Introduction to Pediatric Cardiology - The [Very] Basics

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Lecture is available on Children’s Hospital Heart Center website.
Organization

◆ The Language and the Assumptions
◆ Principles
◆ Hemodynamics
◆ Differential Diagnosis
<table>
<thead>
<tr>
<th>Common Term</th>
<th>Compare to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left ventricle</td>
<td>Left-sided ventricle</td>
</tr>
<tr>
<td>RVH</td>
<td>RVE</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>Define it.</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>Hypoxemia</td>
</tr>
<tr>
<td>Gradient</td>
<td>Obstruction</td>
</tr>
</tbody>
</table>

Remember your assumptions.
The Principles

1. Overwork is bad.

2. Volume is more important than content


4. Who is this guy Fick anyway?
The Principles

1. Myocardial overwork is bad. Why?

What about athletes, especially endurance sports?

Discuss the supply/demand ratio.
The Principles

2. **Volume is more important than content.**

Would you rather be cyanotic with normal volume, or pink and hypovolemic?

**What is critical opening pressure?**

Key is $O_2$ delivery.
3. **Blood flows downhill.**

4. What did Fick describe?

Blood flows through the path of least *NET* resistance.
Fick Principle (I)

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>In</td>
<td>96%</td>
<td>96%</td>
</tr>
<tr>
<td>Out</td>
<td>80%</td>
<td>60%</td>
</tr>
</tbody>
</table>

What is happening? (Why the difference?)

What is *assumed* when using the Fick principle?
Fick Principle (II)

1. Blood flow (Q) is inversely proportional to A-V $O_2$ difference across any vascular bed.

2. Therefore, as A-V $O_2$ difference rises, Q ?↑?↓

3. Applies to: organ, pulm circ, whole body.
**Hemodynamics**

\[ R = \frac{P}{F} \]

Therefore:

\[ P = R \times F \]

\[ F = \frac{P}{R} \]

What do you *really* know? (What do you measure)?

\[ R \]

\[ P \]

\[ F \]
Differential Diagnosis-Cong Heart Dis

CHD

ACYANOTIC
- L-R Shunt
- Obstruction
- Both

ACYANOTIC
- Atrial
- VSD
- Grt Art
- AS, Coa; PS

CYANOTIC
- Tetralogy of Fallot
- TGA
- Truncus arteriosus
- Tricuspid atresia
- TAPVC
Diff Dx: Acquired Hrt Dis in Children

By Etiology
Auto-immune: JRA, RF
Infectious: BE, SBE
Neoplasia: Rhabdo
Trauma: e.g., Coa!

By Structure Involved
Valve: Ao regur, MVP
Muscle: Cardiomyop
Vessel: Kawasaki
Airway: Vasc compres
Diff Dx: Pulm Artery Hypertension

- LV stiffness
- Mitral valve disease
- Left atrial volume or obstruction
- Pulmonary venous anomalies
- Pulmonary Membrane
- Pulmonary arteriolar obstruction
- Branch Pulmonary artery stenosis

Follow the Flow, Backwards
‘Phases’ of Diff Dx

◆ **Phase I:** Medical student
   What is **Possible**?

◆ **Phase II:** Resident/Fellow
   What is **Probable**?

◆ **Phase III:** Sr. Attending
   What is **Treatable**? Or, What is **Life-threatening**?