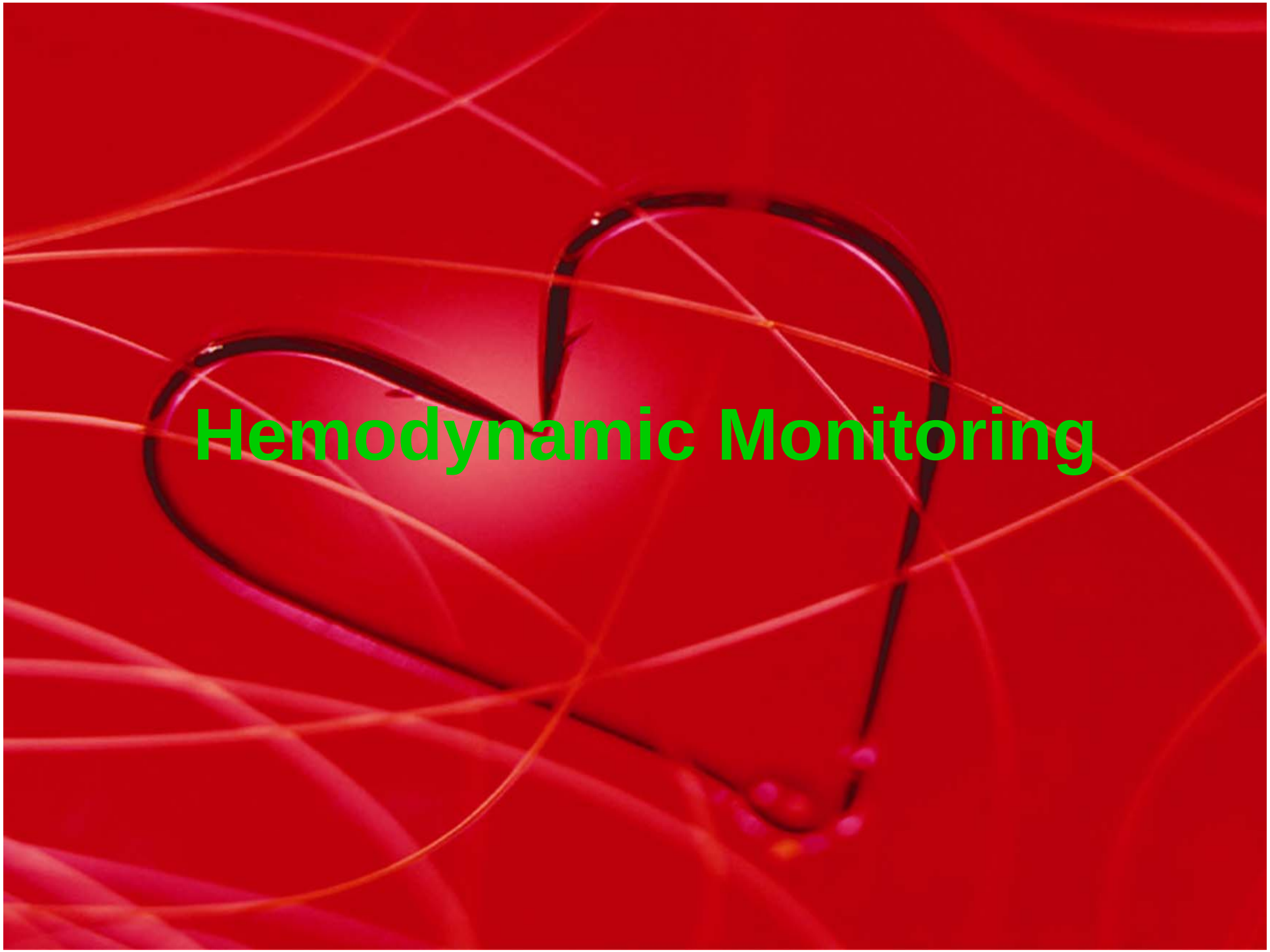
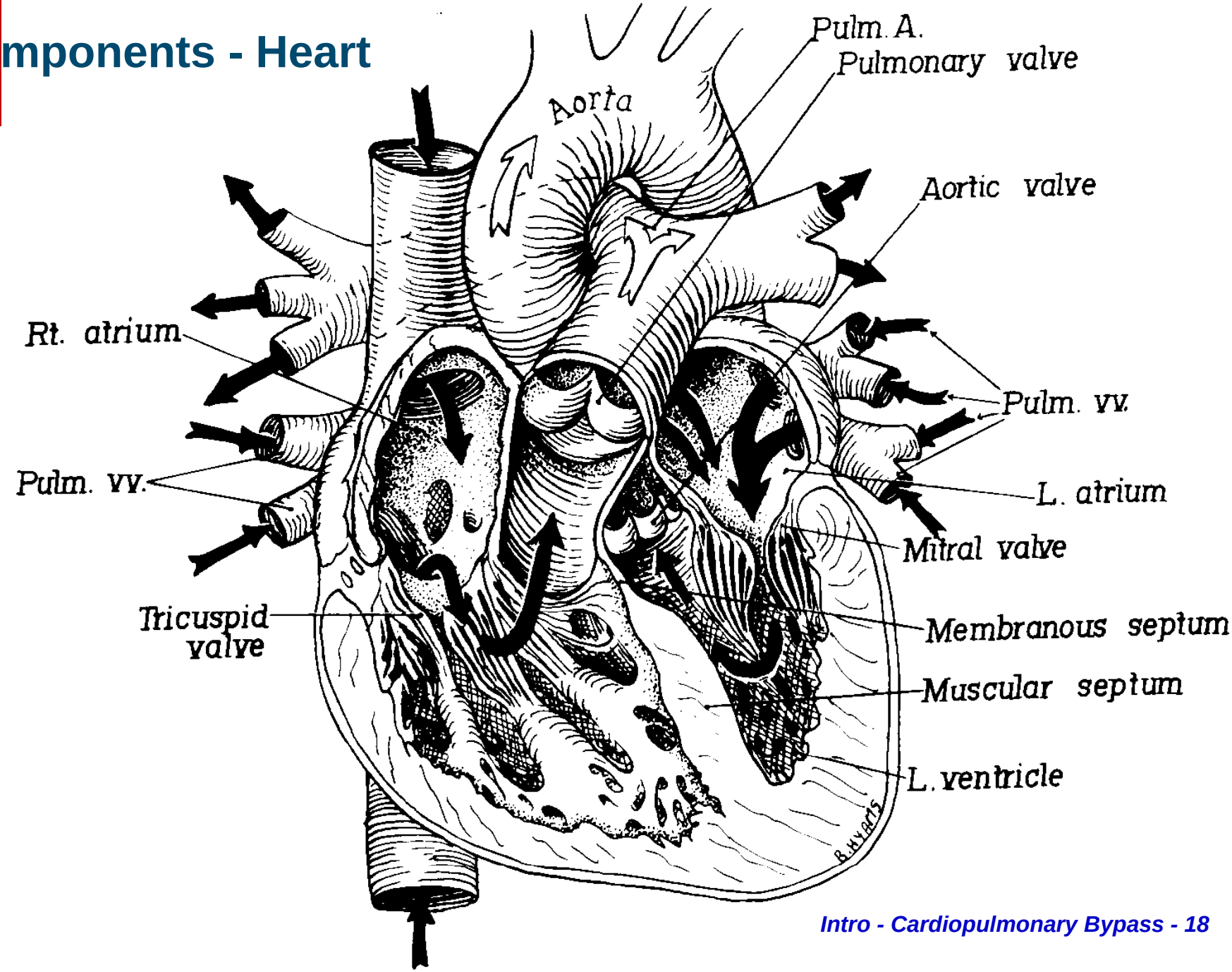
Edwards Lifesciences

Edwards Lifesciences


Hemodynamic Monitoring

Components - Heart



Hemodynamic Monitoring.

- **1) Pressure**

  Arterial pressure , Central Venous Pressure

  Pulmonary Artery Pressure (PAP) ,

  Pulmonary Artery Wedge Pressure (PAWP)

Edwards Lifesciences

Pressure

- **Catheter**
- **Pressure Transducer**
- **Monitor / Pressure module.**

Edwards Lifesciences

Catheters

- **Arterial catheter (AP)**
- **Central Venous Catheter (CVC).....CVP**
- **Pulmonary Artery Catheter (PA Catheter)**

  (CVP , PAP, PAWP)
- **Thermodilution Catheter. (CO Catheter)**

  (CVP, PAP,PAWP,CO)

Edwards Lifesciences


RIGHT ATRIAL PRESSURE
RIGHT VENTRICULAR PRESSURE
PULMONARY ARTERY PRESSURE
PULMONARY ARTERY WEDGE PRESSURE
CARDIAC OUTPUT
SYSTEMIC VASCULAR RESISTANCE
PULMONARY VASCULAR RESISTANCE
STROKE INDEX
VENTRICULAR STROKE WORK INDEX
CORONARY PERFUSION PRESSURE

Multi-Med

Central Venous Catheters (CVC) - CVP

- **16 cm & 20 cm lengths**
- **Single lumen to quad lumen (1L – 4L)**
- **Outer diameter (3 French – 8.5 French)**
- **Heparin coating (AMC THROMBOSHIELD)**

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Multimed CVC

Double Lumens

Distal /Brown 16 G…… Central …….CVP

Proximal/white 16 G …5cm…Medicine /TPN/Blood Sampling

Triple Lumens

.Distal/Brown 16G… Central…CVP measurement

Proximal /White 18G… 5 cm ..Blood Sampling/Medicine

Medial/Blue 18G…. 2 cm…Medicine

Edwards Lifesciences

Multimed Single Lumen

- **Catheter Diameter** **Volume** **Flow Rate**

Distal Tip 14 G /6F	**0.40 CC**	**6016 ml/hr**
Distal Tip 16 G/5F	**0.23 CC**	**3280 ml/hr**
Distal Tip 20 G/3F	**0.10 CC**	**1260 ml/hr**

- **Length 20 cm**

Edwards Lifesciences

Multimed Double Lumens

- **Double Lumen (Flow rate)**

	16 cm	20 cm
• Proximal /16G	3,620 ml/hr	3,292 ml/hr
(Exit port 5 cm)		
• Distal /16G	3,608 ml/hr	3,200 ml/hr
(Exit port at the Tip)		

Edwards Lifesciences

Multimed Triple Lumens

- **Triple Lumens**

	16 cm	20 cm
• **Proximal/18G**	**1,670 ml/hr**	**1,420 ml/hr**
(Exit port at 5 cm)		
• **Medial/18G**	**1,500 ml/hr**	**1,300 ml/hr**
(Exit port at 2 cm)		
• **Distal/16G**	**3,510 ml/hr**	**3,160 ml/hr**
(Exit port at the Tip)		

Edwards Lifesciences

Central Venous Catheter

- **1) High Flow Central Venous Catheter**

Edwards Lifesciences

Edwards Lifesciences

Central Venous Catheter

- **2) Coated Central Venous Catheter**

  (Antimicrobial + Heparin) , Double protection

  Benzalkonium Chloride + Heparin

Some brand only - Sulfadiazine ,Silver Nitrate ,

No Heparin , Only one side.

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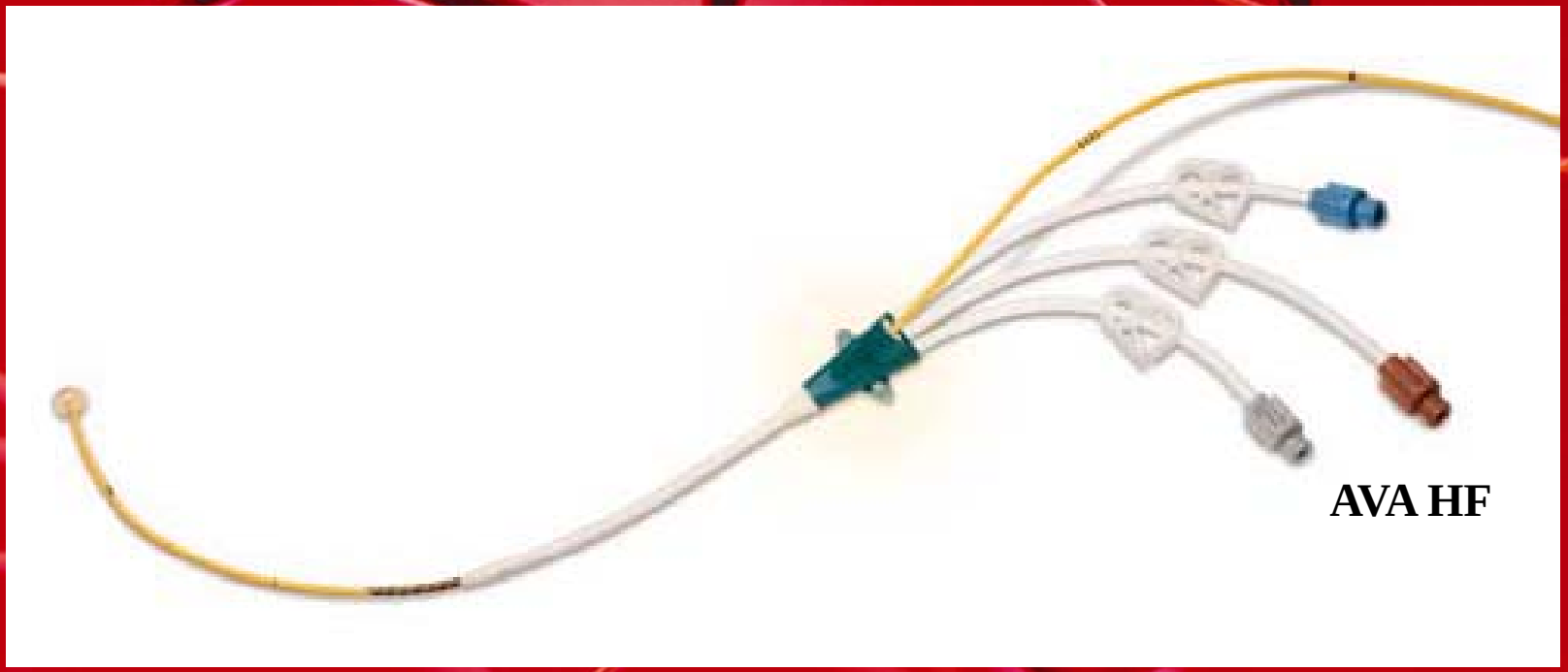
Central Venous Catheter

3) Central Venous Catheter with Introducer capability

Edwards Lifesciences

AVA

Advanced Venous Access Devices



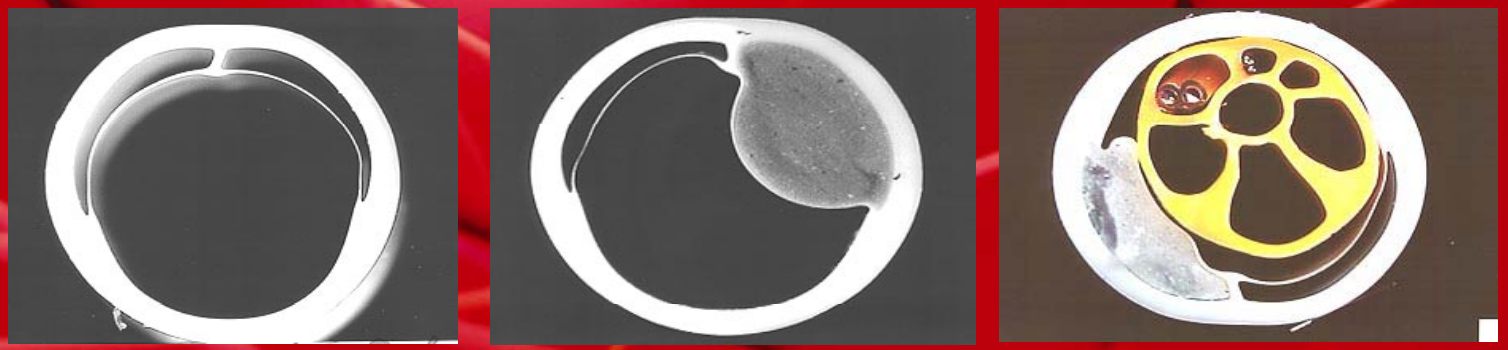
AVA HF

Advance Venous Access

AVA Devices

Competencies in extrusion
Innovation and technology

Flexible Inner Lumens



Increased flow rates

AVA HF (High-Flow)

Advanced Venous Access Devices

Make sure that AVA HF is covering your

H♥R T T S

High Risk ♥ (cardiac)

Re-do CABG or Valve
CABG (multi-vessel)
Unstable patient

Trauma

Accident
GSW
All Trauma centers

Transplant

Liver
Heart
Lung

Surgical

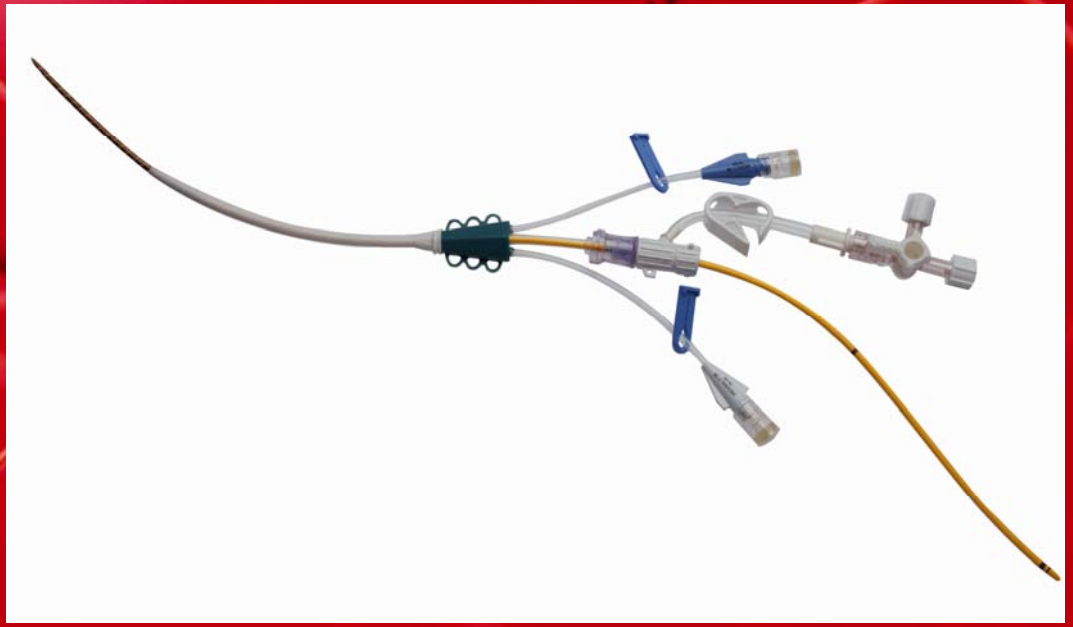
Abdominal Aortic Aneurysm
Vascular
Anticipate difficulty (prostate)

Edwards Lifesciences

AVA 3Xi

Advanced Venous Access Devices

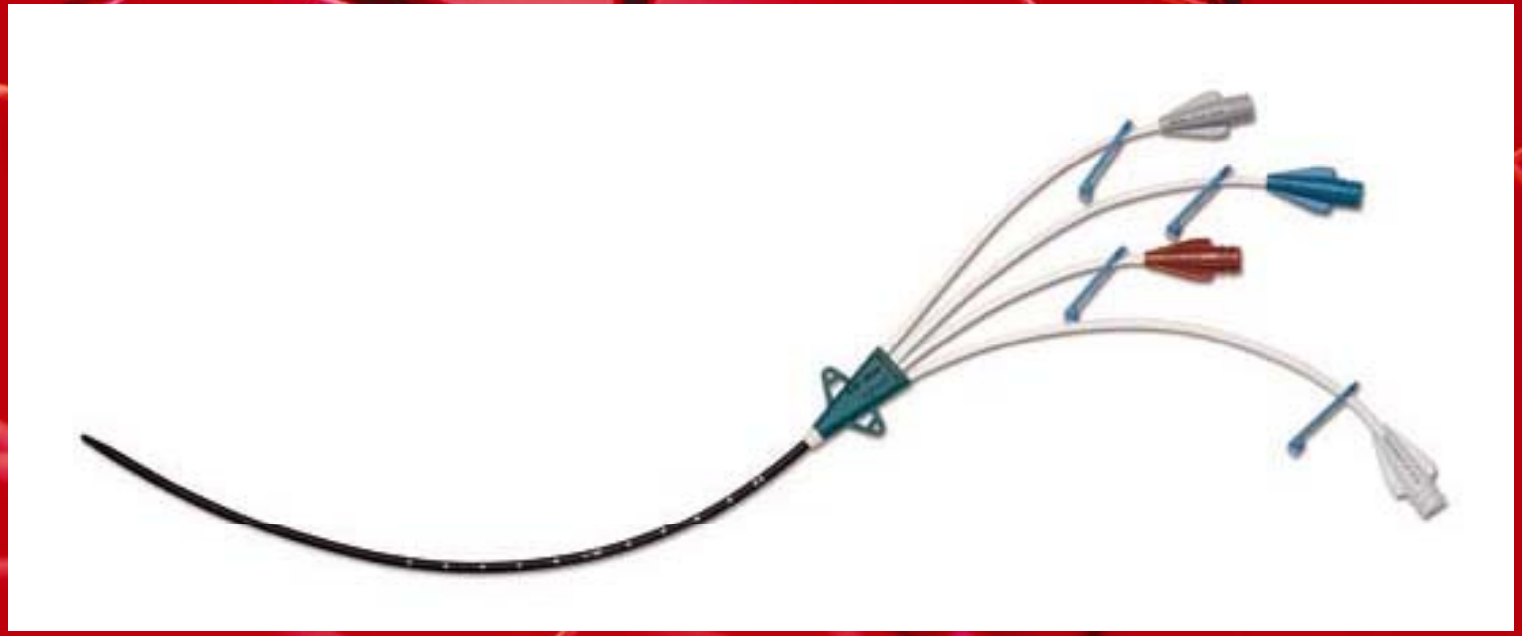
Central Venous Catheter with Introducer capability



Vantex

WITH OLIGON

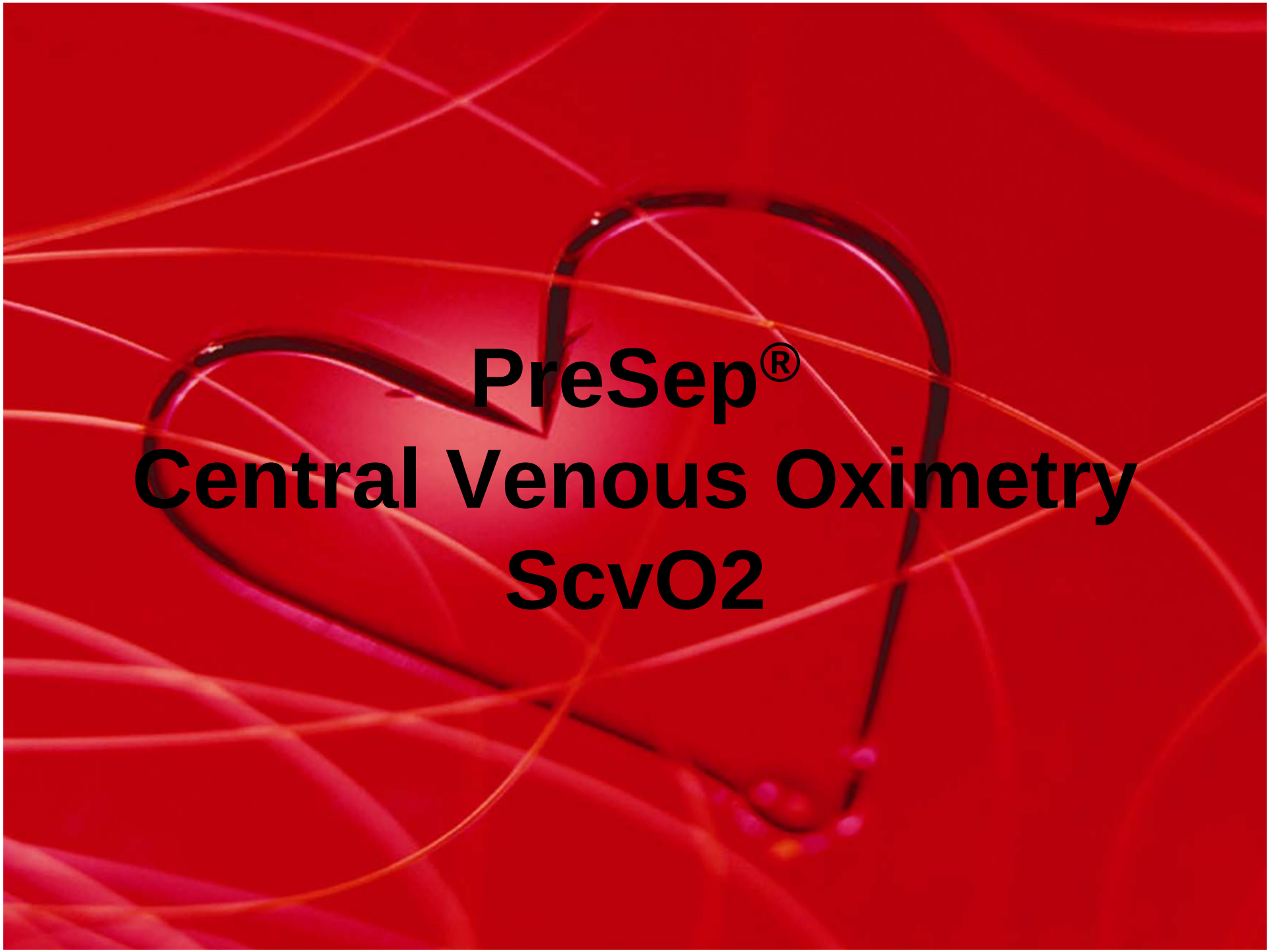
Revolutionizing the Science of Antimicrobial Protection

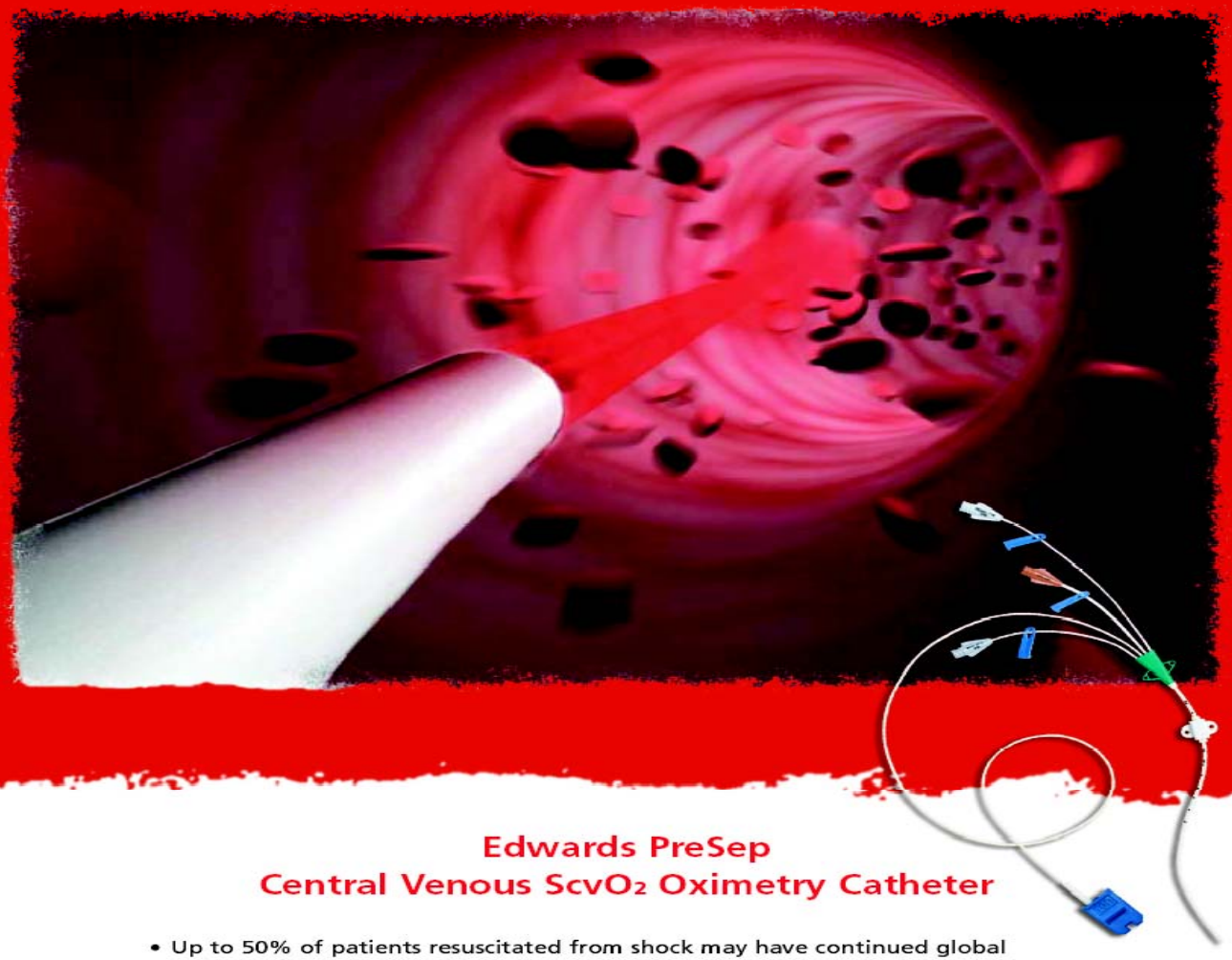


First CVC with an integrated antimicrobial material

OLIGON

- Antimicrobial compound
  - ***Silver***, platinum, and carbon
- Body fluids interact with silver and platinum particles in the material, causing a release of silver ions


PreSep®
Central Venous Oximetry
ScvO2



Edwards PreSep
Central Venous $ScvO_2$ Oximetry Catheter

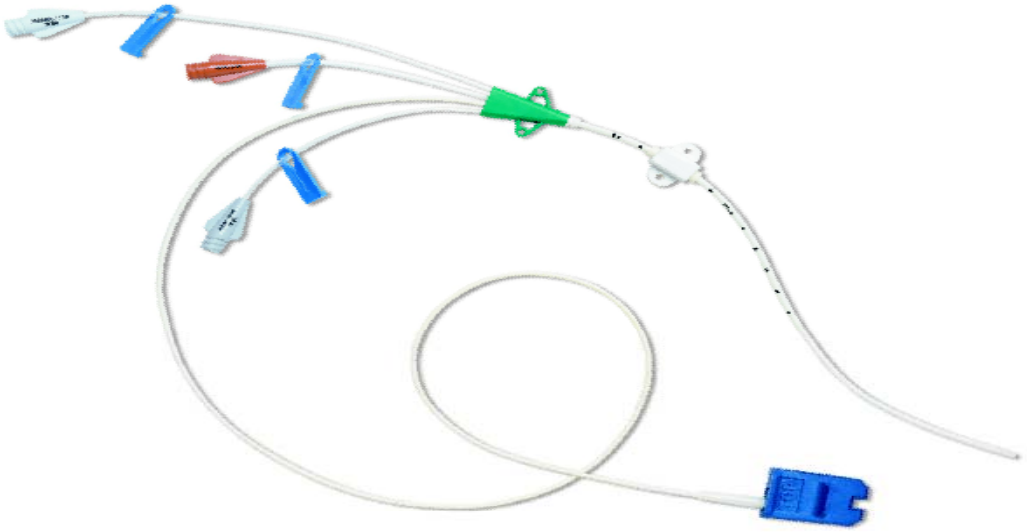
- Up to 50% of patients resuscitated from shock may have continued global tissue hypoxia (i.e., increased lactate and decreased $ScvO_2$) even with the normalization of vital signs and central venous pressure[1]
- Reduced central blood volume is reflected more clearly with $ScvO_2$ than in CVP[2]
- $ScvO_2$ saturation is a reliable and sensitive method for detecting blood loss[3]

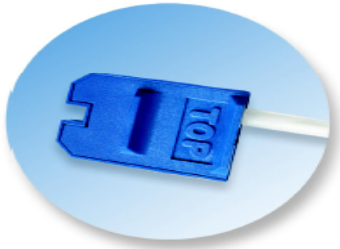
Edwards
LIFESCIENCES

PreSep Central Venous Oximetry Catheter* Specifications:

Model Number	Lumens	Length (cm)	Size F (mm)	Continuous $ScvO_2$	Lumen Size Gauge (mm) Distal	Proximal	Medial	Recommended Dilator F (mm)	Minimum Guidewire Size Inch (mm)	AMC Thromboshield**
X3820HK	3	20	8.5 (2.83)	•	15 (1.77)	18 (1.33)	18 (1.33)	10.5 (3.5)	0.32 (0.8)	•
X3820K	3	20	8.5 (2.83)	•	15 (1.77)	18 (1.33)	18 (1.33)	10.5 (3.5)	0.32 (0.8)	
X3820HS***	3	20	8.5 (2.83)	•	15 (1.77)	18 (1.33)	18 (1.33)	10.5 (3.5)	0.32 (0.8)	•

*PreSep catheters are designed for use with Edwards Lifesciences SAT-2 device, Explorer monitor, Vigilance monitor and OM2 optics module to continuously monitor $ScvO_2$.
**All model numbers with an "H" contain AMC Thromboshield, an antibacterial heparin coating which decreases viable microbe count on surface of product during handling and placement.
*** Model numbers with an "S" do not contain xylocaine local anesthesia.





Compatible with Edwards Swan-Ganz SvO_2 Optics modules and computers
- *Vigilance monitor*
- *Explorer monitor*
- *SAT-2 device*

Soft Tip. Helps reduce the likelihood of complications resulting from vessel perforation.

$ScvO_2$ a sensative indicator of changes in:

Oxygenation:
FiO_2 Ventilation

Cardiac Output:
Heart Rate, Preload, Afterload, Contractililty

Hemoglobin
Bleeding, Hemodilution

Metabolic Demand
Shivering, Work of breathing, Fever, Seizures

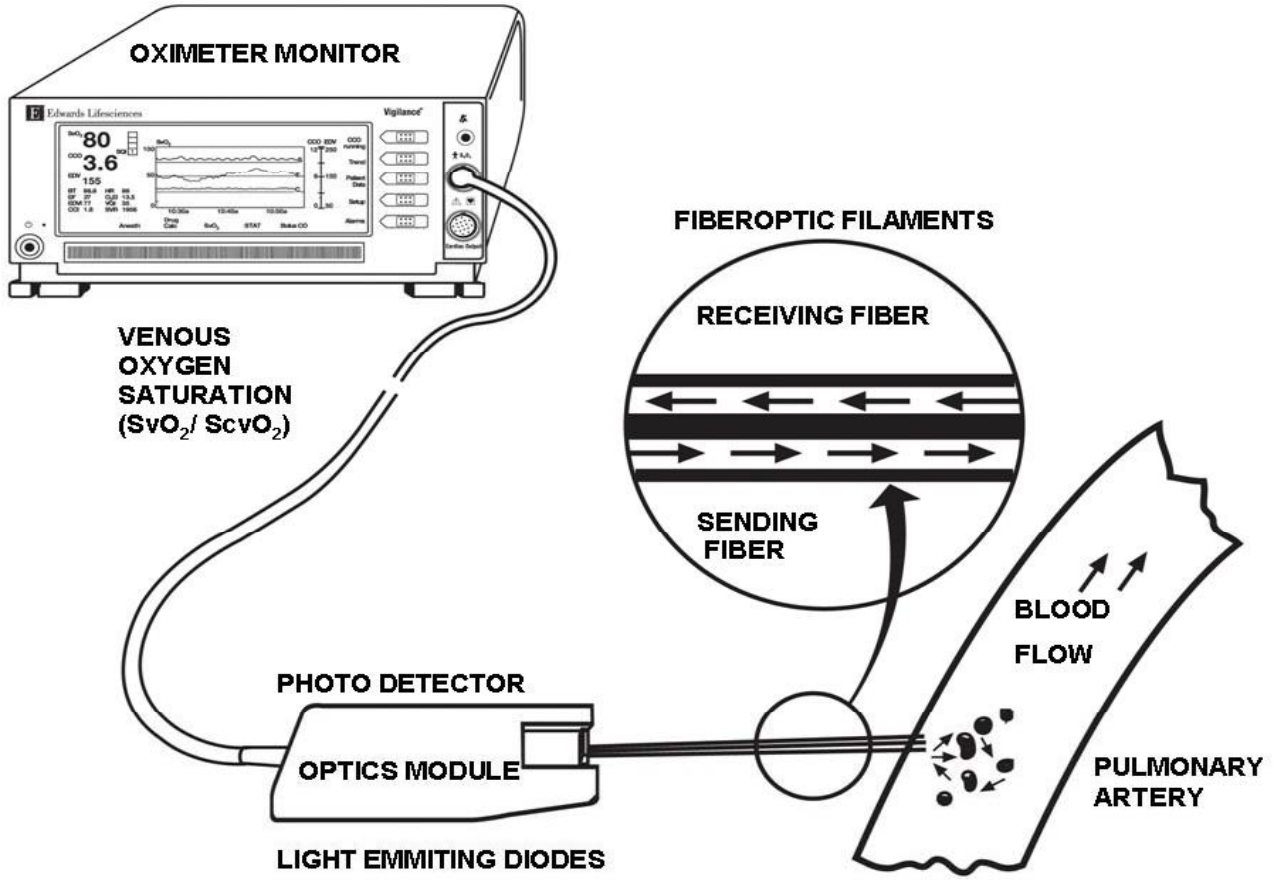
References
1. Rivers M., et al. Central venous oxygen saturation monitoring in the critically ill patient. Curr Opin Crit Care 2001; 7(3):204-11
2. Madsen P et al., Central venous oxygen saturation during hypovolaemic shock in humans. Scand J Clin Lab Invest 1993; 53:67-72
3. Scalea TM et al., Central venous oxygen saturation: a useful clinical tool in trauma patients. J Trauma 1990; 30:1539-1543

Caution: Federal (USA) law restricts this device to sale by or on the order of a physician. See instructions for use for full prescribing information.

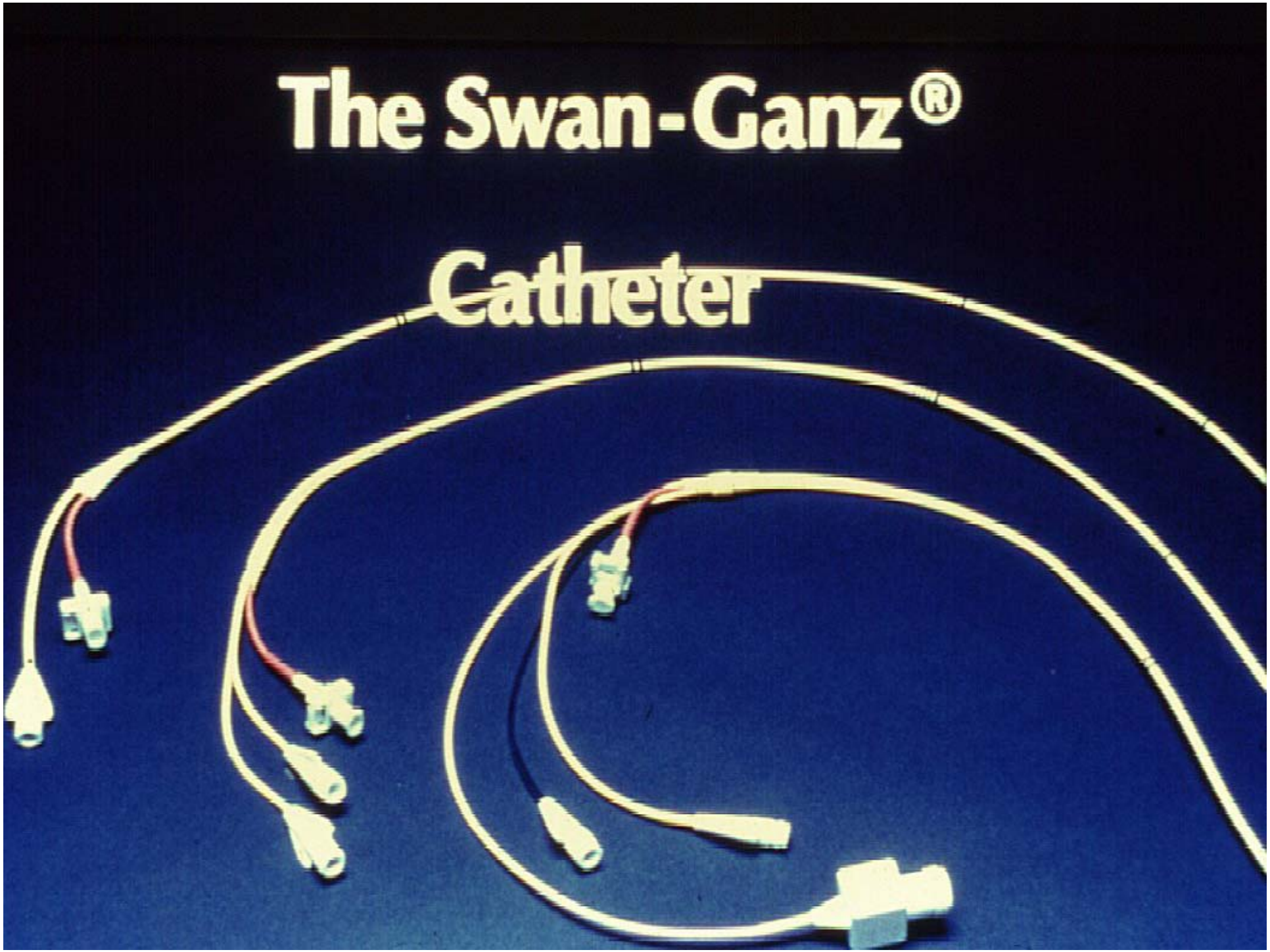
Edwards Lifesciences devices placed on the European market meeting the essential requirements referred to in Article 3 of the Medical Device Directive 93/42/EEC bear the CE marking of conformity.

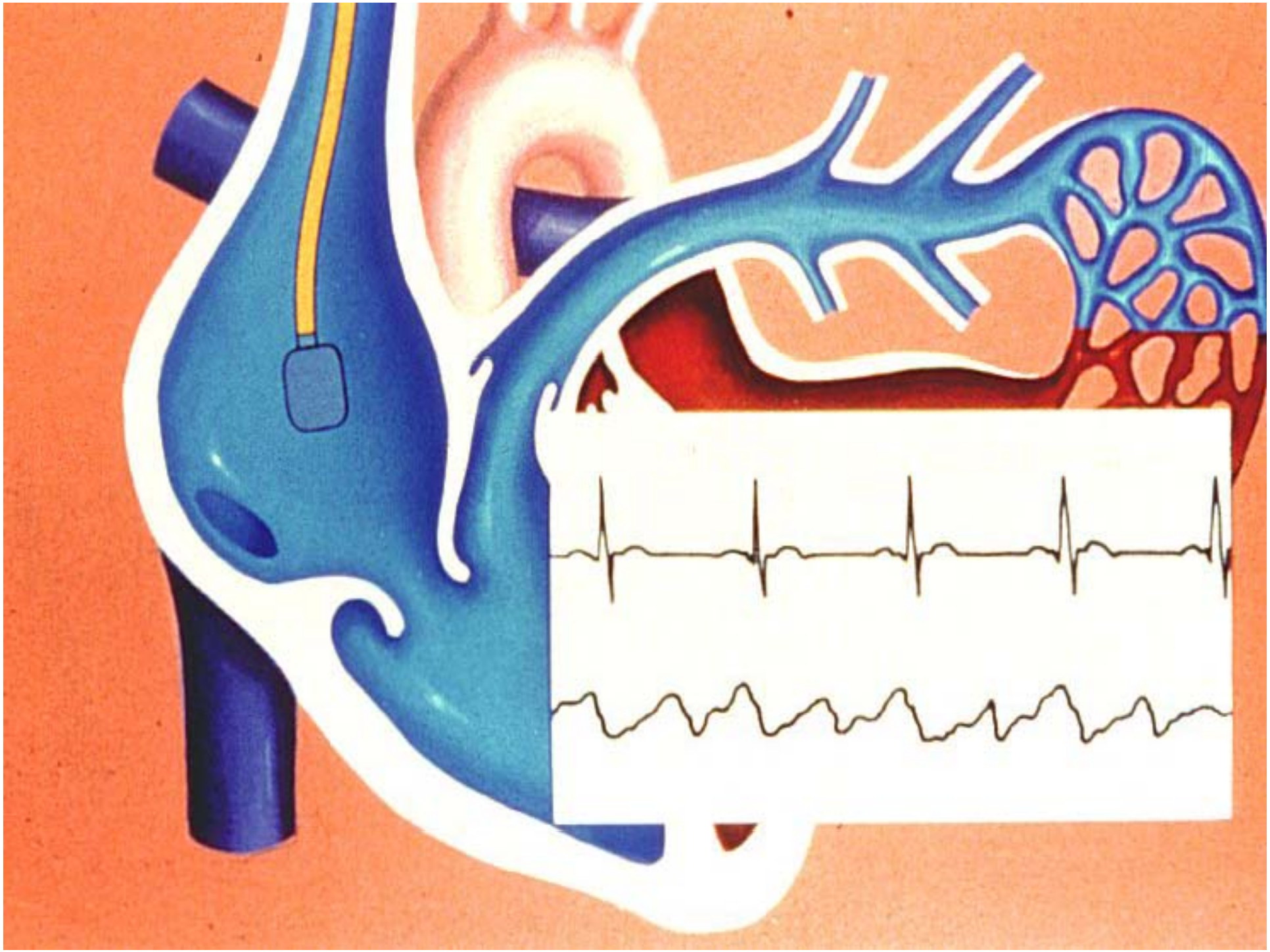
Edwards Lifesciences

$ScvO_2$ measurement



Edwards Lifesciences


The Swan-Ganz®
Catheter



Right Atrium

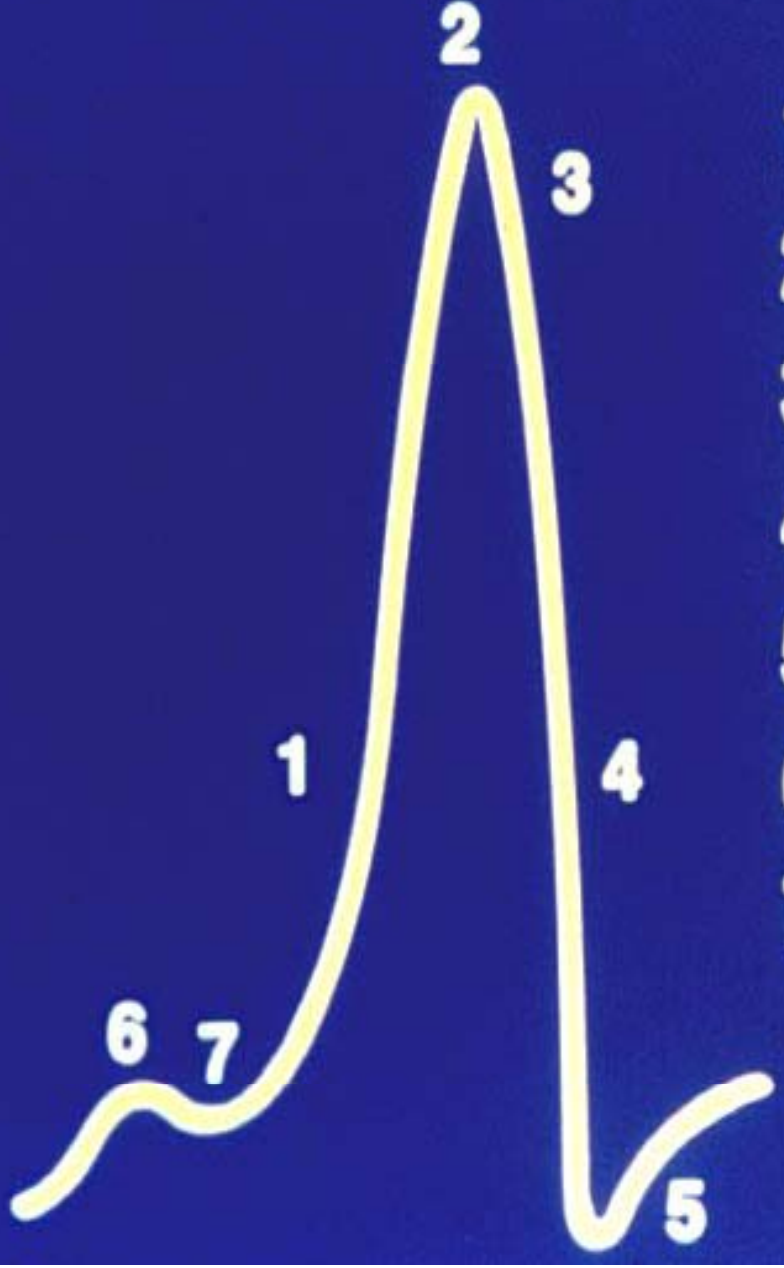
"x" = Atrial Diastole

"y" = Atrial Emptying

Right Atrial Pressure

Mean 2 - 6 mm Hg

Right Ventricle



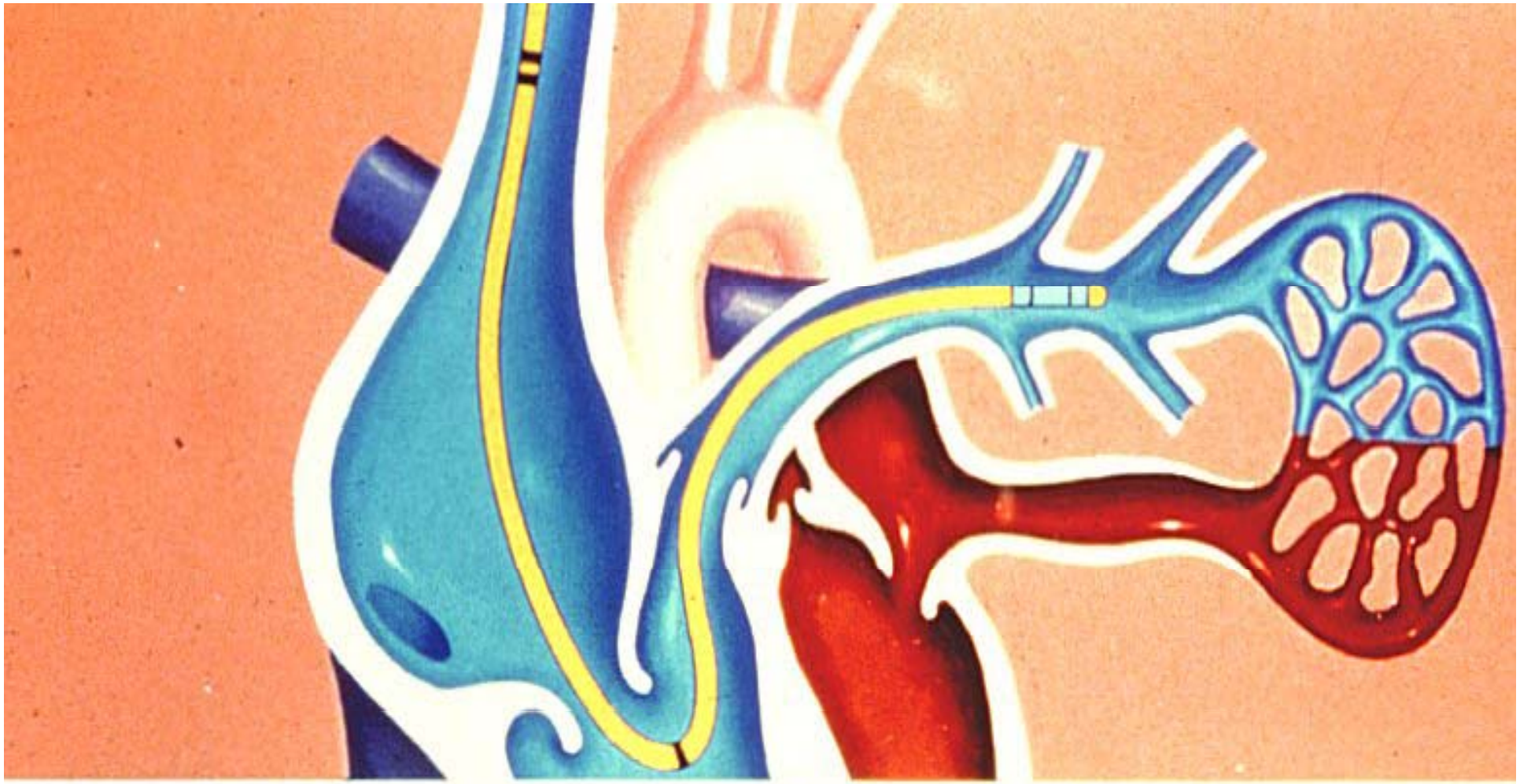
1. Isovolumic Contraction
2. Rapid Ejection
3. Reduced Ejection
4. Isovolumic Relaxation
5. Early Diastole
6. Atrial Systole
7. End-Diastole

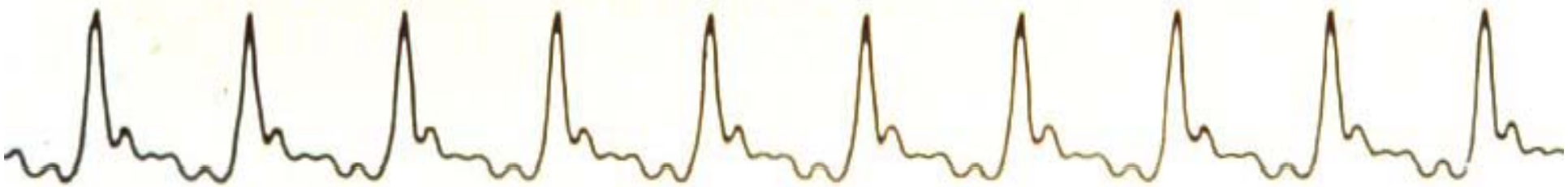
Right Ventricular Systolic Pressure

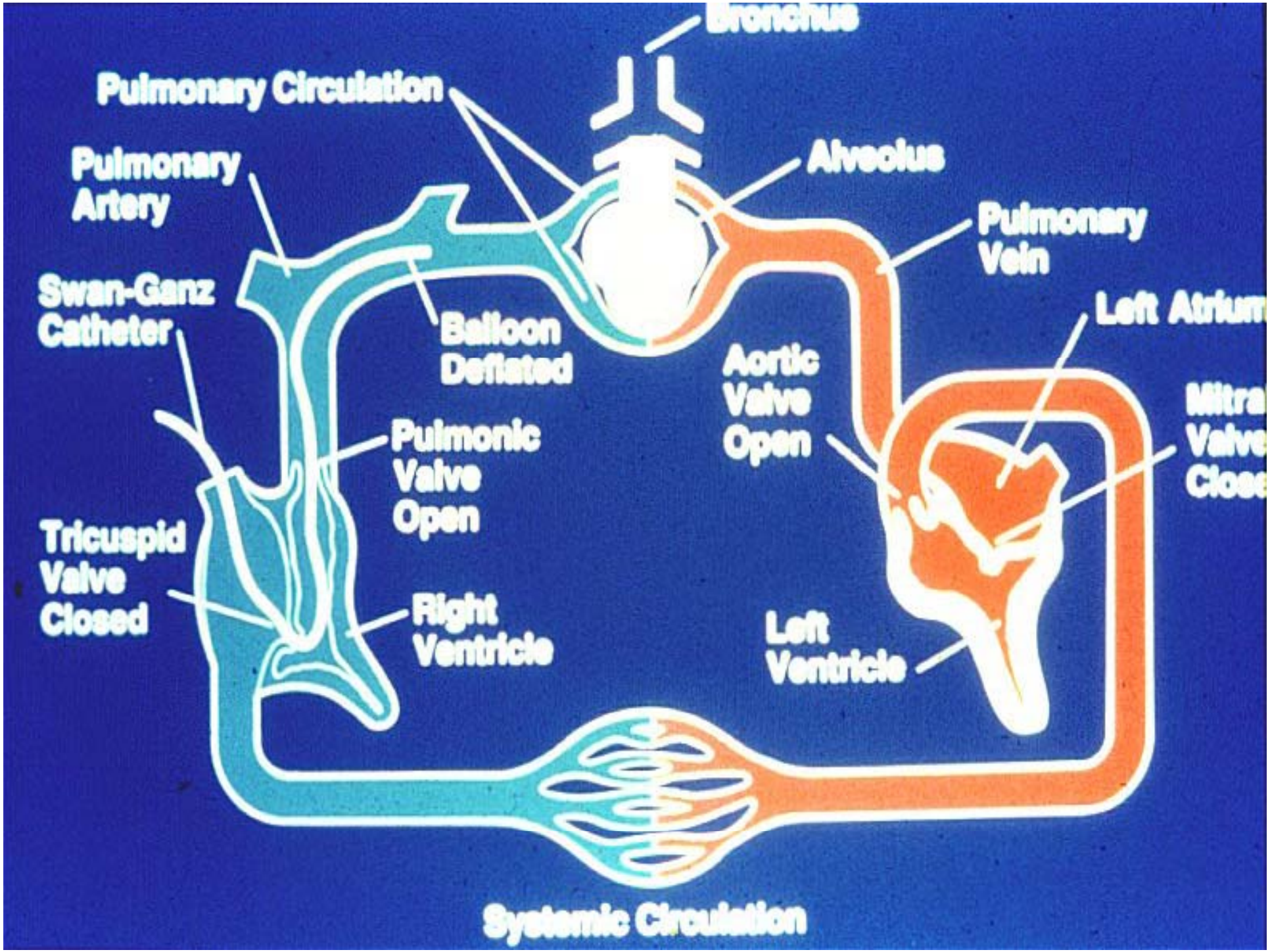
15 - 25 mm Hg

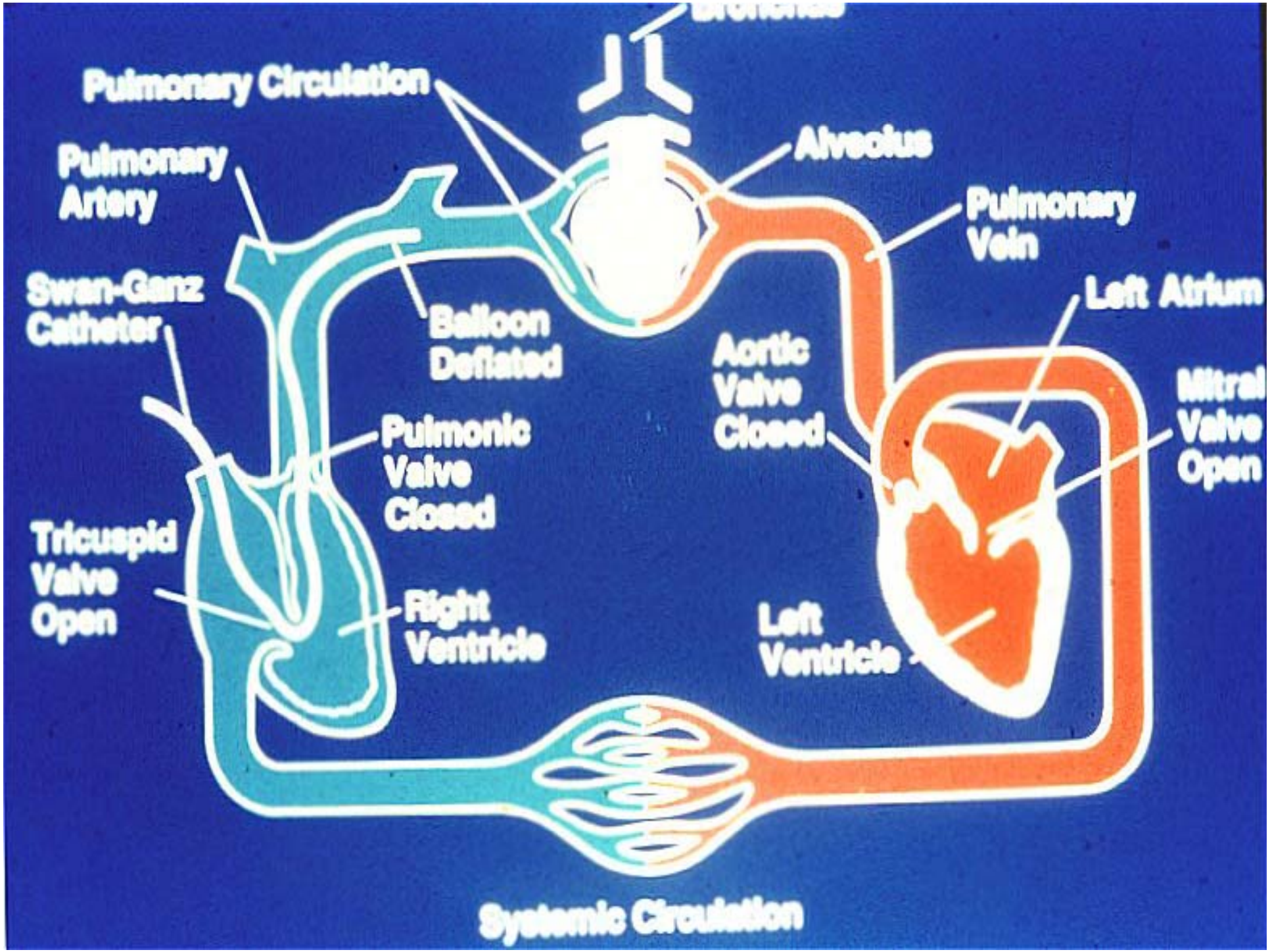
Right Ventricular End-Diastolic Pressure

0 - 8 mm Hg






Bronchus
Pulmonary Circulation
Pulmonary Artery
Alveolus
Pulmonary Vein
Swan-Ganz Catheter
Balloon Deflated
Left Atrium
Aortic Valve Open
Pulmonic Valve Open
Tricuspid Valve Closed
Right Ventricle
Left Ventricle
Systemic Circulation

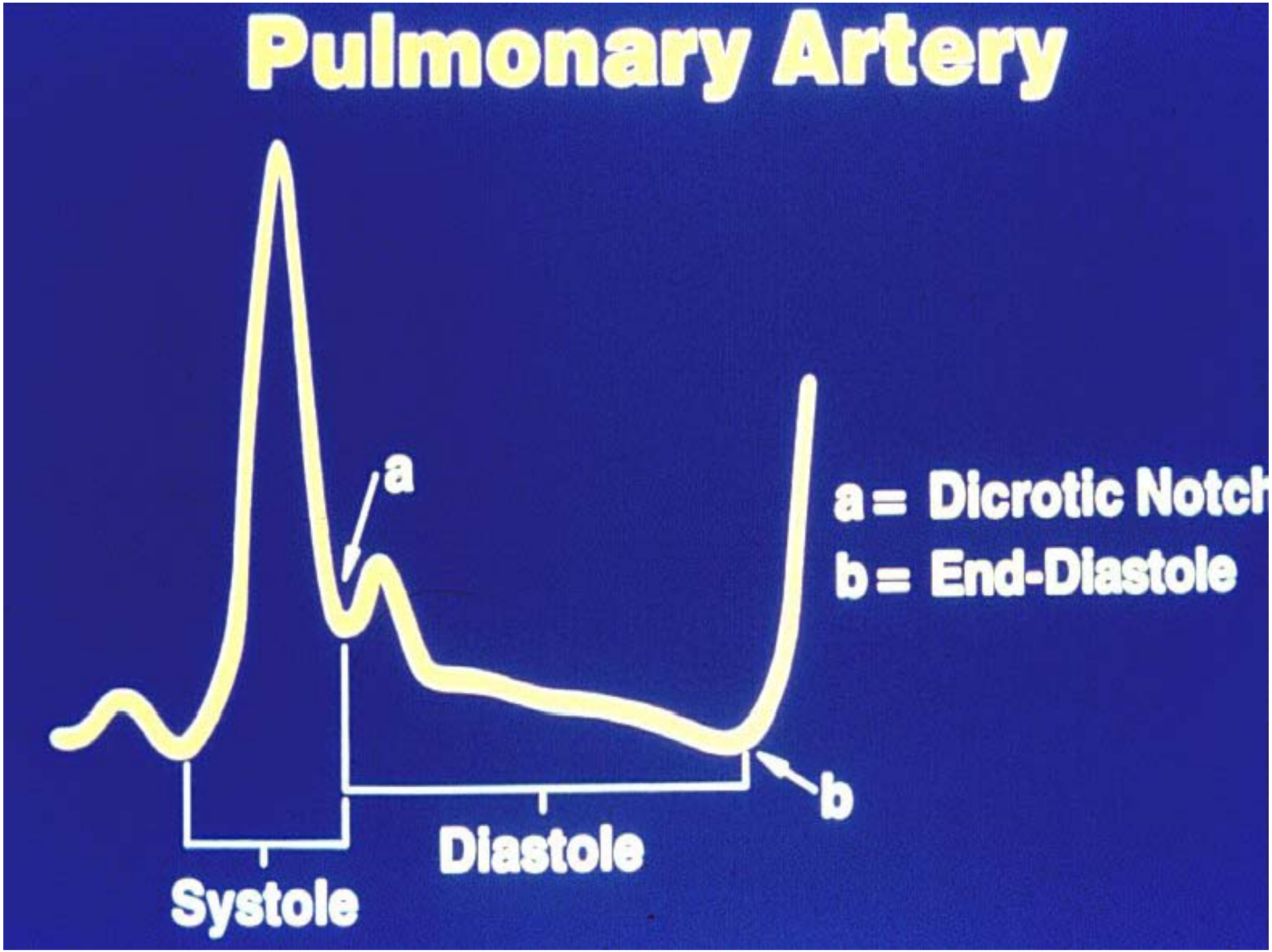

Pulmonary Circulation
Pulmonary Artery
Swan-Ganz Catheter
Balloon Deflated
Pulmonic Valve Closed
Tricuspid Valve Open
Right Ventricle
Alveolus
Pulmonary Vein
Aortic Valve Closed
Left Atrium
Mitral Valve Open
Left Ventricle
Systemic Circulation

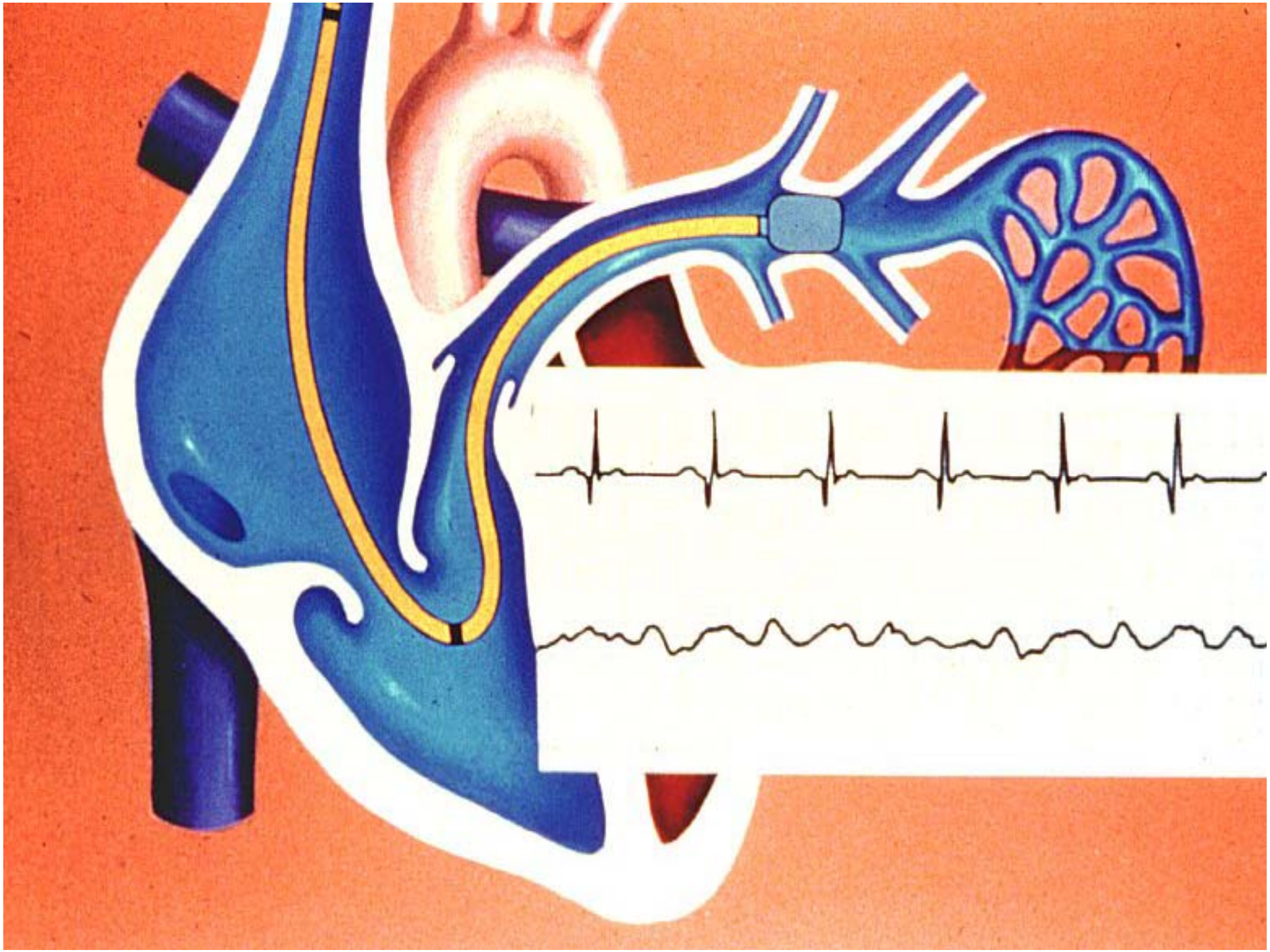
Pulmonary Artery Systolic Pressure

15 - 25 mm Hg

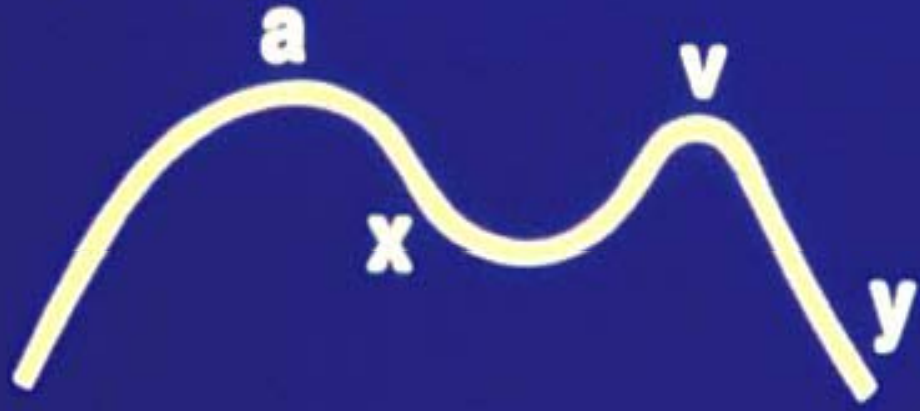
Pulmonary Artery Diastolic Pressure

8 - 15 mm Hg


Pulmonary Artery
a
a = Dicrotic Notch
b = End-Diastole
b
Diastole
Systole



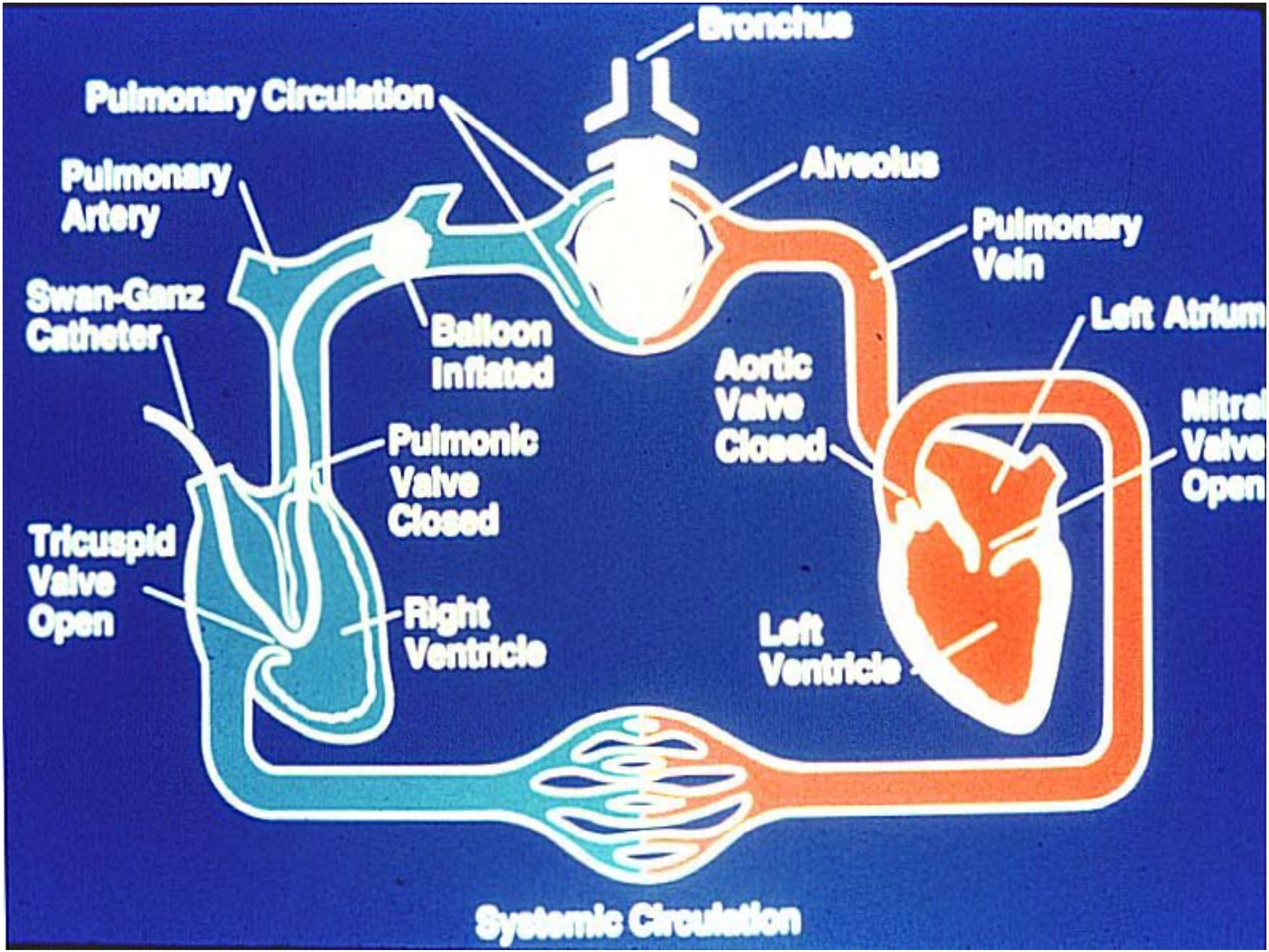
Pulmonary Artery Wedge



"a" Wave = Atrial Contraction
"x" Descent = Atrial Diastole
"v" Wave = Passive Atrial Filling
"y" Descent = Atrial Emptying

Pulmonary Artery Wedge Pressure

Mean	6 - 12 mm Hg


Bronchus
Pulmonary Circulation
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Swan-Ganz Catheter
Balloon Inflated
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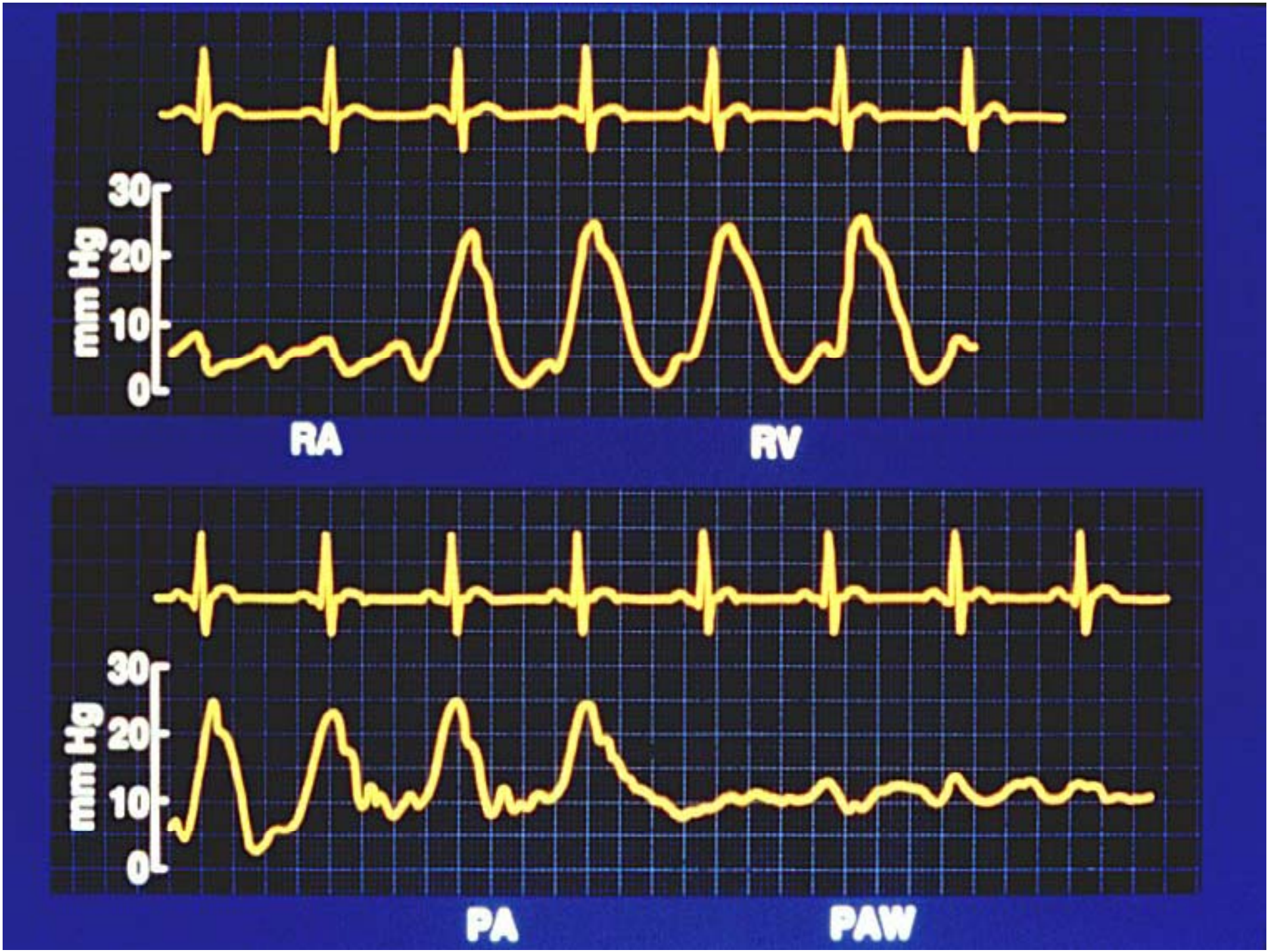
Mitral Valve Open
Pulmonic Valve Closed
Tricuspid Valve Open
Right Ventricle
Left Ventricle
Systemic Circulation


30
20
10
0
mm Hg
RA
RV
30
20
10
0
mm Hg
PA
PAW

TruWave™ Disposable Pressure Transducer

An Easy, Convenient System...

The ease of using the TruWave™ Disposable Pressure Transducer is immediately apparent – from the ergonomical design that fits your hand, to the cable connector* that has been designed to connect and disconnect easier. The unique flow-through design provides an unimpeded fluid path for easy filling of the system. The protective connector sheath is water resistant and connects without pins. The test port minimizes trouble shooting by testing both the monitoring cables and disposable pressure transducer.

An Accurate System...

The backside test port lets you verify the accuracy of the system quickly and easily. The convenient Snap-Tab™ flush device, designed for a sure grip, can be pulled from any direction to flush your system and will generate a square-wave test pattern. With greater Snap-Tab™ sensitivity, you "feel" how fast you're flushing the system.

And With VAMP® Kits, A Complete System.

Paired with VAMP® Kits (Venous Arterial blood Management Protection system), you have a complete and reliable closed, needleless blood sampling system with accurate pressure readings in one complementary unit.

For years, the Edwards Critical-Care Division of Baxter Healthcare has brought you the benefit of its critical care experience. You told us what you wanted, and we listened.

Edwards Critical-Care Division

Baxter

*Patent Pending

Edwards Lifesciences

Hemodynamic

- **2) Volume / Cardiac output**

  Swan Ganz Thermodilution

- **3) Oxgenation**

  Swan Ganz with SVO2

Edwards Lifesciences

Hemodynamic Monitoring

- **2) Volume**

  -Stoke Volume (SV)

  - Ejection Fraction (EF)

  - Continuous end diastolic volume (CEDV)

  - End Systolic Volume (ESV)

  - Cardiac output (CO , CCO)

Edwards Lifesciences

Hemodynamic Monitoring

- **3) Oxygen Profile**

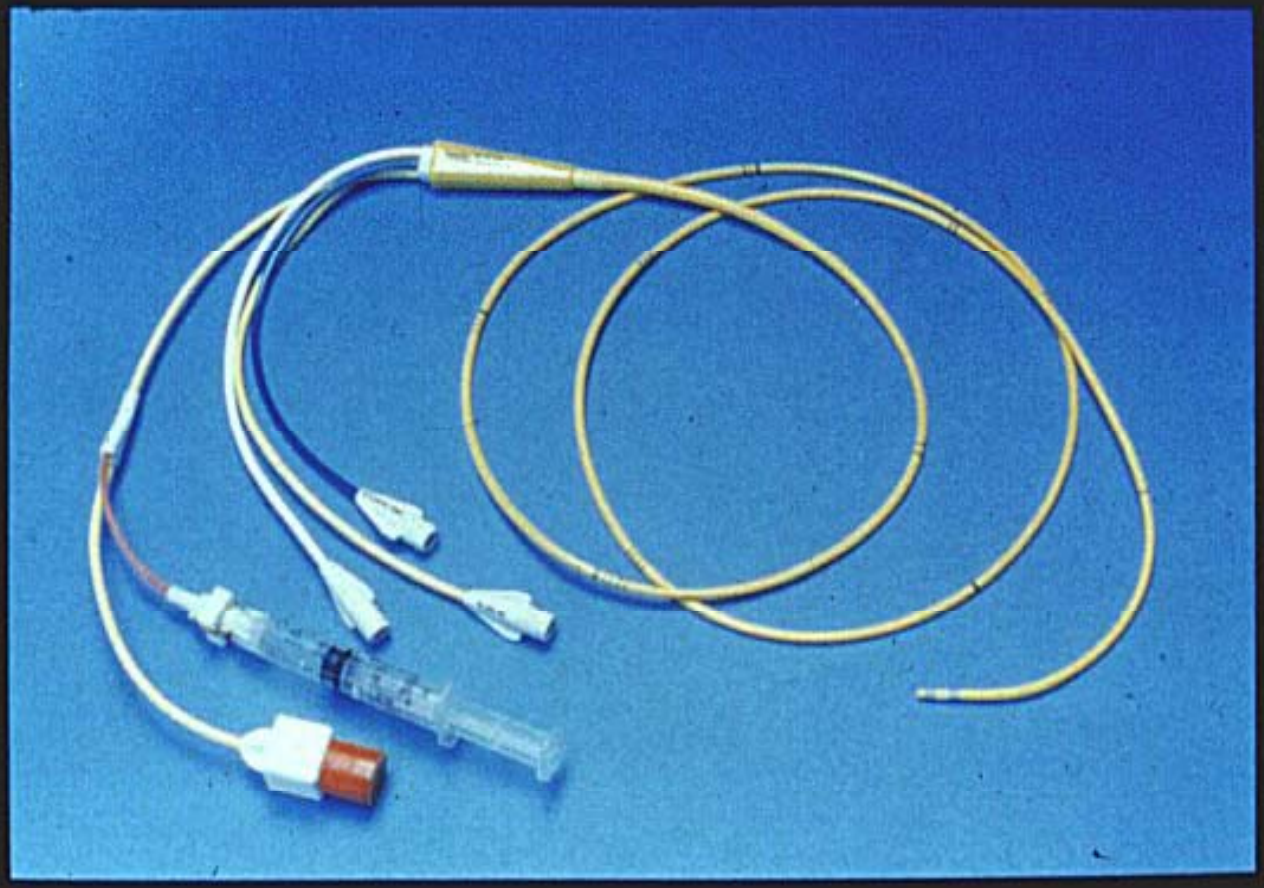
  - Delivery (DO2) , Consumption (VO2)

  - Mixed Venous Oxygen Saturation (SVO2)

  -Central Venous Oxygen Saturation (ScVO2)

Edwards Lifesciences

Hemodynamic Measurements

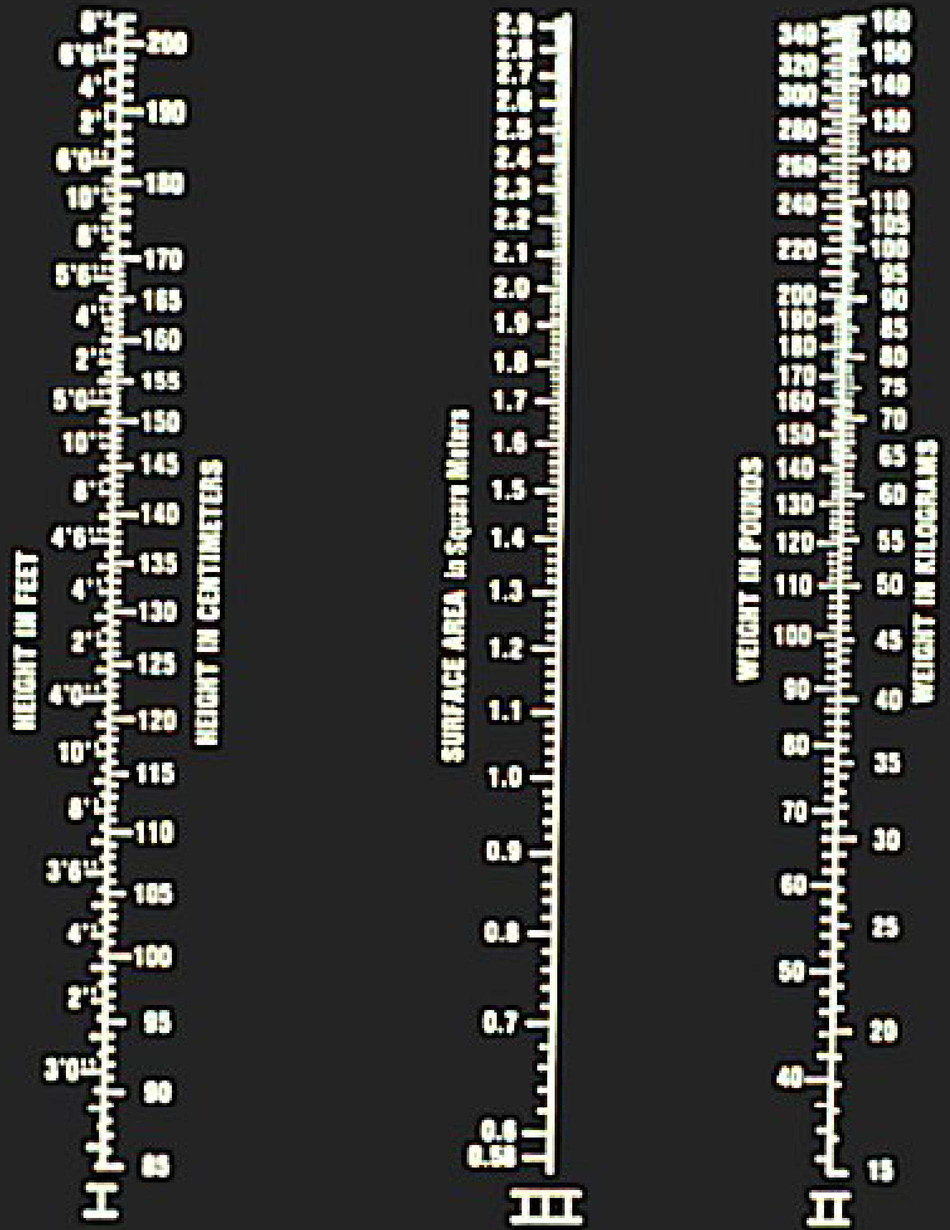


Cardiac Output (CO)

CO = Heart Rate (HR) x
Stroke Volume (SV)

Cardiac Index (CI)

$$CI = \frac{CO}{\text{Body Surface Area (BSA)}}$$



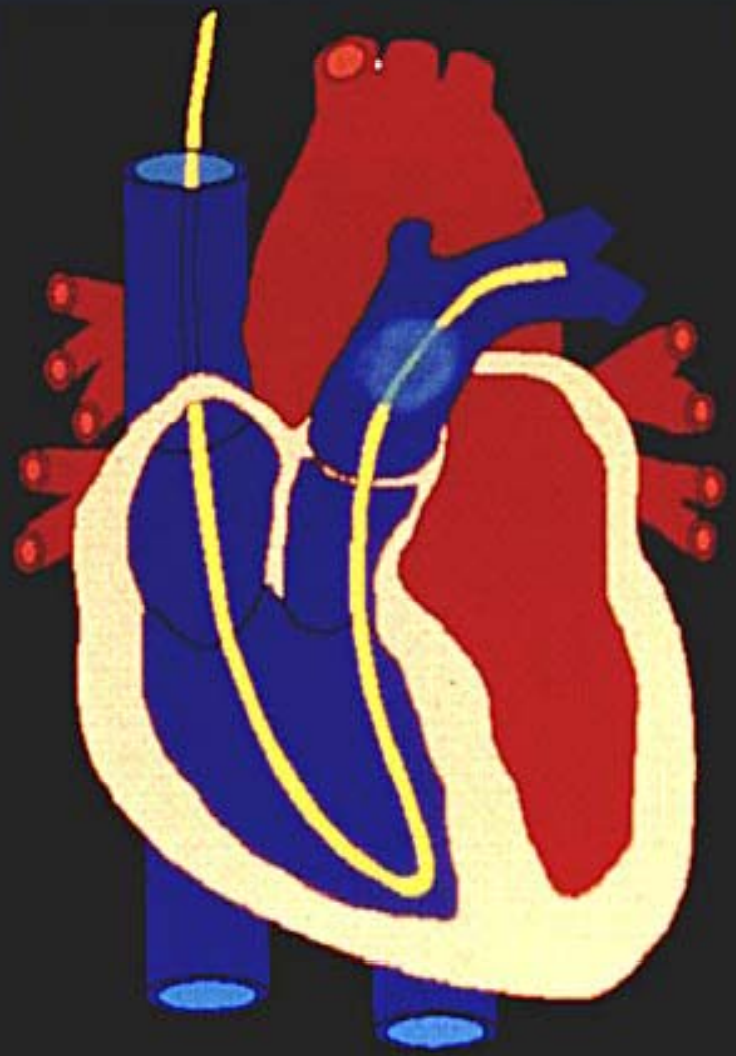
Bois, E.F. Basal Metabolism
ealth Disease, Lea and
ger, 1936.

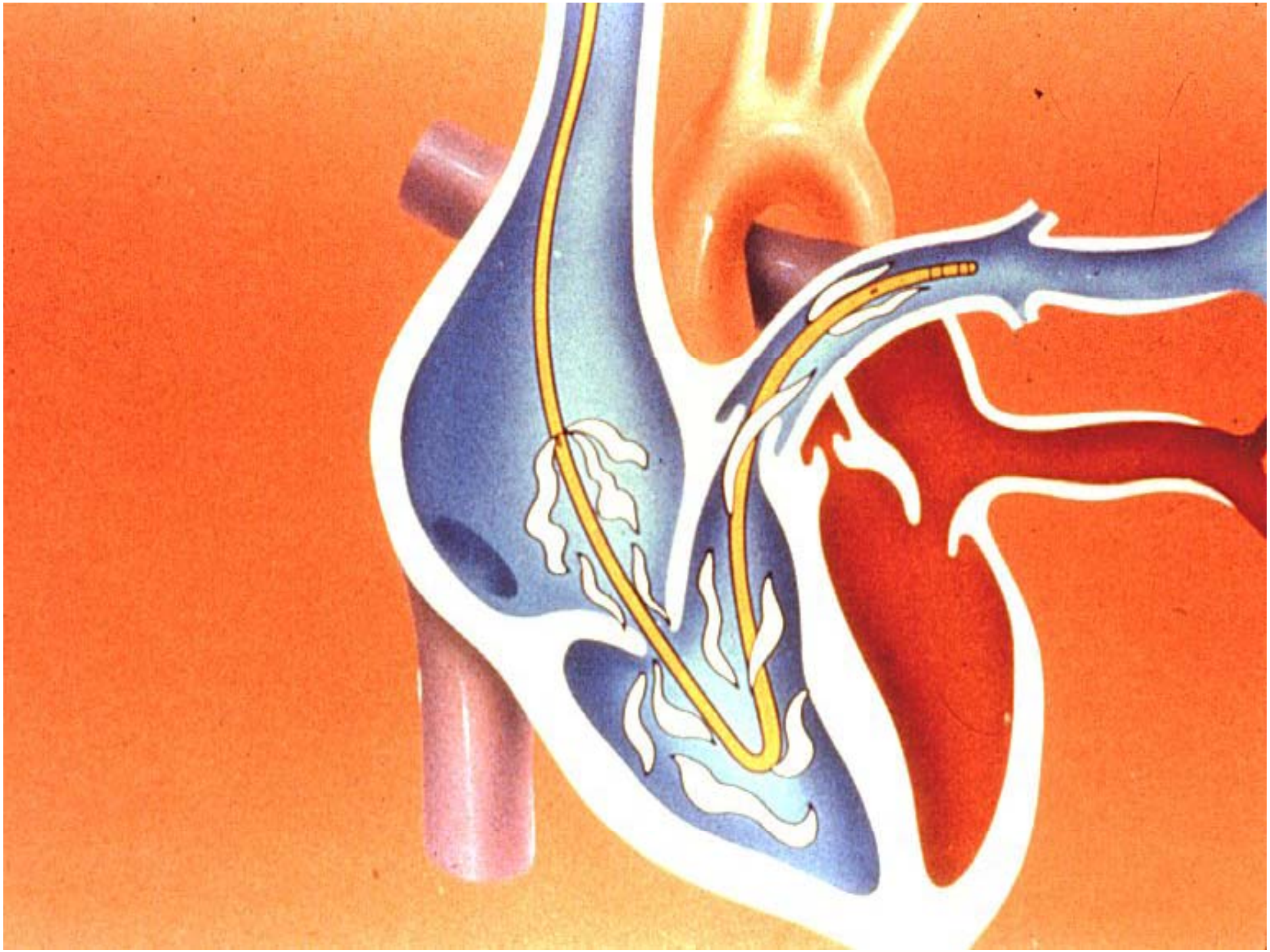
CO = 4 – 8 liters/min

CI = 2.5 – 4.0 liters/min/m^2

Thermodilution

General Principles





Technical Factors Necessary for Accurate Bolus CO

- Appropriate technique
- Appropriate catheter position
- Accurate temperature of the injectate
- Accurate volume of injectate
- Appropriate computation constant
- Consistent timing of injection
- Consistent averaging strategy

Appropriate Technique

- Steady, consistent injections
- 10 cc / 4 seconds

Appropriate Catheter Position

- Appropriate wedge tracing
- Balloon inflation volume: 1.25 - 1.5 cc
- Appropriate RA tracing

Accurate Temperature of the Injectate

- 1°C error in injectate temperature:

  2.7 % using 0°C (iced) injectate
  7.7% using 24°C (room temperature) injectate

  Levett J & Replogle RL; 1979

Accurate Injectate Volume

- A 0.5 ml error in a 5 ml injection will cause a 10% error.

Weissman, (1987) Measuring Oxygen Uptake.

Consistent Timing of Injection

- Issue of accuracy vs reproducibility
- Reproducibility: variation from respiratory cycle reduced.
- If CO determinations shot throughout the cycle: variance reported to be as high as 70%.

Jansen, 1981.

Case Studies: What has changed in this patient?

• C.O./C.I	2.4 / 1.50	4.91 / 3.07
• PAWP	13	14
• PAP (S/D)	36 / 18	40 / 15
• BP (S/D/M)	106 / 68 / 81	110 / 70 / 85
• HR	100	90
• RAP	6	7
• SVR	2643	1270

Computation Constant: Function of lumen size, injectate volume, injectate temperature

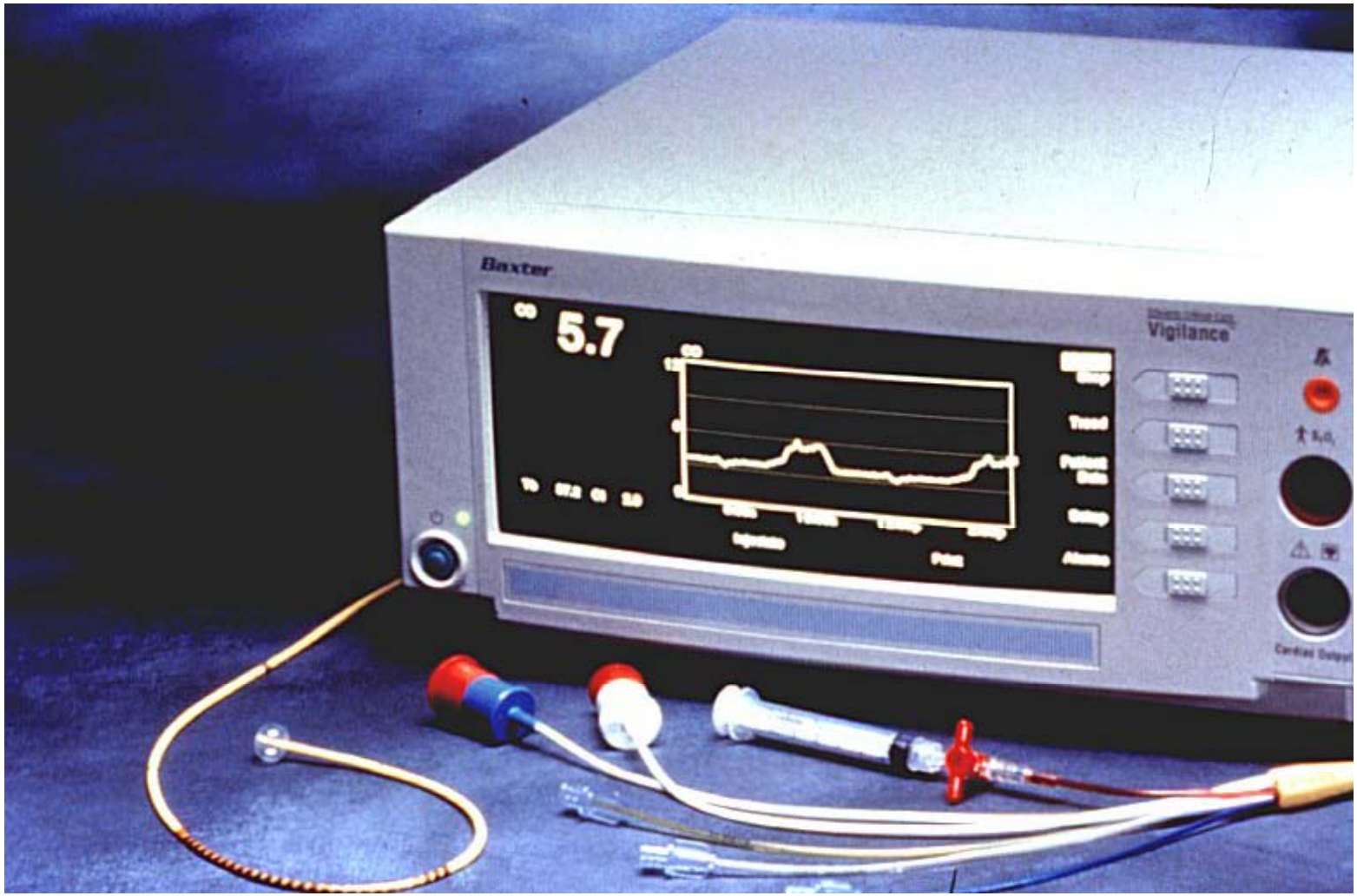
- During the night shift, the RN increased the volume of injectate from 5 to 10 cc to enhance reproducibility.
- CO Wrong x CC Right / CC Wrong
- 2.4 x 0.561 / 0.259 = 5.2

Consistent Averaging Strategy

- Delete values associated with poor curves, alerts.
- Attain triplicate measurements.
- Common practice: delete values outside a median value of 10%.

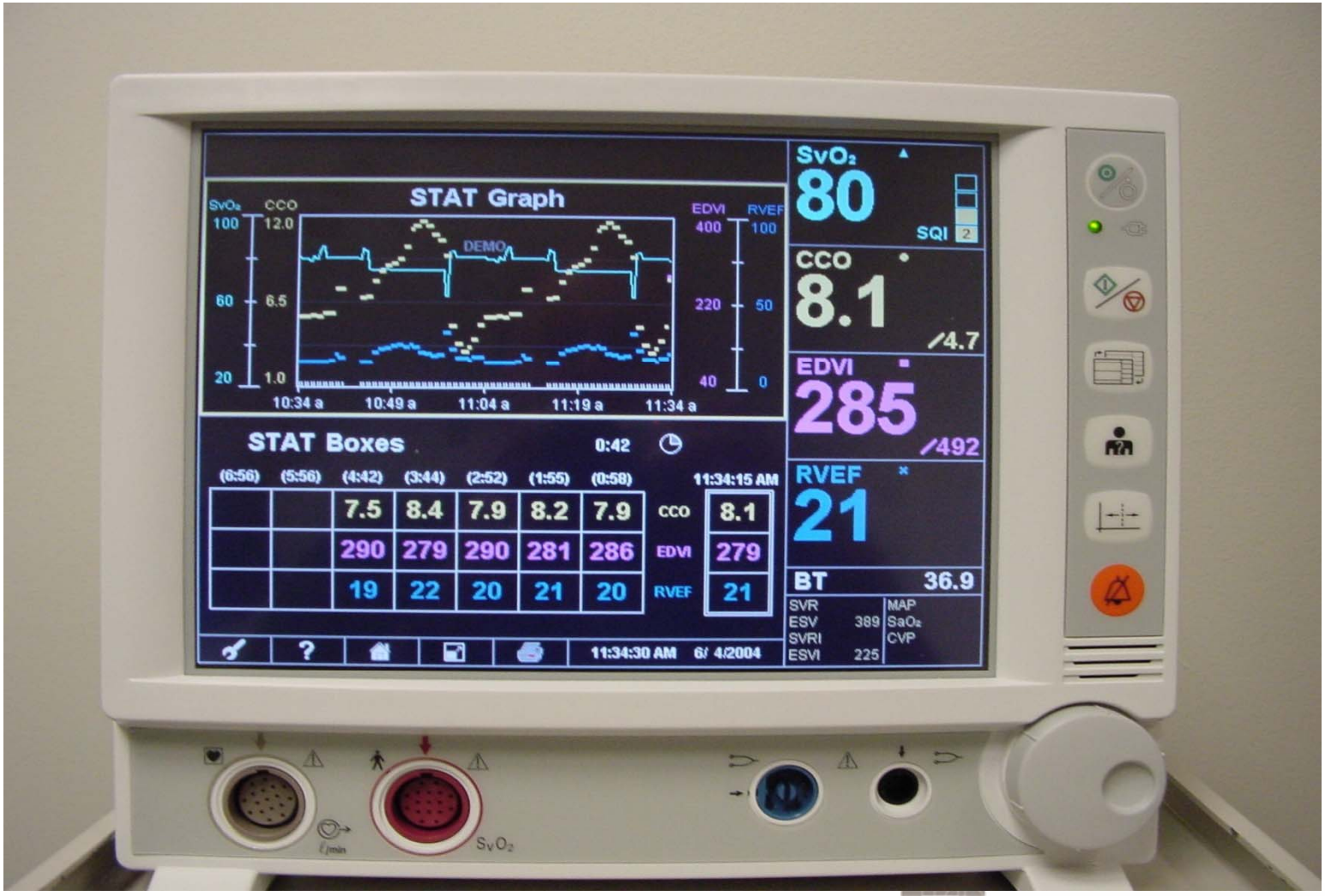
CONTINUOUS CARDIAC OUTPUT

Continuous Cardiac Output –Vigilance I



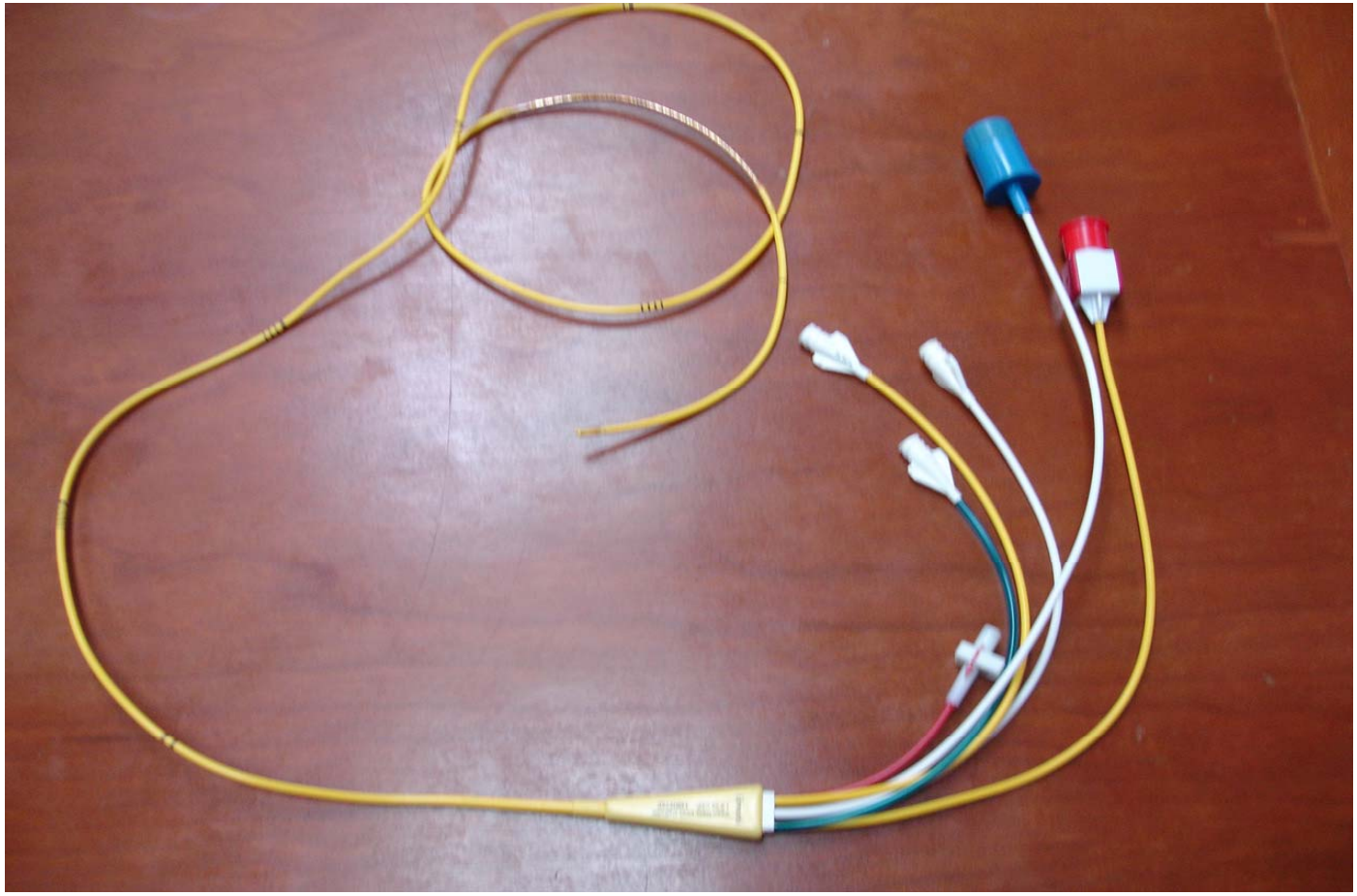
Edwards Lifesciences

Vigilance II



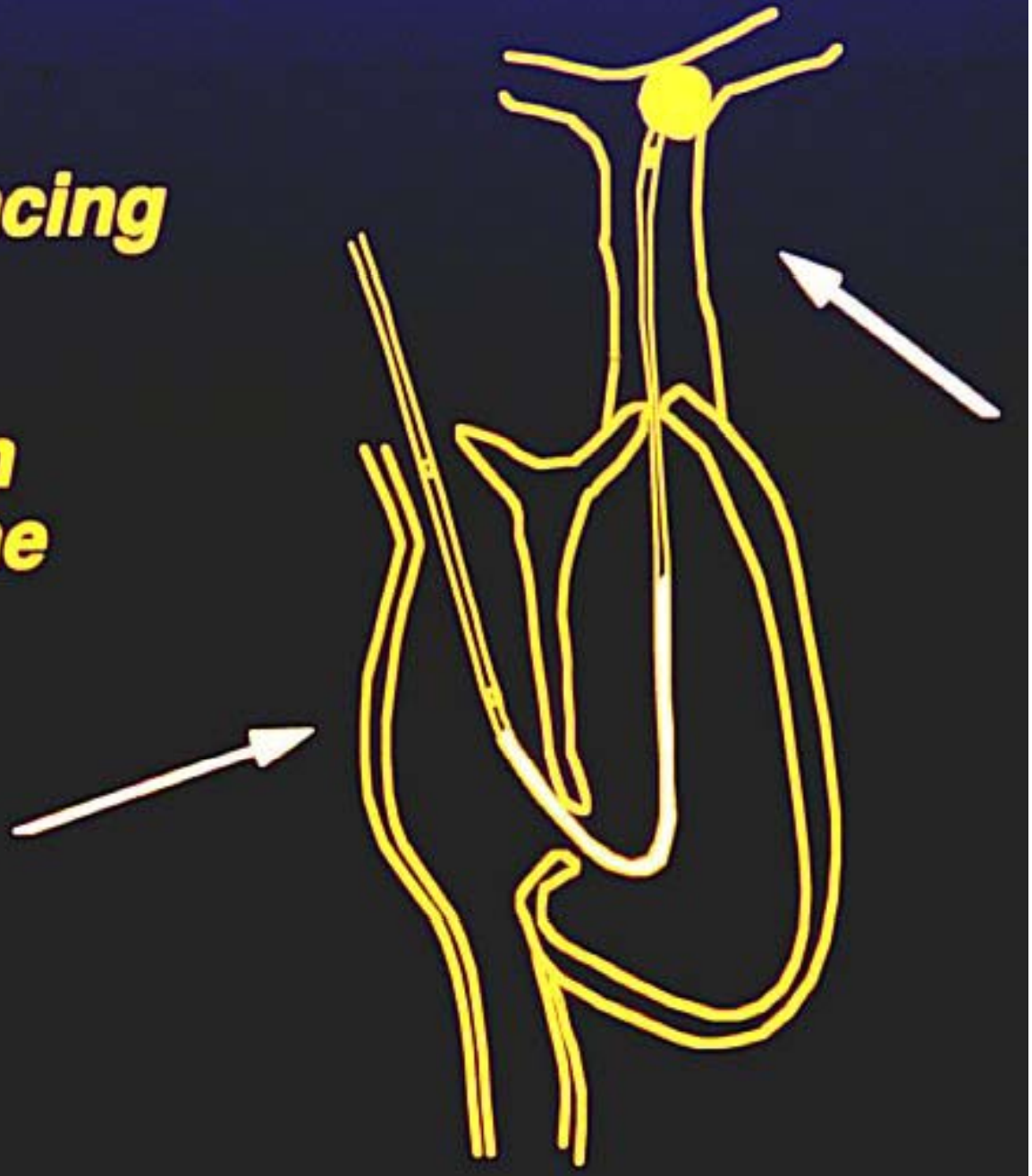
Edwards Lifesciences

Swan Ganz –CCO Catheter



Edwards Lifesciences

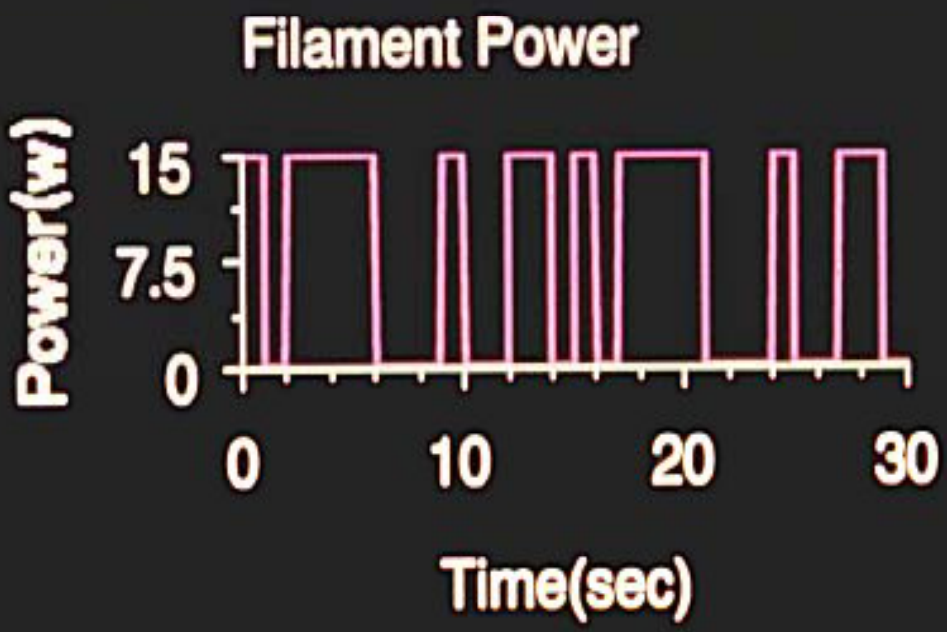
- Assess Right Atrial Tracing
- Assess PAWP
- Assess Balloon Inflation Volume



Input Signal

- Small energy signals (indicator) are infused directly into the blood in an apparently random (but actually repeating), on-off pattern.

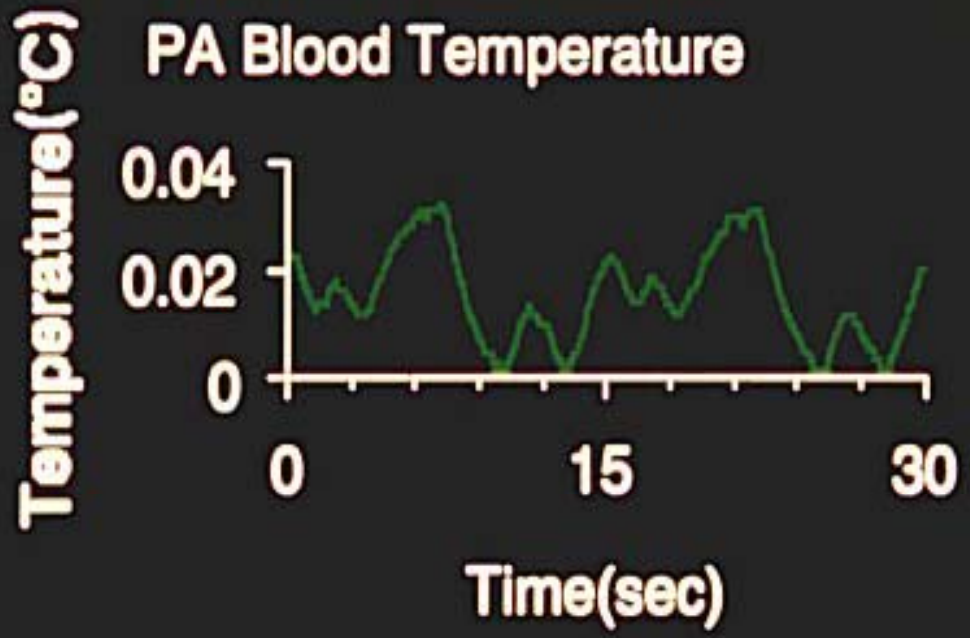
Random, on-off pattern

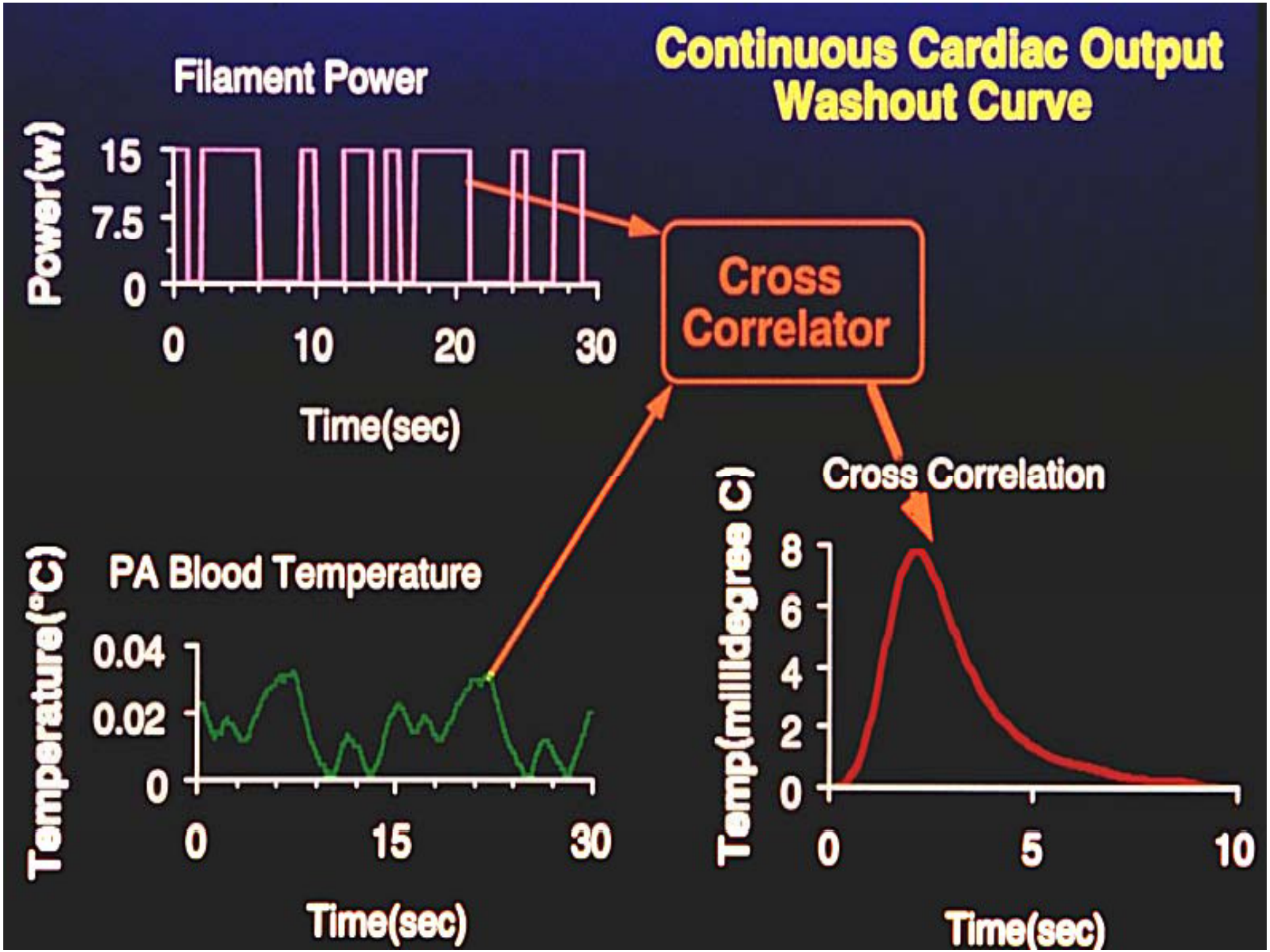


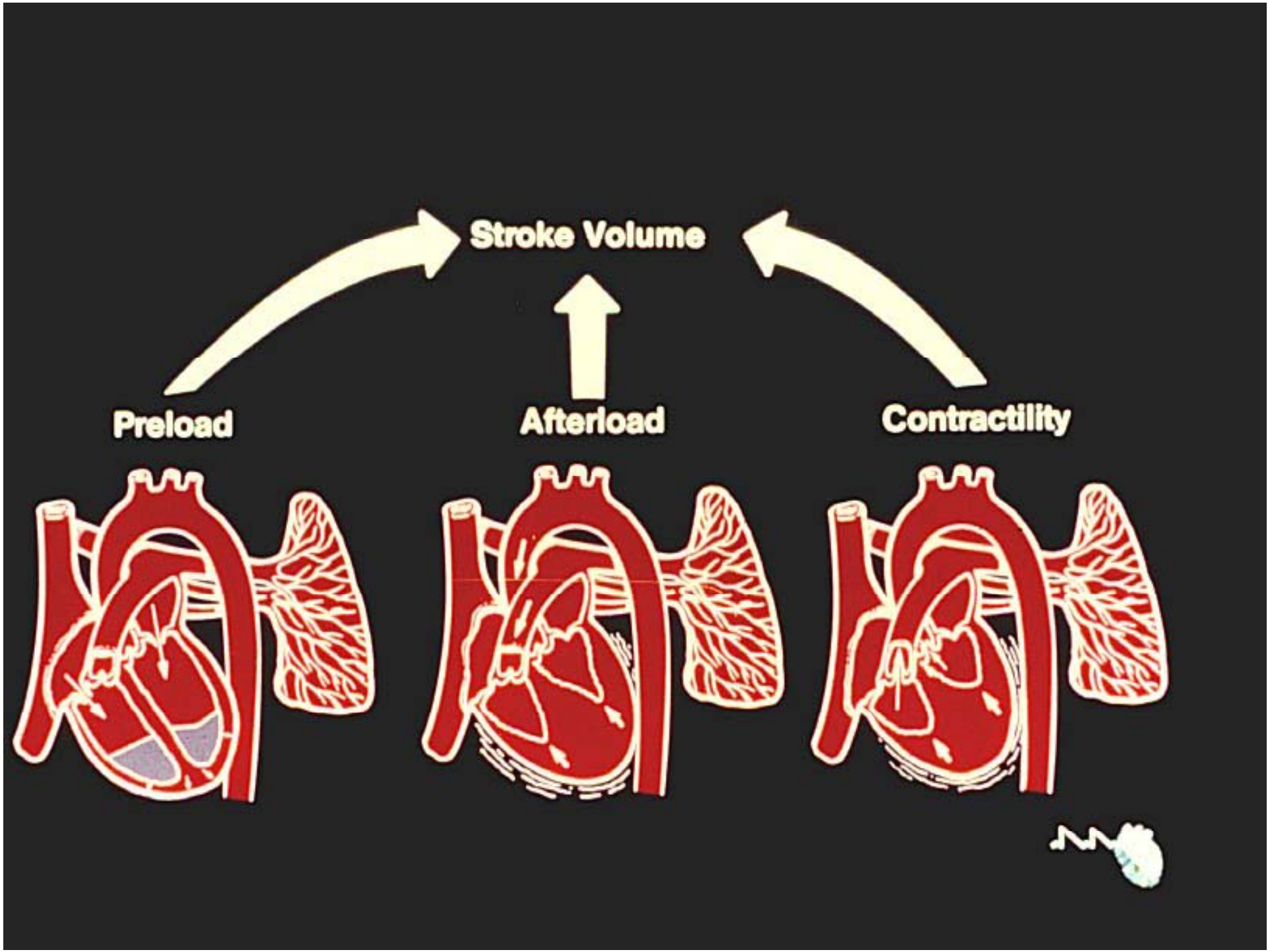
Output Signal

- The resulting blood temperature changes are detected at the thermistor in the pulmonary artery.

Pulmonary artery temperature changes




Continuous Cardiac Output
Washout Curve
Filament Power
Power(w)
15
7.5
0
0
10
20
30
Time(sec)
Cross
Correlator
Cross Correlation
PA Blood Temperature
Temperature(°C)
0.04
0.02
0
0
15
30
Time(sec)
Temp(milldegrees C)
8
6
4
2
0
0
5
10
Time(sec)


Stroke Volume
Preload
Afterload
Contractility

Swan Ganz –CCO /SVo2 /CEDV /EF

- Continuous cardiac output
- Mixed Venous oxygen satuaration
- Countinuous End diastolic volume
- Ejection Fraction

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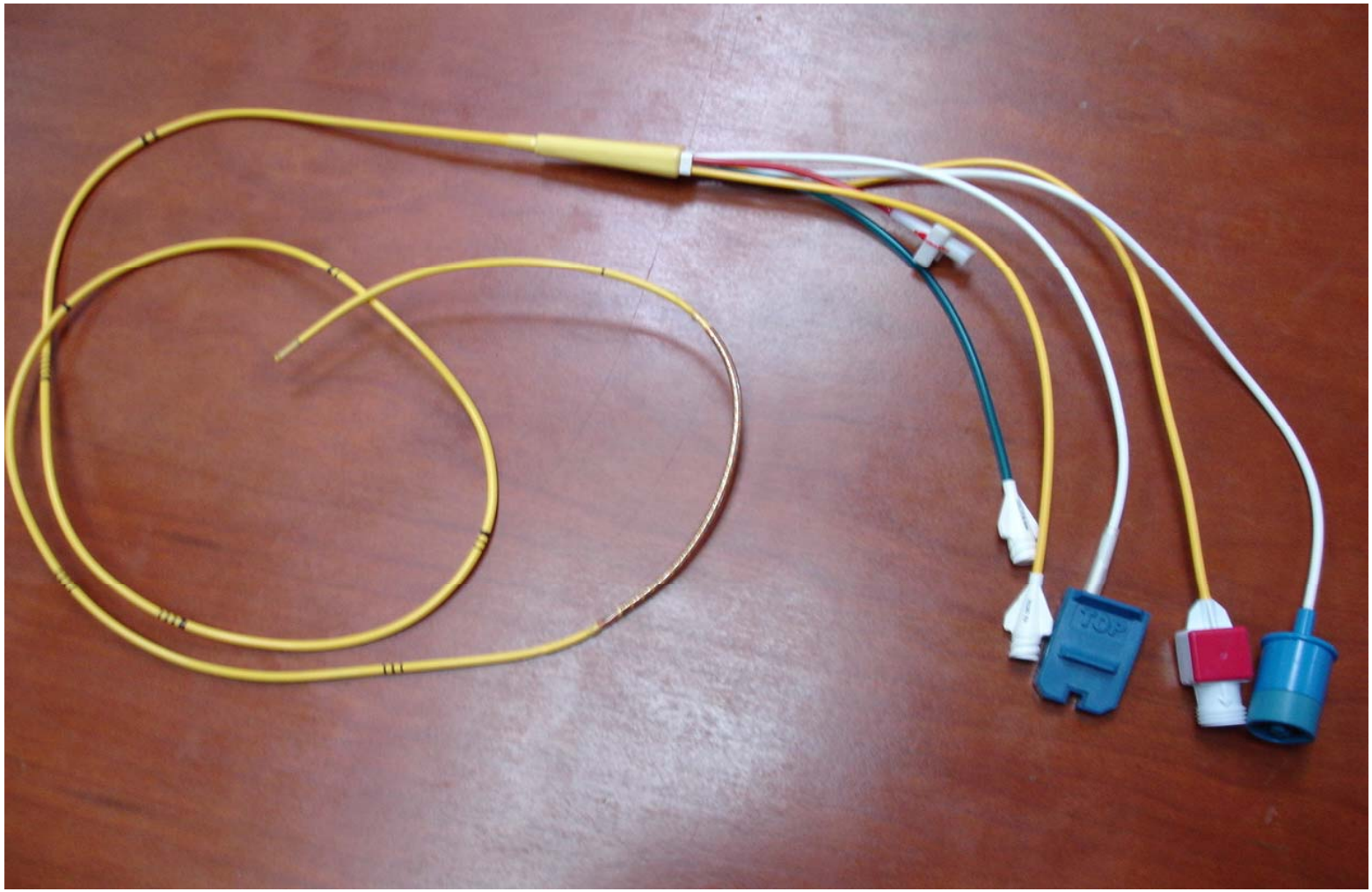
Swan Ganz – CCO/SVO2



Edwards Lifesciences

FloTrac Sensor
&
Vigileo Monitor

A New Platform for Minimally Invasive Hemodynamic Monitoring

Preecha Bhandtivej

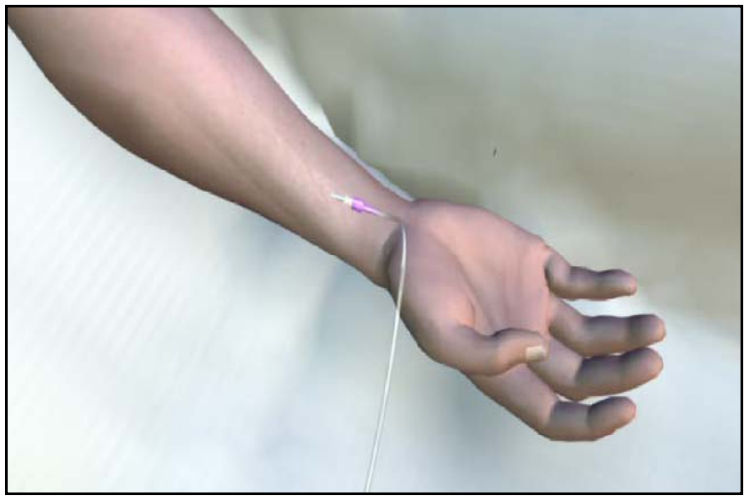
Minimally Invasive Monitoring

Vigileo Monitor

FloTrac Sensor

Edwards Lifesciences

FloTrac: Easy, Accurate and Convenient



- From a standard arterial line
- Monitors an important subset of parameters
  - Cardiac Output, Oxygenation
- Applicable to many more patients

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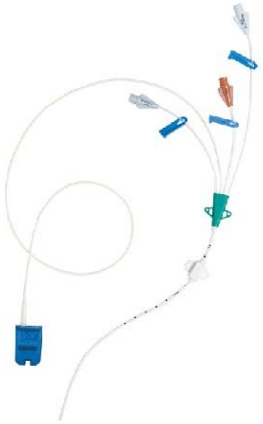
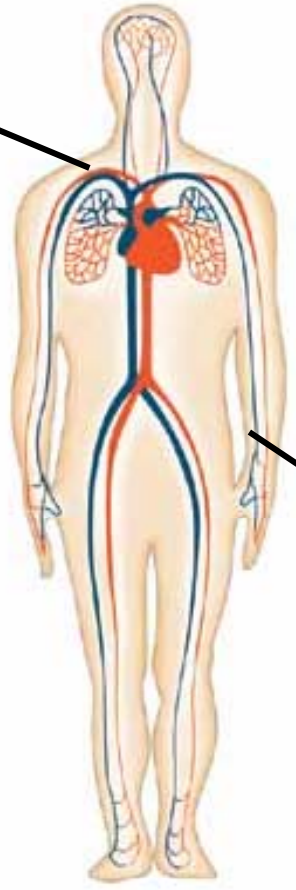
System Configuration

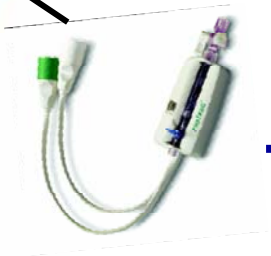
PreSEP Catheter
(central vein)





Oximetry

Vigileo
Instrument



Cardiac Output

FloTrac Sensor
(peripheral artery)

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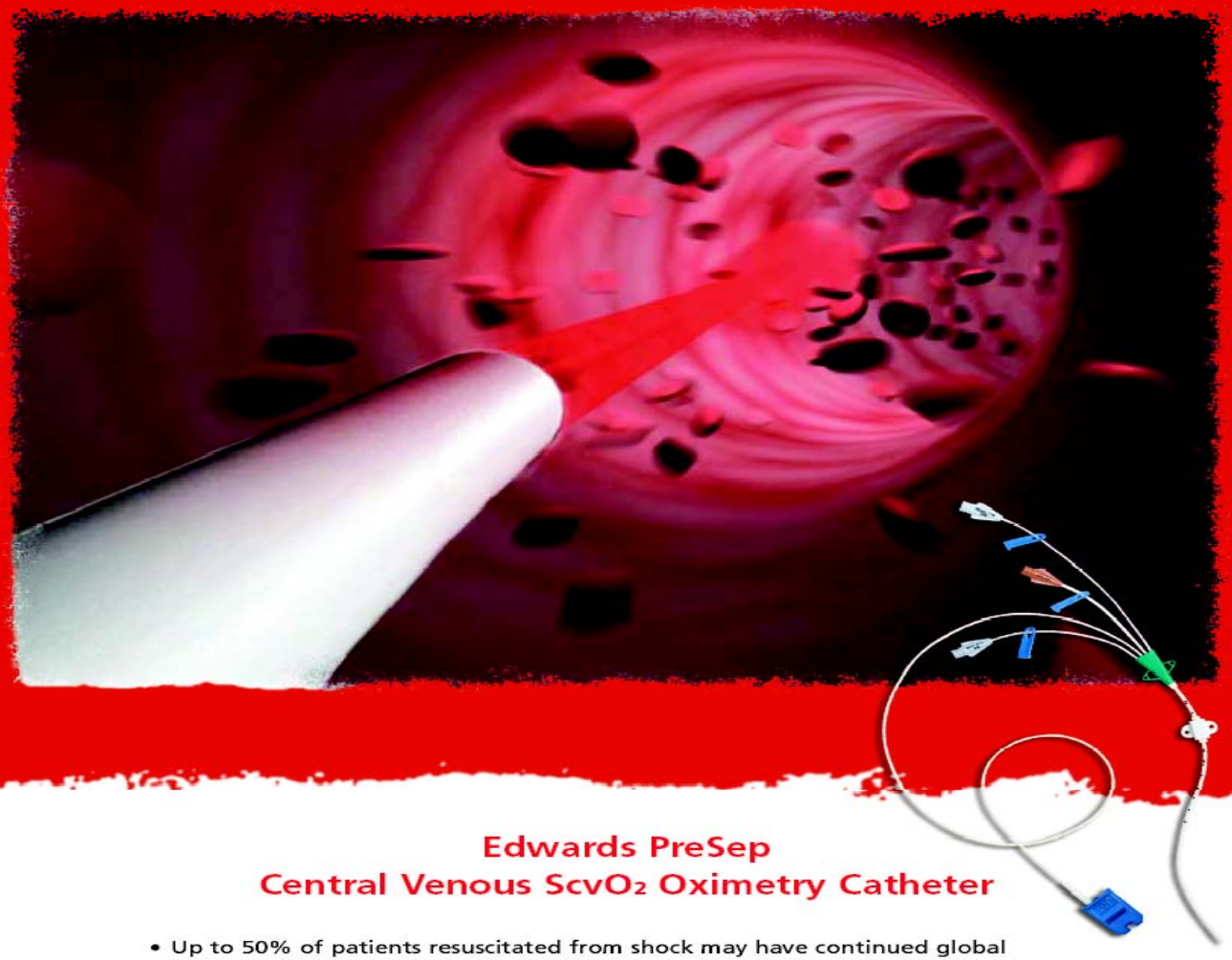

Edwards PreSep
Central Venous $ScvO_2$ Oximetry Catheter

- Up to 50% of patients resuscitated from shock may have continued global tissue hypoxia (i.e., increased lactate and decreased $ScvO_2$) even with the normalization of vital signs and central venous pressure[1]
- Reduced central blood volume is reflected more clearly with $ScvO_2$ than in CVP[2]
- $ScvO_2$ saturation is a reliable and sensitive method for detecting blood loss[3]

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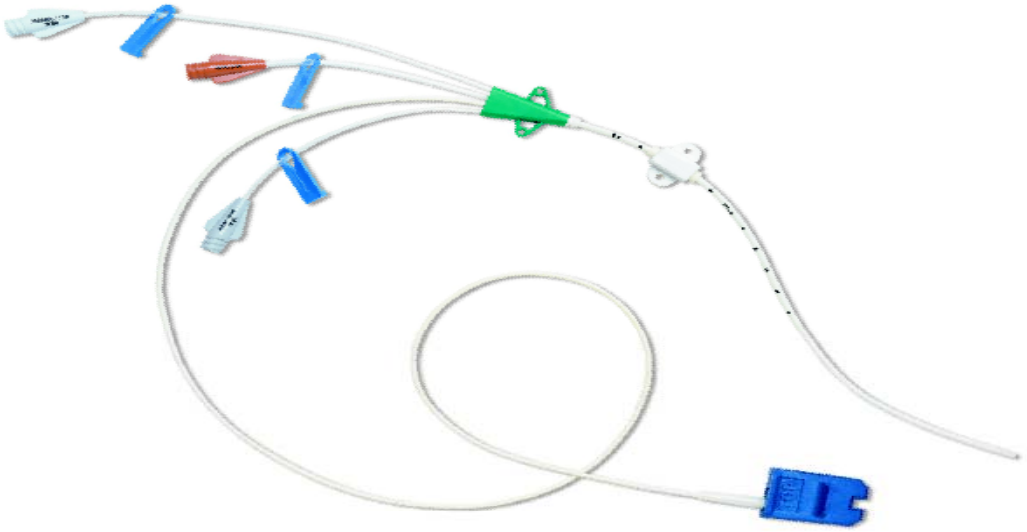
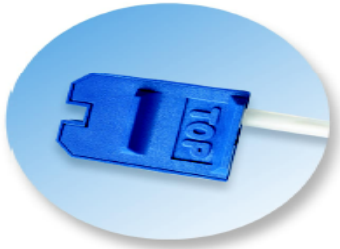
PreSep Central Venous Oximetry Catheter* Specifications:

Model Number	Lumens	Length (cm)	Size F (mm)	Continuous $ScvO_2$	Lumen Size Gauge (mm) Distal	Proximal	Medial	Recommended Dilator F (mm)	Minimum Guidewire Size Inch (mm)	AMC Thromboshield**
X3820HK	3	20	8.5 (2.83)	•	15 (1.77)	18 (1.33)	18 (1.33)	10.5 (3.5)	0.32 (0.8)	•
X3820K	3	20	8.5 (2.83)	•	15 (1.77)	18 (1.33)	18 (1.33)	10.5 (3.5)	0.32 (0.8)	
X3820HS***	3	20	8.5 (2.83)	•	15 (1.77)	18 (1.33)	18 (1.33)	10.5 (3.5)	0.32 (0.8)	•

*PreSep catheters are designed for use with Edwards Lifesciences SAT-2 device, Explorer monitor, Vigilance monitor and OM2 optics module to continuously monitor $ScvO_2$.
**All model numbers with an "H" contain AMC Thromboshield, an antibacterial heparin coating which decreases viable microbe count on surface of product during handling and placement.
*** Model numbers with an "S" do not contain xylocaine local anesthesia.





Compatible with Edwards Swan-Ganz SvO_2 Optics modules and computers
- *Vigilance monitor*
- *Explorer monitor*
- *SAT-2 device*

Soft Tip. Helps reduce the likelihood of complications resulting from vessel perforation.

$ScvO_2$ a sensative indicator of changes in:

Oxygenation:
FiO_2 Ventilation

Cardiac Output:
Heart Rate, Preload, Afterload, Contractililty

Hemoglobin
Bleeding, Hemodilution

Metabolic Demand
Shivering, Work of breathing, Fever, Seizures

References
1. Rivers M., et al. Central venous oxygen saturation monitoring in the critically ill patient. Curr Opin Crit Care 2001; 7(3):204-11
2. Madsen P et al., Central venous oxygen saturation during hypovolaemic shock in humans. Scand J Clin Lab Invest 1993; 53:67-72
3. Scalea TM et al., Central venous oxygen saturation: a useful clinical tool in trauma patients. J Trauma 1990; 30:1539-1543

Caution: Federal (USA) law restricts this device to sale by or on the order of a physician. See instructions for use for full prescribing information.

Edwards Lifesciences devices placed on the European market meeting the essential requirements referred to in Article 3 of the Medical Device Directive 93/42/EEC bear the CE marking of conformity.

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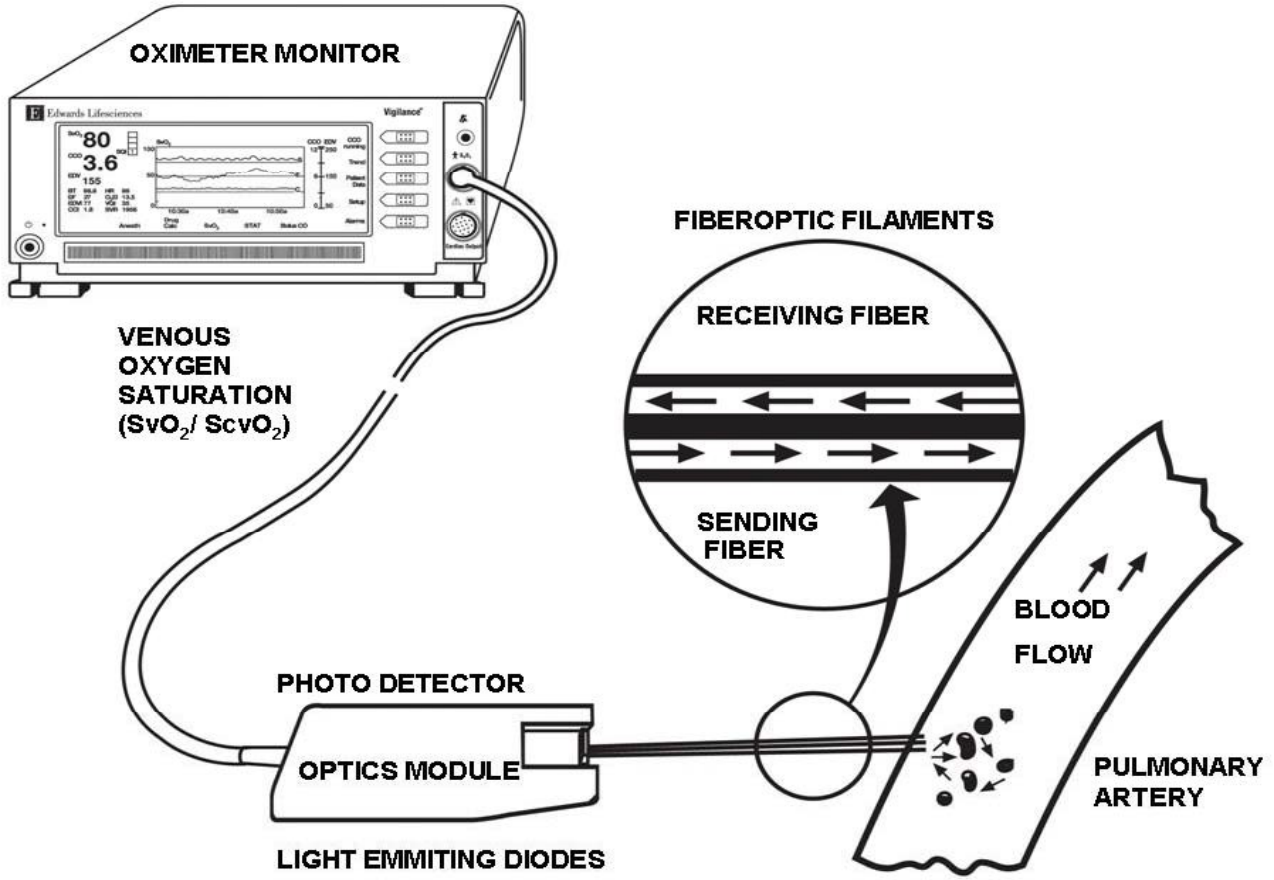
$ScvO_2$ measurement



Edwards Lifesciences

Sepsis, EGDT

Sepsis: Find it Fast. Manage it Early.

Edwards PreSep™ Central Venous Oximetry Catheter

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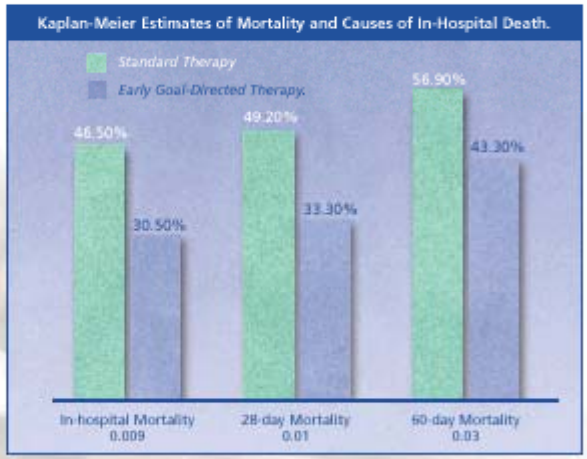
We observed a lower mortality rate in patients with septic shock assigned to early goal-directed therapy (42.3 percent) than in those assigned to standard therapy (56.8 percent)[2]

Early Goal-Directed Therapy (EGDT) with PreSep yields significant reductions in sepsis related mortality.



Results:[2]

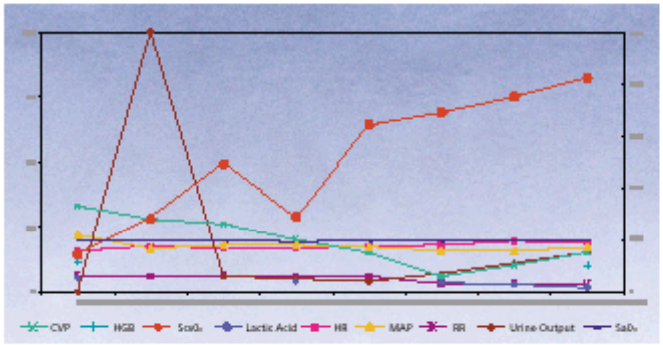
34% Reduction of in-hospital mortality

3.8 Reduction in hospital days

$12,000 Reduction in total hospital charges

Sepsis, EGDT

Case Study



History of Present Illness:

85-year-old male with a history of hypertension, atherosclerotic heart disease, and congestive heart failure. He presents with cough and shortness of breath that started while making breakfast. He became ill while visiting his wife in the hospital and decided to come to the Emergency Department from the hospital floors.

Physical Examination:

Temperature 34.5, pulse 84, blood pressure 150/98, respiratory rate 28. Elderly male who was awake, talkative, alert and in no acute distress.
HEENT: mild jugular venous distention at 30 degrees, dry mucous membranes.
LUNGS: crackles in the left lung base.
CARDIOVASCULAR: Regular rate and rhythm. No auscultatory murmur.
ABDOMEN: Mildly distended and tympanitic below the umbilicus.
RECTAL: Heme-negative, brown stool with very enlarged prostate.

Diagnosis:

1. Urosepsis secondary proteus mirabilis and obstructive uropathy.
2. Pneumonia – pseudomonas aeruginosa.
3. Mild Consumptive coagulopathy.
4. Decompensated heart failure-exascerbated by sepsis.
5. Acute renal insufficiency secondary to obstructive uropathy and acute tubular necrosis.

Hour	HR	MAP	CVP	RR	Urine Output	HGB	SaO2	ScvO2	Lactic Acid	Diagnostics and Medical Intervention
0	79	110	33	32	0	11.5	98.7	14	5.3	Chest x-ray positive for left lower lobe pneumonia. Foley catheter attempted but unsuccessful, urology consultation, increased CVP and pre-renal azotemia indicates myocardial insufficiency
1	88	83	28	30	500		99	28		Suprapubic catheterization performed, large amount of cloudy urine is present (post-obstructive diuresis), urinalysis positive for urinary tract infection. Antibiotics started for pneumonia and urinary tract infection. Dobutamine started at 2.5 mcg/kg/min
2	84	90	26	32	30		97	49		Dobutamine increased to 5 mcg/kg/min
3	83	89	20	28	25		98	29	4.1	Dobutamine increased to 7.5 mcg/kg/min. Sudden drop in ScvO2, patient became agitated, tachypneic which necessitated intubation and mechanical ventilation
4	88	87	15	30	20		98	64		Patient sedated and dobutamine increased to 10 mcg/kg/min
5	90	79	6	16	35		97	69	3.6	Fluid challenge given and dobutamine increased to 12.5 ug/kg/min
6	97	79	10	16	55		99	75	2.9	Repeat fluid challenge and additional sedation provided
7	95	85	15	16	75	10	99	82	1.5	Patients transported to the intensive care unit, extubated 3 days later and discharged 7 days later to home

Sepsis patients may be at high risk of irreversible organ failure, even in the presence of normal vital signs.

"Up to 50% of patients resuscitated from shock may have continued global tissue hypoxia (i.e. increased lactate and decreased $ScvO_2$) even with the normalization of vital signs and central venous pressure."[3]

Protocol for Early Goal-Directed Therapy for Sepsis.

"The early identification of patients with insidious illness (global tissue hypoxia accompanied by stable vital signs) makes possible the early implementation of goal directed therapy...we conclude that goal-directed therapy provided at the earliest stages of severe sepsis and septic shock... has significant short-term and long-term benefits."[3]

Screen Early for At-Risk Patients:

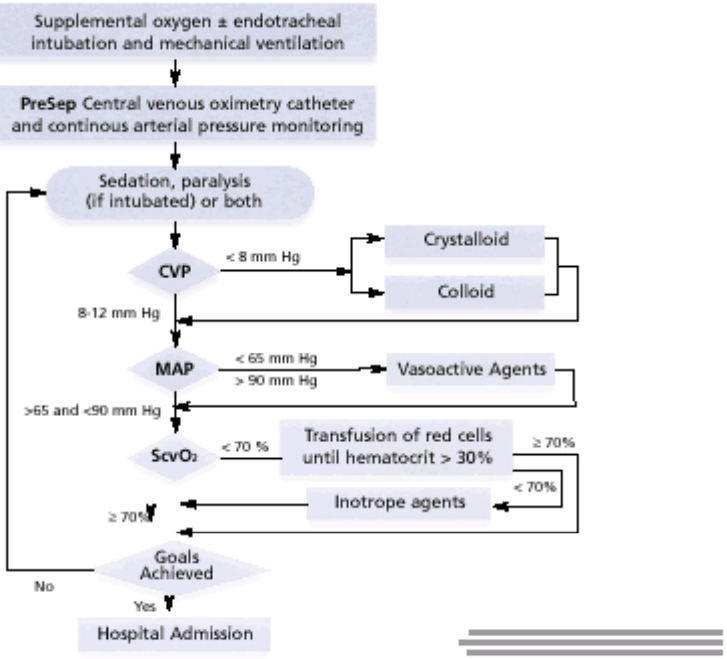
2 Signs of the Systemic Inflammatory Response Syndrome (SIRS) +

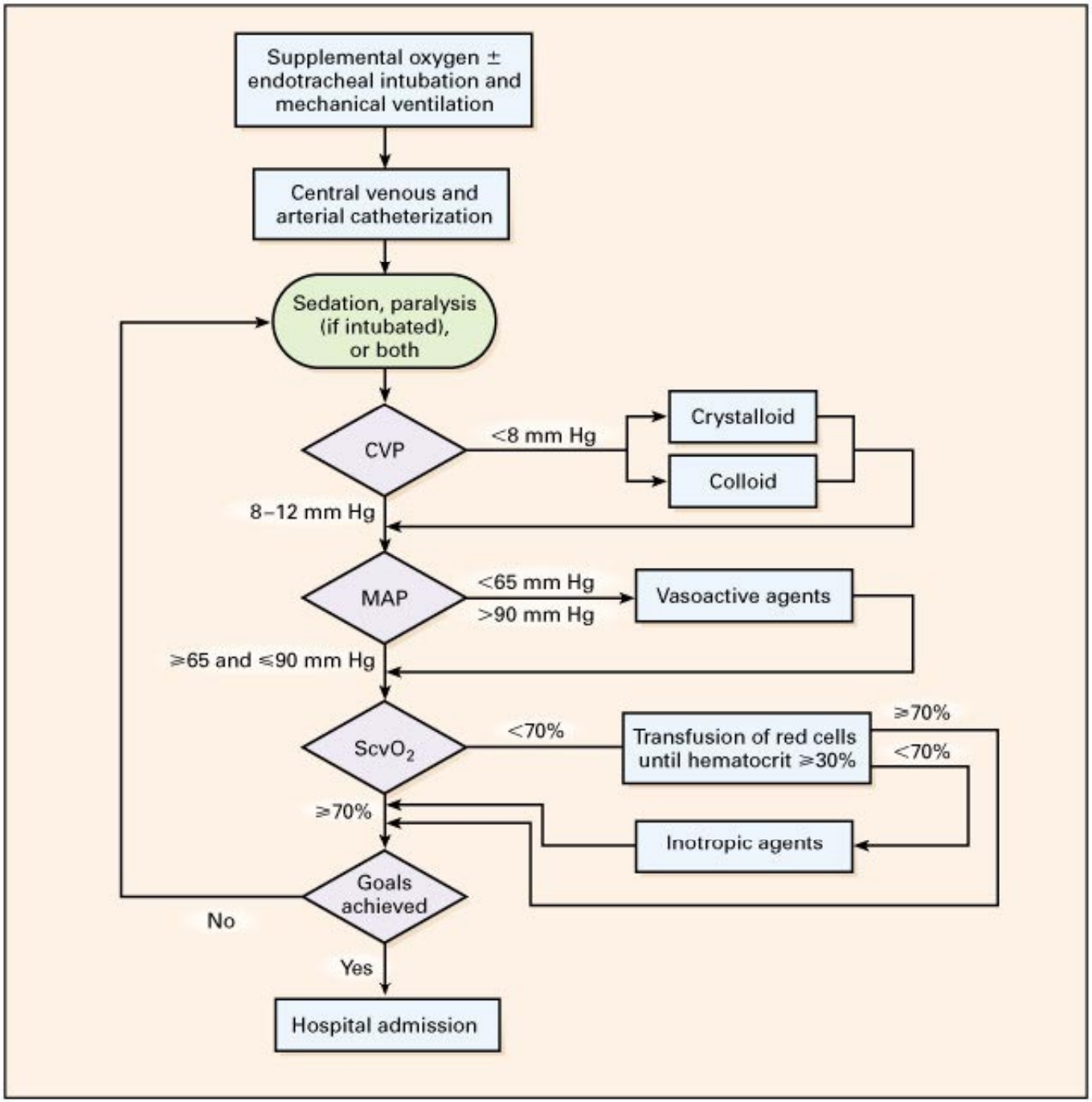
Temp C° < 36°C or > 38°
HR > 90 beats per/m
Resp > 20 breaths per/m
WBC > 12.0 x 109/liter (L)

Sign of Global Tissue Hypoxia

SBP < 90 mm Hg
or
Lactate 4 mmol/L

Early Treatment:




Supplemental oxygen ± endotracheal intubation and mechanical ventilation
Central venous and arterial catheterization
Sedation, paralysis (if intubated), or both
CVP
<8 mm Hg
Crystalloid
Colloid
8–12 mm Hg
MAP
<65 mm Hg
>90 mm Hg
Vasoactive agents
≥65 and ≤90 mm Hg
ScvO2
<70%
Transfusion of red cells until hematocrit ≥30%
≥70%
<70%
≥70%
Inotropic agents
Goals achieved
No
Yes
Hospital admission

Parameters

Label	Parameter	Range/Units
CO	Arterial Pressure Cardiac Output	1.0 - 20.0 L/min
$ScvO_2$**	Central Venous Oxygen Saturation	0 - 99%
SvO_2**	Mixed Venous Oxygen Saturation	0 - 99%
CI	Cardiac Index	0 - 20.0 L/min/m^2
SV	Stroke Volume	0 - 300 ml/beat
SVI	Stroke Volume Index	0 - 200 ml/beat m^2
SVV	Stroke Volume Variation	0 - 99%
SVR	Systemic Vascular Resistance	0 - 3,000 dynes-sec/cm^5 (0 - 300.0 kPa-sec/l)
SVRI	Systemic Vascular Resistance Index	0 - 6,000 dynes-sec-m^2/cm^5 (0 - 600.0 kPa-sec-m^2/l)

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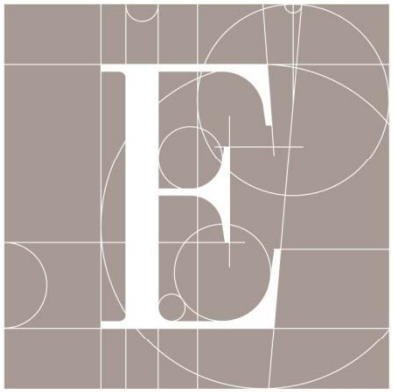

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Helping patients is our life's work, and *life is now*

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