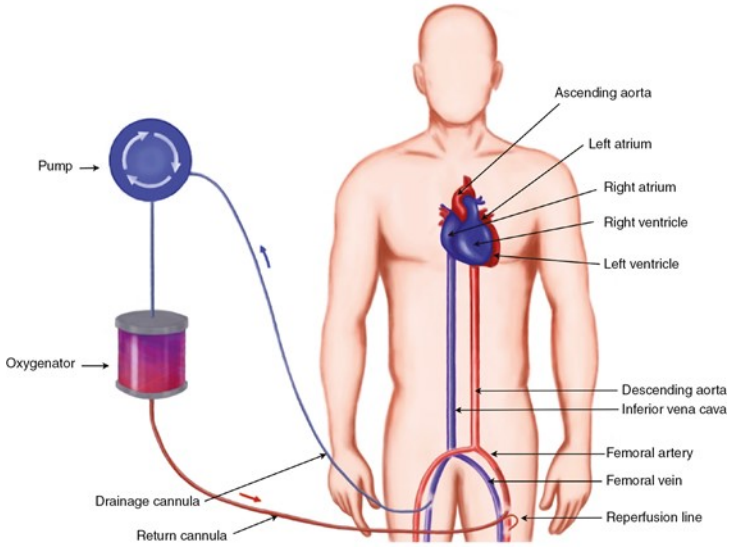

Figure 1[1]

if the patient had a functional status prior to the arrest, and if the patient's brain had undergone any sustained period of irreversible hypoxia.[2] However, although there is no universal ECPR criteria, it is important that hospitals with ECPR programs have predefined guidelines for who or whom not to place on extracorporeal life support (ECLS), especially with high risk patient populations. Being consistent with these guidelines will help give the patient the best opportunity for a full recovery. In the setting of CA, it is often difficult to make a split-second decision and prolonged discussions may waste valuable time.[4] Research shows that a good functional recovery is more likely if the time from collapse to the start of ECMO flow is less than 60 minutes.[2] Futhermore, patients who undergo prolonged CCPR are more likely to experience widespread organ damage, including but not limited to, brain injury, myocardial dysfunction, and/or systemic inflammatory response.[2] Similarly, much like the lack of universal crtieria for utilization, there are no universal criteria for the contrainidcations for ECLS, aside from the absolute "Do Not Resuscitate" orders. Various contraindications across different programs include severe neurological impairment prior to cardiac arrest, irreversible disease process that is known prior to cardiac arrest, severely immunocompromised patients, severely coagulopathic patients, prolonged arrest "low-flow" time, and lack of access for cannulation due to poor anatomical anomalies.[3] Even though it may be difficult morally to say "no" to placing a patient on ECLS and allowing the patient to expire, it is acceptable especially when there will be no direct benefit to the patient, which prevents any further hardships to the family when death is imminent.[4]

Once ECMO has been established, the multi-disciplinary work on deciphering the cause of the CA begins, recent AHA guidelines state "that ECPR may be considered for selected patients when the suspected etiology of CA is potentially reversible during a limited period of mechanical cardiorespiratory support" and this limited period is when the intensive care team decides what, and if any, interventions may need to be taken to fix any abnormalities.[6] At this point, ECMO is now being used as a "bridge" to some sort of destination. This bridge can be to "recovery/stabilization", where the platform provides time for the appropriate diagnostic procedures and/or interventions to be performed. It could also be a "bridge to bridge", where the patient will next get some type of implantable device. Lastly, either ECMO or an alternative long-term device can be used as a "bridge to transplantation" awaiting a heart transplant or organ preservation/donation or "bridge to decision/destination", where the patient lives their life and let's the pathology of the disease run it's course.[4] The decision on the purpose that the platform is serving is made based on the health status of the patient as well as the wishes and desires of the patient and/or family.

The application of ECLS is gaining popularity across the world as new technological advances are appearing year after year in both adult and pediatric ECLS. The specialization of a perfusionist's role in ECLS

makes it an exciting and powerful time to be a perfusionist.[5] Surgeons and perfusionists can collaborate with which cannulas should be used and obtain the appropriate supplies for the application of ECLS. With established programs, once the patient is in the ICU, adequately trained nurses have the abilities to monitor the ECMO circuit and patient, however a perfusionist is required to be in-house at all times as a resource for care of the patient and for troubleshooting equipment and clinical difficulties, especially pertaining to the evolving cardiac function of the patient. Perfusionists can help collaborate with the intensive care team as they monitor the hemodynamic state of the heart. Special attention should also be paid to the status of the left heart which can develop myocardial dysfunction and lead to severe complications such as irreversible cardiac function and/or pulmonary edema.[3] Left ventricular distention can arise from many variables, and as the specialist, the perfusionist should pay close attention to exclude any mechanical issues with the ECMO circuit and be sure the pump is functioning at an optimal set flow rate for the specific patient. Other aspects that the perfusionist can address with the ICU team are cannula position, volume status (overloaded versus underfilled), and pharmacological interventions (inotropes for improved contractility or vasodilators to decrease afterload). Lastly, if medical management does not resolve the problem of distention and the patient is still hemodynamically compromised, the perfusionist can recommend intervening with a left ventricular vent option to decompress the left ventricle while optimizing cardiac output and perfusion for the patient.[3] However, complications can arise from various organ systems that necessitate intervention, not just the heart. Neurologic status of patients must be determined as soon as safely possible post-arrest and needs to be closely monitored, as it could be a huge determinant in decision-making going forward. Near-infrared spectroscopy (NIRS) monitors are frequently used to monitor cerebral oxygenation and serve as an indicator of neurological activity and overall perfusion in the patient.[3] Patients on ECLS also commonly see acute kidney injuries that may or may not require temporary renal replacement therapy while the kidneys recover.[3] Perfusionists bring a wealth of knowledge in such a specialized field that they are constructed to become such an integral part of a new era in ECLS.[5]

It is evident that extracorporeal cardiopulmonary resuscitation holds many advantages in resuscitating a patient in refractory cardiac arrest who is not responding to conventional cardiopulmonary resuscitation. The field of ECPR is still relatively new to perfusion practice. However despite its novelty, it is being used more frequently to help augment cardiac output, improve oxygenation, and restore perfusion to vital organs due to cardiac arrest. Perfusionists have such a specialized skill set and wide array of knowledge in the field of cardiopulmonary diseases and mechanical support, that their position is invaluable and irreplaceable in the world of ECPR.

References

1. Ali, J. M. and Jenkins, D. P. Cardiac Extracorporeal Membrane Oxygenation. In: Valchanov K, Jones N, Hogue CW, eds. *Core Topics in Cardiothoracic Critical Care.* 2nd ed. Cambridge: Cambridge University Press; 2018: 193-201. DOI: 10.1017/9781316443415.025
2. Dunser, M. W. and Dankl, D. (2017). Extracorporeal cardiopulmonary resuscitation: Who could benefit? *ICU Management & Practice, 17*(2), 84-86.
3. Farhat, A., Bowens, C. D., Thiagarajan, R., and Raman, L. (2019). Extracorporeal cardiopulmonary Resuscitation. In Firstenberg, M. S., *Advanced applications in extracorporeal membrane oxygenation 9.* IntechOpen. DOI: 10.5772/intechopen.83658
4. Laussen, P. C. and Guerguerian, A. (2018). Establishing and sustaining and ECPR program. *Frontiers in Pediatrics, 2* (152), 1-10. DOI:10.3389/fped.2018.00152.
5. McCoach, R. M., Baer, L. D., Wise, R. K., Woitas, K. R., Palanzo, D. A., Pae Jr, W. E., and Banayosy, A. E. (2010). The new role of the perfusionist in adult extracorporeal life support. *Perfusion, 81*(1), 21-24. DOI: 10.1177/0267659110363185
6. Pappalardo, F. and Montisci, A. (2017). What is extracorporeal cardiopulmonary resuscitation? *Journal of Thoracic Disease. 9*(0), 5859-1419. DOI: 10.21037/jtd.2017.05.33
7. Wang, G., Chen, X., Qio, L., Mei, Y., Lv, J., Huang, X., Shen, B., and Zhang J. (2017). Comparison of extracorporeal and conventional cardiopulmonary resuscitation: A meta-analysis of 2,260 patients with cardiac arrest. *World Journal of Emergency Medicine, 8*(5), 9-11. DOI: 10.5847/wjem.j.1920-8642.2017.01.001

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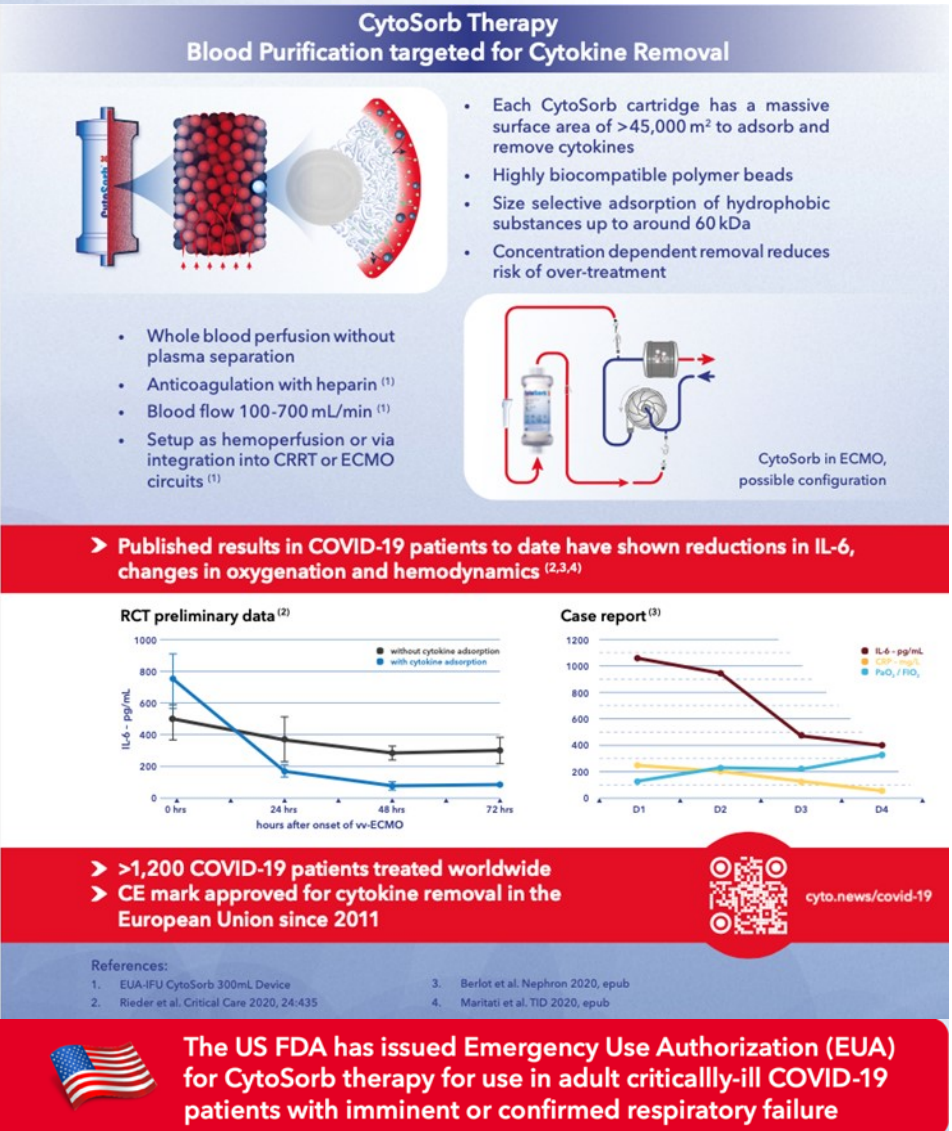

InvoSurg and **Cytosorbents** have partnered to provide the CytoSorb 300mL device for the treatment of Covid-19. **InvoSurg** is supporting the technology across the states of Maine, New Hampshire, Vermont, New York, Massachusetts, Rhode Island, Connecticut, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, Washington DC, West Virginia and Ohio. For more information please reach out to your **InvoSurg** representative or email info@invosurg.com.

2021 Annual Meeting

After careful consideration and for the health and safety of our attendees, the Council of The American Academy of Cardiovascular Perfusion has decided to move our upcoming meeting in Austin, Texas from February 2021 to February 2022. There are still too many uncertainties for a possible second wave of the Covid-19 pandemic in the Fall along with travel bans and decreased reimbursement for travel expenses for us to hold an in-person meeting in early 2021.

The Academy will still hold a conference in February 2021, but it will be completely virtual. The Academy plans to remain flexible to the needs of the perfusion profession so the meeting will include all the elements for which the Academy conferences have come to be known. While the format of the meeting will change, we are excited about the challenge of meeting the learning needs of all our delegates, sponsors, and friends.

This year's virtual meeting will consist of six blocks. Each block will include presentations on a specific topic followed by discussion. Each block will also include some "Fireside Chats" and some historical information. You will be able to register for each block individually or the entire meeting. Each block will be awarded Category I CEUs.

Some of the topics for the meeting will be:

- *ECMO (Multi-disciplinary day)*
- *The Conduct of Research (Perfusion in the Laboratory Setting, IRB Interactions, Authoring a Paper, Reading a Paper)*
- *Non-technical Aspects of Perfusion (PINTS, Self Care, State of the Profession - ABCP Report)*
- *Perfusion Outside the Box (ECMO Travel, OCS, EMR Involvement, Simulation)*
- *Blood (Alternate Anticoagulants and Monitoring, Cytosorb, ZBUF/ Hemoconcentration)*

The exact times for the sessions have not been set yet but here are the dates of the meeting blocks.

- *Block #1 - Saturday, February 6, 2021 (morning)*
- *Block #2 - Saturday, February 6, 2021 (afternoon)*
- *Block #3 - Tuesday, February 9, 2021 (afternoon/evening)*
- *Block #4 - Thursday, February 11, 2021 (afternoon/evening)*
- *Block #5 - Saturday, February 13, 2021 (morning)*
- *Block #6 - Saturday, February 13, 2021 (afternoon)*

Thanks everyone for your contributions and we look forward to working with all of you to make this virtual meeting a huge success!

Stay tuned for more information as we finalize the program.

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