JECT. 2003;35:156–159
The Journal of The American Society of Extra-Corporeal Technology

Articles of Interest

Section Editor: Rick G. Smith, BS, CCP

APROTININ

High-dose aprotinin reduces activation of hemostasis, allogeneic blood requirement, and duration of postoperative ventilation in pediatric cardiac surgery.
Mossinger H, Dietrich W, Braun SL, et al. Ann Thorac Surg. 2003;75:430–437.

Aprotinin reduces operative closure time and blood product use after pediatric bypass.
Costello JM, Backer CL, de Hoyos A. Ann Thorac Surg. 2003;75:1261–1266.

Does aprotinin influence the inflammatory response to cardiopulmonary bypass in patients?
Schmartz D, Tabardel Y, Preiser JC, et al. J Thorac Cardiovasc Surg. 2003;125:184–190.

BIOCOMPATIBILITY

Influence of PMEA-coated bypass circuits on perioperative inflammatory response.
Ninomiya M, Miyaji K, Takamoto S. Ann Thorac Surg. 2003;75:913–917.

Influence of two different perfusion systems on inflammatory response in pediatric heart surgery.
Jensen E, Andreasson S, Bengtsson A, et al. Ann Thorac Surg. 2003;75:919–925.

> Heparin-coated closed perfusion systems with a centrifugal pump provides reductions in complement activation and PMN elastase compared with uncoated, open venous reservoirs and roller pumps for congenital heart surgery. The study demonstrated no differences in interleukin and tissue necrosis factor concentrations.

CARDIOPULMONARY SUPPORT

Experience with percutaneous venoarterial cardiopulmonary bypass for emergency circulatory support.
Schwarz B, Mair P, Margreiter J, et al. Crit Care Med. 2003;31:758–764.

CEREBRAL PROTECTION

Xenon attenuates cardiopulmonary bypass-induced neurologic and neurocognitive dysfunction in the rat.
Ma D, Yang H, Lynch J, et al. Anesthesiol. 2003;98:690–698.

The importance of prior stroke for the adjusted risk of neurologic injury after cardiac surgery for women and men.
Hogue CW Jr, De Wet CJ, Schechtman KB, et al. Anesthesiol. 2003;98:823–829.

Direct visualization of minimal cerebral capillary flow during retrograde cerebral perfusion: an intravital fluorescence microscopy study in pigs.
Duebener LF, Hagino I, Schmitt K, et al. Ann Thorac Surg. 2003;75:1288–93.

> In a laboratory (piglet) model, microscopy was used to visualize cerebral capillary blood flow and functional capillary density and cerebral tissue oxygenation were measured during retrograde cerebral perfusion (RCP). After deep hypothermic circulatory arrest with RCP, no significant capillary blood flow was observed and poor tissue oxygenation indicated by nicotinamide adenine dinucleotide hydrogen (NADH). Significant brain edema was evident as well following RCP. The authors suggest the use of RCP is beneficial to remove air and debris from the cerebral circulation benefit after circulatory arrest.

Deep hypothermic circulatory arrest and global reperfusion injury: avoidance by making a pump prime reperfusate—a new concept.
Allen BS, Veluz JS, Buckberg GD. J Thorac Cardiovasc Surg. 2003;125(3):625–632.

> Oxygen free radicals cause global reperfusion injury resulting in organ and endothethial dysfunction after deep hypothermic circulatory arrest. The authors were able to attenuate many of the deleterious effects with a selected reperfusate and prime composition when reinstituting cardiopulmonary bypass and provided good protection to major organ systems.

Novel cerebral physiologic monitoring to guide low-flow cerebral perfusion during neonatal aortic arch reconstruction.
Andropoulos DB, Stayer SA, McKenzie ED, Fraser CD Jr. J Thorac Cardiovasc Surg. 2003;125(3):491–499.

HEMATOLOGY

Agreements between the prothrombin times of blood treated in vitro with heparinase during cardiopulmonary bypass (CPB) and blood sampled after CPB and systemic protamine.
Ho AM, Lee A, Ling E, et al. Anesth Analg. 2003;96:15–20.

The predictive value of modified computerized thromboelastography and platelet function analysis for postoperative blood loss in routine cardiac surgery.
Cammerer U, Dietrich W, Rampf T, et al. Anesth Analg. 2003;96:51–57.

Modified thromboelastography (TEG) and platelet function analysis (PFA) were compared to determine their usefulness to identify hemostatic complications and predict postoperative blood loss following cardiac surgery. TEG provided better predictive values than PFA. Early analysis and targeted treatment of postoperative bleeding was important to clinical success.

Patients with a history of type II heparin-induced thrombocytopenia with thrombosis requiring cardiac surgery with cardiopulmonary bypass: a prospective observational case series.
Nuttall GA, Oliver WC Jr, Santrach PJ, et al. Anesth Analg. 2003;96:344–350.

Heparin-induced thrombocytopenia with thrombosis (HITT) is a significant challenge in those patients undergoing cardiopulmonary bypass. Anticoagulation with hirudin and monitoring with ecarin clotting time was used to direct hirudin therapy. Case reports of these six patients are provided. Postoperative complications included bleeding, multiple blood transfusions, and a high incidence of reexploration.

Bivalirudin monitored with the ecarin clotting time for anticoagulation during cardiopulmonary bypass.
Koster A, Chew D, Grundel M, et al. Anesth Analg. 2003; 96:383–386.

Heparin-induced thrombocytopenia and cardiopulmonary bypass: perioperative argatroban use.
Lubenow N, Selleng S, Wollert HG, et al. Ann Thorac Surg. 2003;75:577–579.

Near-patient testing for coagulopathy after cardiac surgery.
Johi RR, Cross MH, Hansbro SD. Brit J Anaesth. 2003; 90:499–501.

Point-of-care measurements of prothrombin time and activated partial thromboplastin time using the Hemochron Response showed increasing bias and limits of agreement between standard laboratory assays. The authors question the device's suitability after cardiopulmonary bypass.

Factor V Leiden protects against blood loss and transfusion after cardiac surgery.
Donahue BS, Gailani D, Higgins MS, et al. Circulation. 2003;107:1003–1008.

Recombinant factor VIIa to treat bleeding after cardiac surgery in an infant.
Tobias JD, Berkenbosch JW, Russo P. Pediat Crit Care Med. 2003;4:49–51.

MYOCARDIAL PROTECTION

Myocardial interstitial glucose and lactate before, during, and after cardioplegic heart arrest.
Kennergren C, Mantovani V, Strindberg L, et al. Am J Physiol-Endocrinol Metabol. 2003;284(4):E788–94.

Adenosine in myocardial protection in on-pump and off-pump cardiac surgery.
Vinten-Johansen J, Zhao ZQ, Corvera JS, et al. Ann Thorac Surg. 2003;75:S691–699.

Significant interest in adenosine has provided investigators with numerous opportunities to demonstrate its cardioprotective effects. In this review article, the authors describe adenosine's actions on preventing myocardial ischemia, reperfusion injury and promoting coronary vasodilation. Disparities between clinical studies and laboratory experiments are noted by the authors in this review article.

Improved myocardial function using a Na+/H+ exchanger inhibitor during cardioplegic arrest and cardiopulmonary bypass.
Cox CS Jr, Allen SJ, Sauer H, Laine GA. Chest. 2003;123: 187–194.

PATHOPHYSIOLOGY

Alveolar recruitment strategy improves arterial oxygenation after cardiopulmonary bypass.
Claxton BA, Morgan P, McKeague H, et al. Anaesth. 2003;58:111–116.

Changes in respiratory mechanics during cardiac surgery.
Babik B, Asztalos T, Petak F,et al. Anesth Analg. 2003;96(5):1280–7.

Renal dysfunction after cardiac surgery with normothermic cardiopulmonary bypass: incidence, risk factors, and effect on clinical outcome.
Provenchere S, Plantefeve G, Hufnagel G, et al. Anesth Analg. 2003;96:1258–1264.

Inflammatory response to cardiopulmonary bypass.
Levy JH. Tanaka KA. Ann Thorac Surg. 2003;75:S715–720.

Prophylactic dialysis in patients with renal dysfunction undergoing on-pump coronary artery bypass surgery.
Durmaz I, Yagdi T, Calkavur T, et al. Ann Thorac Surg. 2003;75:859–64.

Is kidney function altered by the duration of cardiopulmonary bypass?
Boldt J, Brenner T, Lehmann A, et al. Ann Thorac Surg. 2003;75:906–912.

Neutrophil CD11b upregulation during cardiopulmonary bypass is associated with postoperative renal injury.
Rinder CS, Fontes M, Mathew JP, et al. Ann Thorac Surg. 2003;75:899–905.

Changes in biochemical and biophysical surfactant properties with cardiopulmonary bypass in children.
Friedrich B, Schmidt R, Reiss I, et al. Crit Care Med. 2003;31:284–290.

Stress doses of hydrocortisone reduce severe systemic inflammatory response syndrome and improve early outcome in a risk group of patients after cardiac surgery.
Kilger E, Weis F, Briegel J, et al. Crit Care Med. 2003;31: 1068–74.

Changes in lymphocyte subsets after cardiac surgery in children.
Habermehl P, Knuf M, Kampmann C, et al. Europ J Pediatr. 2003;162:15–21.

Increased matrix metalloproteinase activity after canine cardiopulmonary bypass is suppressed by a nitric oxide scavenger.
Mayers I, Hurst T, Radomski A, et al. J Thorac Cardiovasc Surg. 2003;125:661–8.

Time course of early induction of intracellular adhesion molecule-1 messenger RNA during reperfusion, following cardiopulmonary bypass with hypothermic circulatory arrest in lambs.
Tabbutt S, Newburger JW, Hickey PR, et al. Pediatr Crit Care Med. 2003;4:83–88.

Abstract

Serum creatinine and estimated creatinine clearance do not predict perioperatively measured creatinine clearance in neonates undergoing congenital heart surgery.
Harrison AM, Davis S, Eggleston S, et al. Pediatr Crit Care Med. 2003;4:55–59.

PEDIATRIC PERFUSION

Effect of perfusion flow rate on tissue oxygenation in newborn piglets during cardiopulmonary bypass.
Schears G, Schultz SE, Creed J, et al. Ann Thorac Surg. 2003;75:560–565.

Current strategies for optimizing the use of cardiopulmonary bypass in neonates and infants.
Shen I, Giacomuzzi C, Ungerleider RM. Ann Thorac Surg. 2003;75:S729–34.

This review on pediatric perfusion outlines strategies to reduce the complications associated with the systemic inflammatory response, hemodilution, and transfusions.

PERFUSION TECHNIQUE

Comparison of alpha-stat and pH-stat cardiopulmonary bypass in relation to jugular venous oxygen saturation and cerebral glucose-oxygen utilization.
Kiziltan HT, Baltali M, Bilen A, et al. Anesth Analg. 2003; 96:644–50.

An assessment of different filter systems for extracorporeal elimination of bivalirudin: an in vitro study.
Koster A, Chew D, Grundel M, et al. Anesth Analg. 2003; 96:1316–9.

Retrograde autologous priming: is it useful in elective on-pump coronary artery bypass surgery?
Eising GP, Pfauder M, Niemeyer M, et al. Ann Thorac Surg. 2003;75:23–27.

Retrograde autologous priming (RAP) allows substantial reductions in priming volume and hemodilution during cardiopulmonary bypass. In addition to reducing transfusion requirements, RAP also maintained colloid osmotic pressure, reduced extravascular lung water and weight gain following cardiac surgery.

Surgery for acute type A dissection using antegrade selective cerebral perfusion: experience with 122 patients.
Di Eusanio M, Tan ME, Schepens MA, et al. Ann Thorac Surg. 2003;75:514–519.

Elimination of fat microemboli during cardiopulmonary bypass.
Kaza AK, Cope JT, Fiser SM, et al. Ann Thorac Surg. 2003;75:555–559.

Left ventricular aneurysm resection with port-access surgery: a new mini-invasive surgical approach.
Alloni A, Rinaldi M, Gazzoli F, et al. Ann Thorac Surg. 2003;75:786–789.

Cannulation of the axillary artery for cardiopulmonary bypass: safeguards and pitfalls.
Sinclair MC, Singer RL, Manley NJ, Montesano RM. Ann Thorac Surg. 2003;75(3):931–934.

Axillary artery cannulation is a useful alternative to ascending aortic cannulation for cardiopulmonary bypass. Useful in reoperations, atherosclerotic aortas and aortic dissections, axillary artery cannulation can be accomplished either by direct cannulation or inter-

position of a prothetic graft anastomosed to the axillary artery.

Adding lactate to the prime solution during hypothermic cardiopulmonary bypass: a quantitative acid-base analysis.
Himpe D, Neels H, De Hert S. Van Cauwelaert P. Brit J Anaesth. 2003;90:440–5.

Rescue therapy with methylene blue in systemic inflammatory response syndrome after cardiac surgery.
Dagenais F. Mathieu P. Can J Cardiol. 2003;19:167–169.

Methylene blue administration reverses severe hypotension (vasoplegia) following cardiopulmonary bypass.

Aortic arch reconstruction using regional perfusion without circulatory arrest.
Lim C, Kim WH, Kim SC, et al. Europ J Cardio-Thorac Surg. 2003;23:149–55.

Hypothermic circulatory arrest for the surgical treatment of complicated adult coarctation of the aorta.
Gudbjartsson T, Mathur M, Mihaljevic T, et al. J Am Coll Cardiol. 2003;41:849–851.

Successful use of a miniaturized bypass system with the DeltaStream extracorporeal rotary blood pump.
Christiansen S, Gobel C, Buhre W, et al. J Thorac Cardiovasc Surg.2003;125:43–44.

Methylene blue during cardiopulmonary bypass to treat refractory hypotension in septic endocarditis.
Grayling M, Deakin CD. J Thorac Cardiovasc Surg. 2003; 125:426–427.

Brachial artery cannulation in type A aortic dissection operations.
Galajda Z, Szentkiralyi I, Peterffy A. J Thorac Cardiovasc Surg. 2003;125:407–409.

Experience with an elective vacuum assisted cardiopulmonary bypass in the surgical treatment of renal neoplasms extending into the right atrium.
Tasca A, Abatangelo G, Ferrarese P, et al. J Urology. 2003;169(1):75–78.

VENTRICULAR ASSIST

Implantation of the Jarvik 2000 left ventricular assist device without the use of cardiopulmonary bypass.
Frazier OH. Ann Thorac Surg. 2003;75:1028–1030.

United States Postal Service

Statement of Ownership, Management, and Circulation

1. Publication Title	2. Publication Number	3. Filing Date
Journal of Extra-Corporeal Technology	0 0 2 2 _ 1 0 5 8	1/21/03
4. Issue Frequency	5. Number of Issues Published Annually	6. Annual Subscription Price
Quarterly	4	$ 70 Individual U.S. $ 130 International

7. Complete Mailing Address of Known Office of Publication *(Not printer) (Street, city, county, state, and ZIP+4)*: Geisinger Medical Center, 100 N. Academy Avenue, MC 20-25, Danville, PA 17822-2025 — Contact Person: Al Stammers — Telephone: 570-214-2471

8. Complete Mailing Address of Headquarters or General Business Office of Publisher *(Not printer)*: American Society of Extra-Corporeal Technology, 503 Carlisle Drive, Suite 125, Herndon, VA 20170

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor *(Do not leave blank)*

Publisher *(Name and complete mailing address)*: American Society of Extra-Corporeal Technology, 503 Carlisle Drive, Suite 125, Herndon, VA 20170

Editor *(Name and complete mailing address)*: Alfred H. Stammers, MSA, CCP, Geisinger Medical Center, 100 N. Academy Avenue, MC 20-25, Danville PA 17822-7062

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The American Society of Extra-Corporeal Technology, Inc.	503 Carlisle Drive, Suite 125 Herndon, VA 20170

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13. Publication Title: The Journal of Extra-Corporeal Technology			14. Issue Date for Circulation Data Below: September 2002	
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j.		Percent Paid and/or Requested Circulation *(15c. divided by 15g. times 100)*	97%	97%

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