So, I think I get it …

- I’m the “old guy”
- Every conference needs an “old guy” talk
  - It makes everybody feel better about themselves for NOT being the “old guy”
  - There is always the hope that the “old guy” may have a pearl or two of wisdom some perspective that may have value
The Future of Pediatric Open-Heart Surgery

Bruce C. Pitts, M.D.
Professor of Surgery
Chief, Cardiac Surgical Service
Department of Surgery
Medical College of Georgia

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>Elimination of ALF</td>
</tr>
<tr>
<td>1995</td>
<td>Use of new bubbler</td>
</tr>
<tr>
<td>1980</td>
<td>Reduction of line lengths</td>
</tr>
</tbody>
</table>

**1980 - 2018**

Era of Miniaturization

OXYGENATORS ARE SMALLER
ARTERIAL LINE FILTERS ARE SMALLER

BLOOD CPS ARE SMALLER

PEDIATRIC PERFUSIONISTS ARE GETTING SMALLER

1994 - 1996

Era of Ultrafiltration Techniques
Modified ultrafiltration was reported by 71%...

...In the long-term the whole basic concepts of venous return and arterial pumping must be re-addressed.

Martin Elliott
Perfusion
1993: 8:81-86

NEXT GENERATION
CARDIOPULMONARY BYPASS IN NEONATES, INFANTS and YOUNG CHILDREN
Jonas R and Elliott M
Chapter 16 Kirklin, Raible, Blackstone
Priming volume and other aspects of pump oxygenators for neonates and infants

1998 Era of VAVD

1994
Vacuum-Assisted Venous Drainage: A 2014 Safety Survey
Rachel Gumbino, BS; Bruce Scarles, MS, CCP; Edward M. Darling, MS, CCP
Department of Cardiovascular Perfusion, College of Health Professions, SUNY Upstate Medical University, Syracuse, New York

Table 6. Reported VAVD-related incidents.

<table>
<thead>
<tr>
<th>Incident</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature venous reservoir activating PVRV (s)</td>
<td>25.8</td>
</tr>
<tr>
<td>Premature venous reservoir leading to reintegrate and high internal line pressure</td>
<td>26.2</td>
</tr>
<tr>
<td>Leak in vacuum system rendering it nonfunctional when trying to reivate</td>
<td>21.4</td>
</tr>
<tr>
<td>Vacuum regulator malfunction</td>
<td>52.4</td>
</tr>
<tr>
<td>Vacuum source (valve / sensor) malfunction</td>
<td>33.3</td>
</tr>
<tr>
<td>Over-administration of drugs or fluids due to increased height</td>
<td>19.1</td>
</tr>
</tbody>
</table>

Figure 1. Remote mounted pump control screen proximity to patient.
Figure 6. View of remote mounted components.
“… the debate over which is better, pH stat or alpha stat, is really a non sequitur because both should be used by the perfusionist depending on the situation to provide optimal perfusion…”

Gary Grist, 2007
Personal communication

Krough Cylinder, OPFT, Hyperoxia

Hyperoxia does not significantly increase the oxygen content of arterial blood, but it does help to redistribute oxygen to lethal corner areas along axial vectors during period of low blood flow or poor PCD.

What has changed since 1991????

1. Minimal acceptable Hematocrit in 1994 for DHCA…………. 19.1%.
Minimal acceptable Hematocrit in 2011 for DHCA/low flow……. 24.9%.

2. Average prime volume circa 1994?……………around 750 mL.
Average prime volume 2011 (our survey)……. 325.3 mL (range 50-1300 mL)

3. Retrograde autologous priming. 40%.

4. Vacuum assisted venous drainage. 61%.

5. Integrated arterial line filters. 22.9%.

Mejak
Bill Harris points out that a balance of pediatric and adult cases is important to keep skill levels current in both areas.

Personally, I would like to remain well-rounded by performing a variety of procedures that encompass varying patient populations.

It requires a totally different mental state to pump a child, said Pat Courtney.

I am a firm believer in the value of specializing in pediatric/infant perfusion.

Fifty-eight percent (58%) of the AmSECT practicing perfusionists feel that the profession should recognize areas of specialization within perfusion.
“Although there have been pediatric sessions at various national and regional meetings, there has never been an opportunity for pediatric perfusionists to get together and discuss techniques, equipment or other concerns …”

**PEDIATRIC PERFUSIONISTS: IDENTITY CRISIS?**

Who are we?
Are we a specialty?
Recognition / Badges?
Certification?
Micro-credential?
Proficiency & Competency?
Education & Training?

**Formation of a new Pediatric Perfusion Committee and Chapter**

Following the ANESTHETIC Perfusion Society's (ANESP) May 1995 national meeting in Dallas, it was decided at the President's meeting by majority vote to form a Pediatric Perfusion Committee and Chapter. The formation of a Pediatric Perfusion Committee and Chapter was approved by a majority vote in March 1995 at the Pediatric Perfusion Committee meeting.

The Pediatric Perfusion Committee and Chapter was formed to address the needs of pediatric perfusionists and to promote the growth and development of pediatric perfusion as a recognized and respected specialty.

The Pediatric Perfusion Committee and Chapter is committed to providing educational and professional opportunities for pediatric perfusionists, as well as advocating for the recognition and respect of their specialty.

**Pediatric Perfusionists**

Organizational efforts to develop a national body of pediatric perfusionists are currently underway. In evaluating the needs of this sub-specialty, it is estimated that 150 perfusionists from 50 counties are interested in such a group. Various propositions have been raised to address this issue, including the formation of a National Alliance of Pediatric Perfusionists (NAPP) or a committee to address this need within ANESTHETIC.

A proposal has been made to the ANESTHETIC Board of Directors to form such a program and will be voted on at the October meeting.

The goals of such a program would be:

1. Encourage the dissemination of clinical information among pediatric perfusionists.

**NAPP**

1995

1995
"Should case volume be linked to proficiency?"
"What other criteria should be used to determine proficiency?"
"What is the role of perfusion schools in addressing this concern?"
"Should we (AmSECT Peds committee) make a recommendation on specific case volume/perfusionist?"

61% - "Some form of identification or recognition of pediatric training and ability is necessary in the perfusion community"

"Should we as a Society recognize individuals as AmSECT pediatric perfusionists based upon specific requirements including case volume, CE, research and training?"

"Some form of identification or recognition of pediatric training and ability is necessary in the perfusion community"

Status of Pediatric Perfusion Education: 2000 Survey
Ron Angona, BS; Bruce Searles, CCP; Fadi Nasrallah, MD; Edward Darling, CCP
Department of Cardiovascular Perfusion, Upstate Medical University, Syracuse, New York
Presented at the 58th International Congress of the American Society of Extra-Corporeal Technology, March 22-25, 2001, Miami, FL.
Table 4. Comparison of responses to core questions.

<table>
<thead>
<tr>
<th>Core Questions</th>
<th>Program Directors</th>
<th>Recent Graduate</th>
<th>Ped Card Anesth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the essentials and guidelines requirements for pediatric clinical activity too low?</td>
<td>Yes-52% Yes-73%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Should there be subspecialization and/or certification in pediatric perfusion?</td>
<td>Yes-13% Yes-43%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Would a postgraduate program in infant perfusion be a benefit to the community?</td>
<td>Yes-78% Yes-82%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
That was 10 years ago and since then over 125 have cleared the bar to receive the Formal recognition as an AmSECT Fellow in Pediatric Perfusion.

What’s next?

MOVING FORWARD - TECHNIQUES

Recent innovations in perfusion and cardiopulmonary bypass for neonatal and infant cardiac surgery

• Addressing the transfusion problem
• Addressing cardioplegia
• Monitoring during neonatal CPB

MOVING FORWARD - PROFESSIONALLY

• Pediatric Body of Knowledge
• Pediatric Standards and Guidelines
• Formalized Post-graduate training in Pediatrics Perfusion?
• Pediatric & Congenital Perfusion Certification?

THANK YOU!