

# Vascular access in Apheresis Procedures

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# Vascular access in Apheresis Procedures

- Definition
- Access possibilities
- Needle sizes
- side effects




# Vascular access in Apheresis Procedures






## Adverse reactions

(Related to donor and patient apheresis)




Uw ziekenhuis.

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Hans Vrieling




## Anatomy

(Related to apheresis)



Uw ziekenhuis.

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# Definition

## Vascular access

The ability to enter the vascular system; the ease with which the vascular system can be entered for administering therapy or obtaining blood.

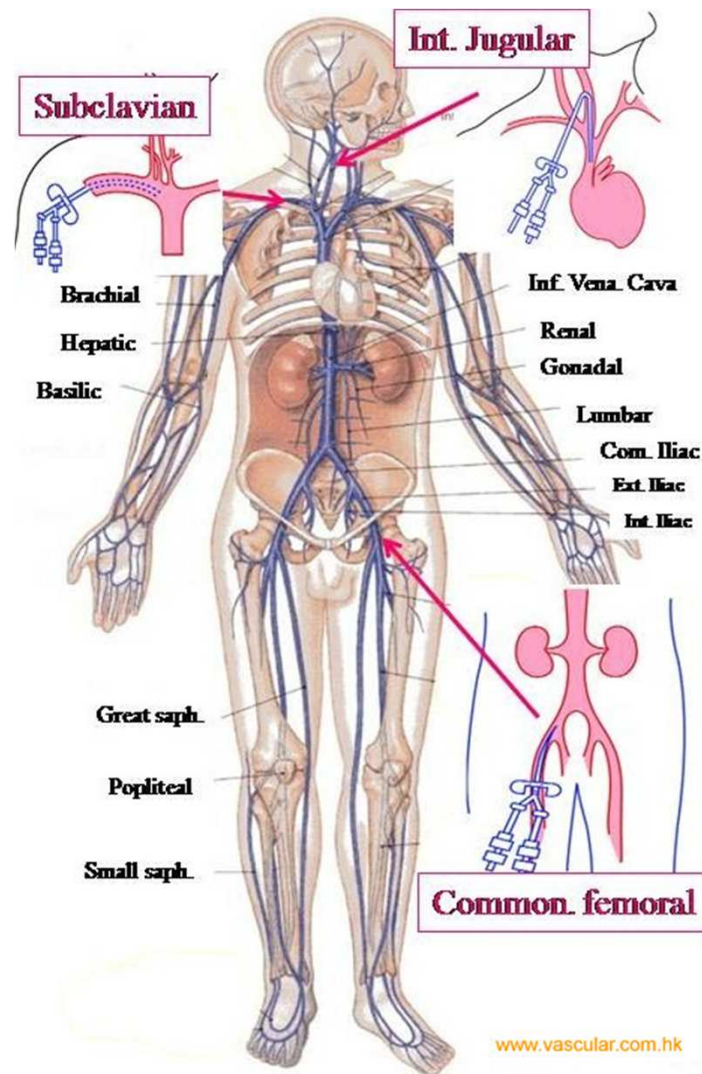
## Reserved act

proven theoretical and practical medical knowledge

declaration of competence for infusion insertion and cvc care

Every 5 years renewal

# Access possibilities





# Donor or patient

(Un) related donor

Patient

europ  
donor

Donorweek 13 t/m 19 oktober



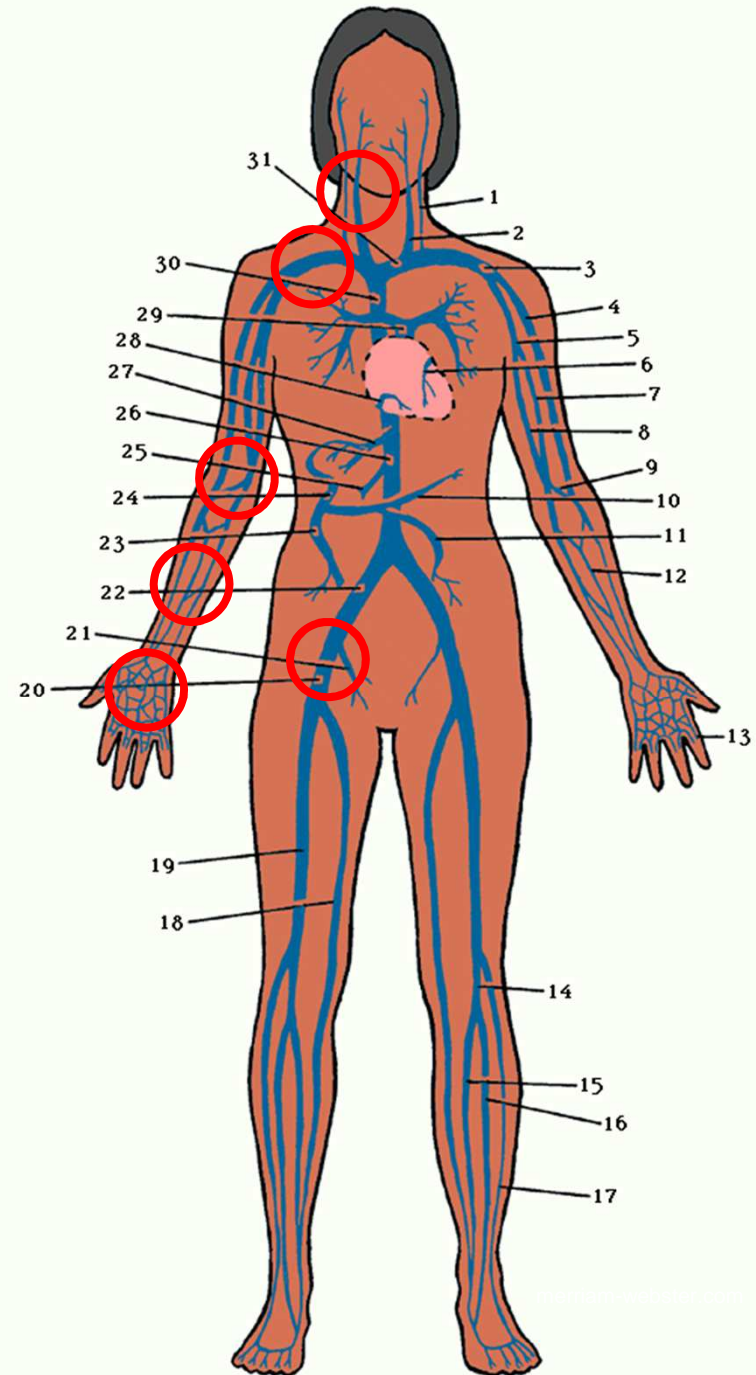
Mijn stamcellen  
tegen leukemie

**Geef kans op leven.  
Word ook **stamceldonor.****

Meer info en/of aanmelden: [www.wordstamceldonor.nl](http://www.wordstamceldonor.nl)

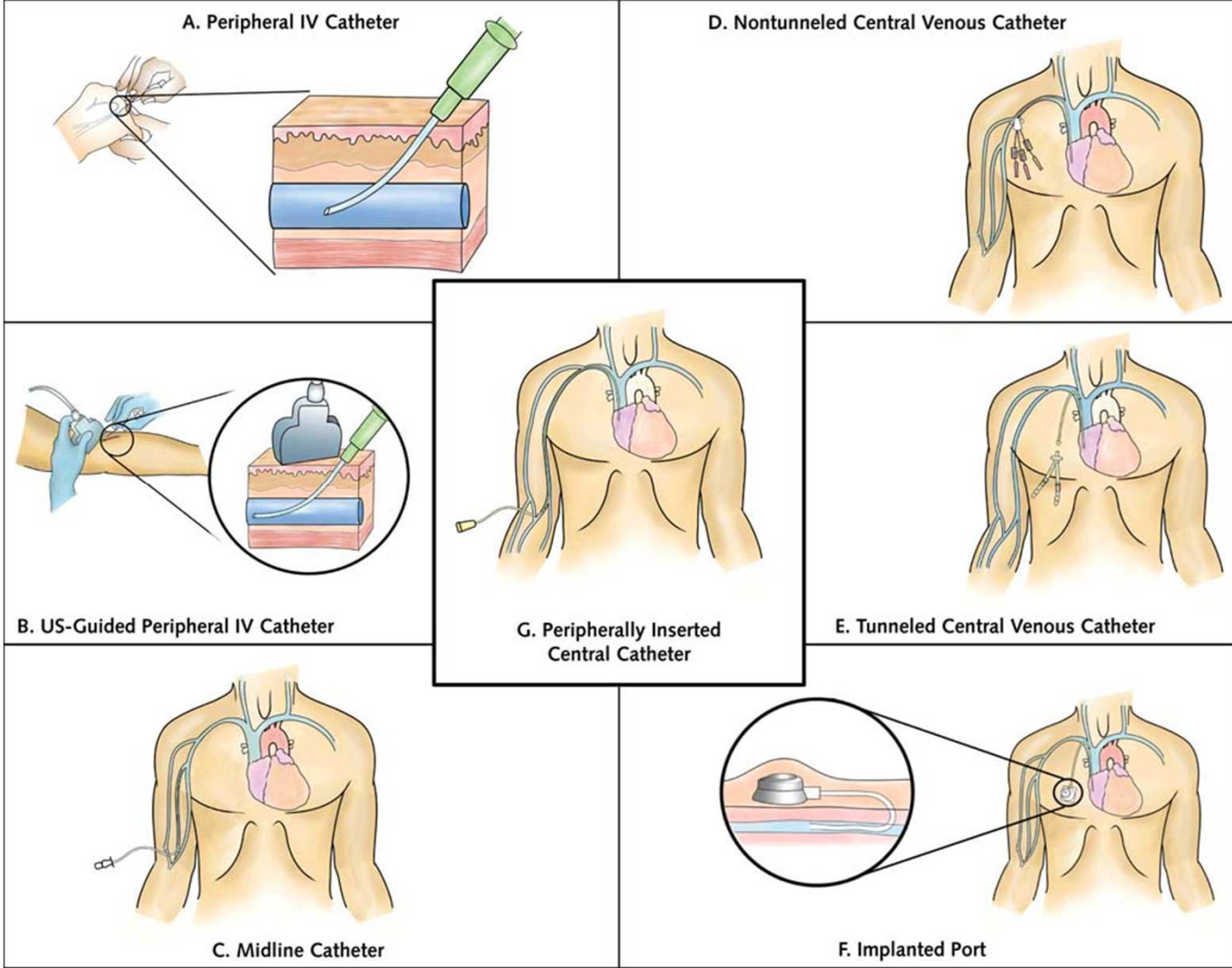
# Venipunctures

- Forearm
- Fossa Cubiti
- Subclavian vein
- Internal Jugular vein
- Femoral vein





# Access possibilities



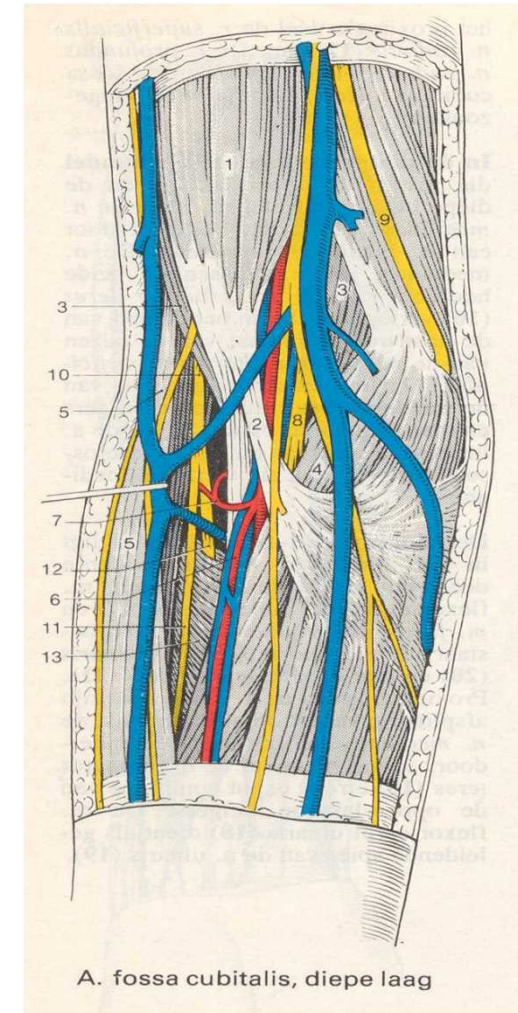
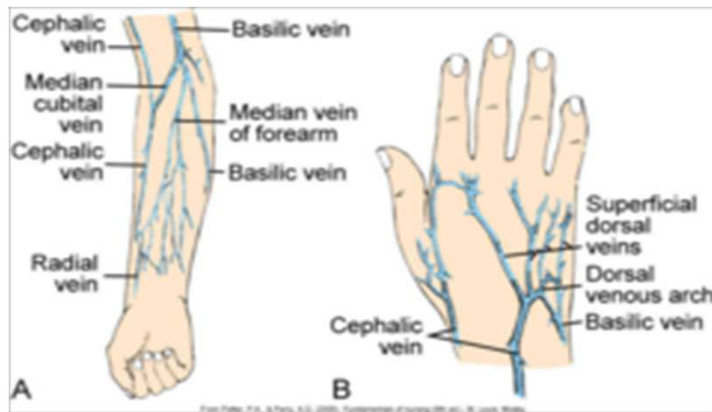


# Access possibilities

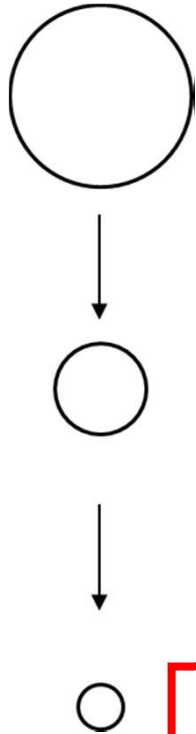
Good access ➔ sufficient blood flow

What access you use depends on:

- the veins of the patient
- the procedure you're going to run
- the competence of the nurses
- the competence of the medical staff
- the materials the hospital supplies



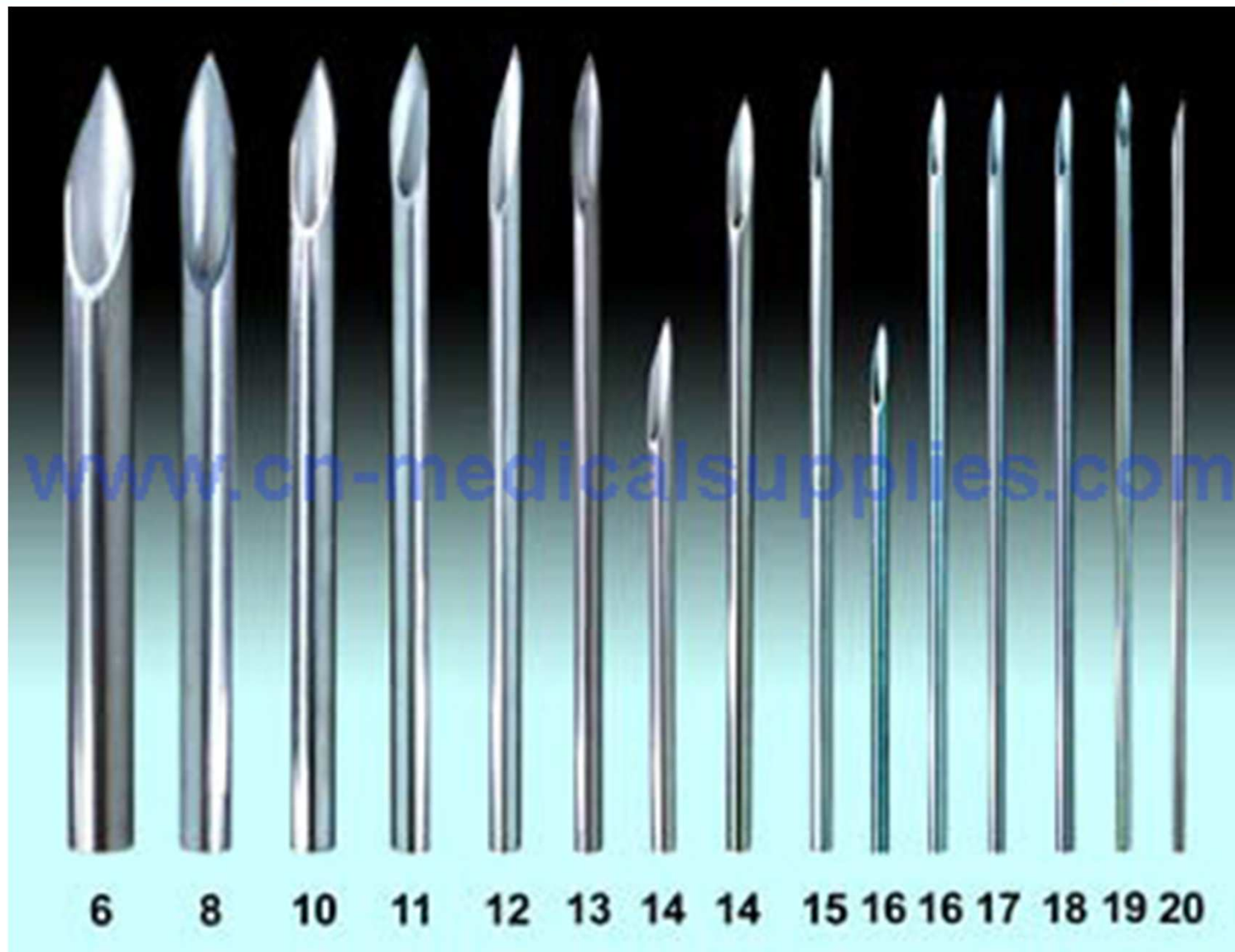
# Needle size



| Needle<br><i>Gauge</i> | Nominal Outer Diameter |           |   | Nominal Inner Diameter |           |   | Nominal Wall Thickness |           |   |
|------------------------|------------------------|-----------|---|------------------------|-----------|---|------------------------|-----------|---|
|                        | <i>inches</i>          | <i>mm</i> | <i>tol.</i><br><i>inches</i><br><i>(mm)</i> | <i>inches</i>          | <i>mm</i> | <i>tol.</i><br><i>inches</i><br><i>(mm)</i> | <i>inches</i>          | <i>mm</i> | <i>tol.</i><br><i>inches</i><br><i>(mm)</i> |
| 7                      | 0.180                  | 4.572     | ±0.001<br>(±0.025)                          | 0.150                  | 3.810     | ±0.003<br>(±0.076)                          | 0.015                  | 0.381     | ±0.001<br>(±0.025)                          |
| 8                      | 0.165                  | 4.191     | ±0.001<br>(±0.025)                          | 0.135                  | 3.429     | ±0.003<br>(±0.076)                          | 0.015                  | 0.381     | ±0.001<br>(±0.025)                          |
| 9                      | 0.148                  | 3.759     | ±0.001<br>(±0.025)                          | 0.118                  | 2.997     | ±0.003<br>(±0.076)                          | 0.015                  | 0.381     | ±0.001<br>(±0.025)                          |
| 10                     | 0.134                  | 3.404     | ±0.001<br>(±0.025)                          | 0.106                  | 2.692     | ±0.003<br>(±0.076)                          | 0.014                  | 0.356     | ±0.001<br>(±0.025)                          |
| 11                     | 0.120                  | 3.048     | ±0.001<br>(±0.025)                          | 0.094                  | 2.388     | ±0.003<br>(±0.076)                          | 0.013                  | 0.330     | ±0.001<br>(±0.025)                          |
| 12                     | 0.109                  | 2.769     | ±0.001<br>(±0.025)                          | 0.085                  | 2.159     | ±0.003<br>(±0.076)                          | 0.012                  | 0.305     | ±0.001<br>(±0.025)                          |
| 13                     | 0.095                  | 2.413     | ±0.001<br>(±0.025)                          | 0.071                  | 1.803     | ±0.003<br>(±0.076)                          | 0.012                  | 0.305     | ±0.001<br>(±0.025)                          |
| 14                     | 0.083                  | 2.108     | ±0.001<br>(±0.025)                          | 0.063                  | 1.600     | ±0.003<br>(±0.076)                          | 0.01                   | 0.254     | ±0.001<br>(±0.025)                          |
| 15                     | 0.072                  | 1.829     | ±0.0005<br>(±0.013)                         | 0.054                  | 1.372     | ±0.0015<br>(±0.038)                         | 0.009                  | 0.229     | ±0.0005<br>(±0.013)                         |
| 16                     | 0.065                  | 1.651     | ±0.0005<br>(±0.013)                         | 0.047                  | 1.194     | ±0.0015<br>(±0.038)                         | 0.009                  | 0.229     | ±0.0005<br>(±0.013)                         |
| 17                     | 0.058                  | 1.473     | ±0.0005<br>(±0.013)                         | 0.042                  | 1.067     | ±0.0015<br>(±0.038)                         | 0.008                  | 0.203     | ±0.0005<br>(±0.013)                         |
| 18                     | 0.050                  | 1.270     | ±0.0005<br>(±0.013)                         | 0.033                  | 0.838     | ±0.0015<br>(±0.038)                         | 0.0085                 | 0.216     | ±0.0005<br>(±0.013)                         |
| 19                     | 0.042                  | 1.067     | ±0.0005<br>(±0.013)                         | 0.027                  | 0.686     | ±0.0015<br>(±0.038)                         | 0.0075                 | 0.191     | ±0.0005<br>(±0.013)                         |
| 20                     | 0.03575                | 0.9081    | ±0.00025<br>(±0.0064)                       | 0.02375                | 0.603     | ±0.00075<br>(±0.019)                        | 0.006                  | 0.1524    | ±0.00025<br>(±0.0064)                       |

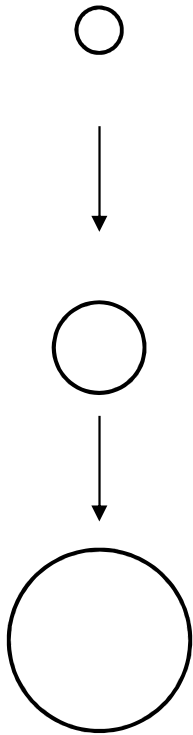


# Needle size



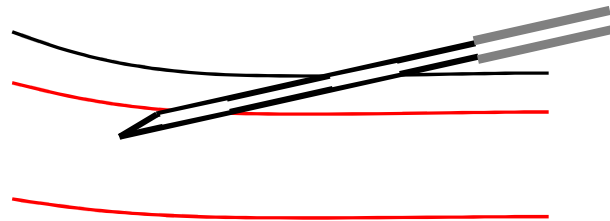
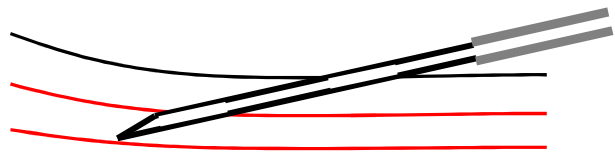


# Needle size

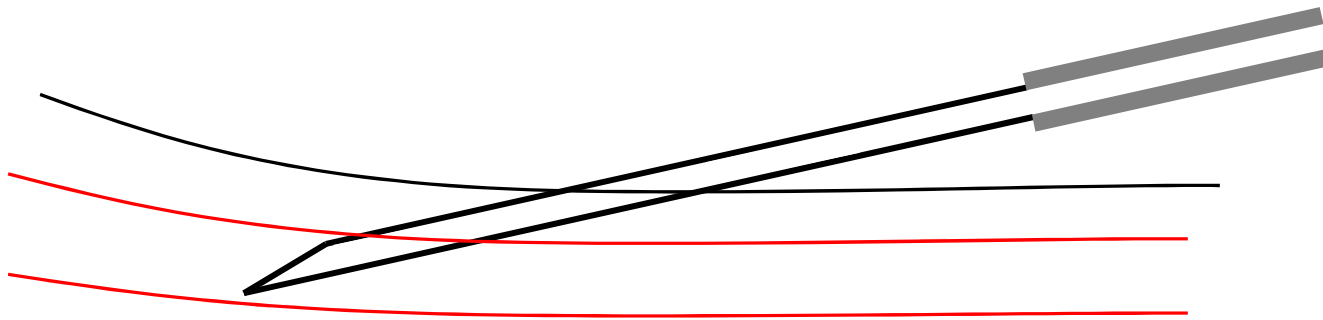


| French Gauge | Diameter (mm) | Diameter (inches) |
|--------------|---------------|-------------------|
| 3            | 1             | 0.039             |
| 4            | 1.33          | 0.053             |
| 5            | 1.67          | 0.066             |
| 6            | 2             | 0.079             |
| 7            | 2.3           | 0.092             |
| 8            | 2.7           | 0.105             |
| 9            | 3             | 0.118             |
| 10           | 3.3           | 0.131             |
| 11           | 3.7           | 0.144             |
| 12           | 4             | 0.158             |
| 13           | 4.3           | 0.170             |
| 14           | 4.7           | 0.184             |
| 15           | 5             | 0.197             |
| 16           | 5.3           | 0.210             |
| 17           | 5.7           | 0.223             |
| 18           | 6             | 0.236             |
| 19           | 6.3           | 0.249             |
| 20           | 6.7           | 0.263             |
| 22           | 7.3           | 0.288             |
| 24           | 8             | 0.315             |
| 26           | 8.7           | 0.341             |
| 28           | 9.3           | 0.367             |
| 30           | 10            | 0.393             |
| 32           | 10.7          | 0.419             |
| 34           | 11.3          | 0.445             |

# Peripheral venous access

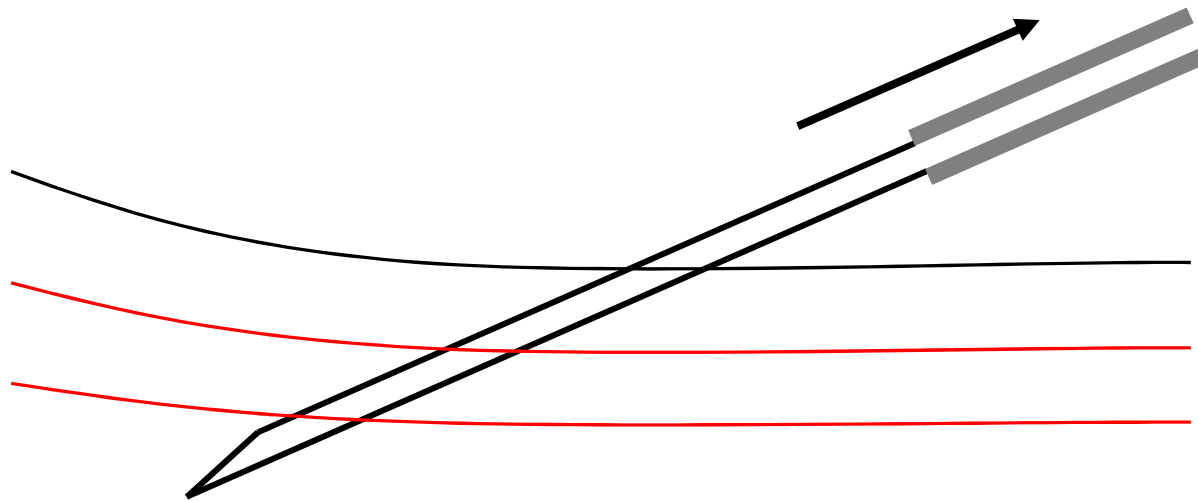


# Peripheral venous access

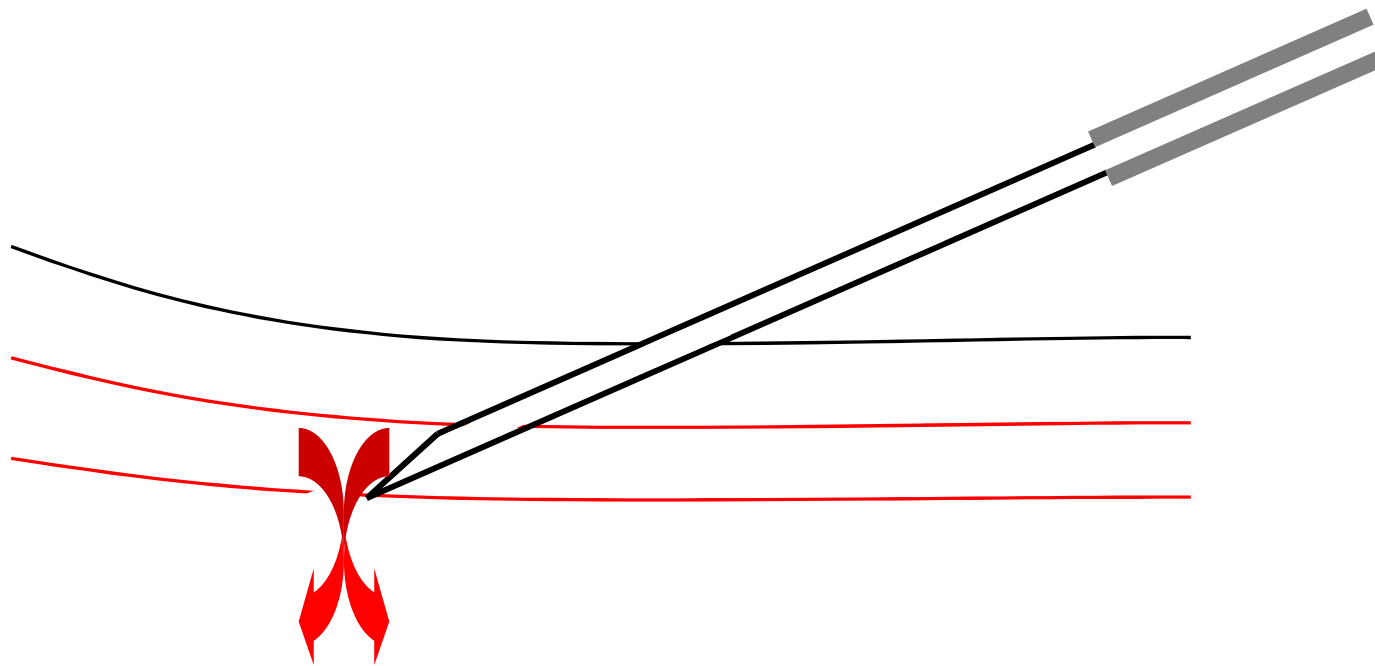




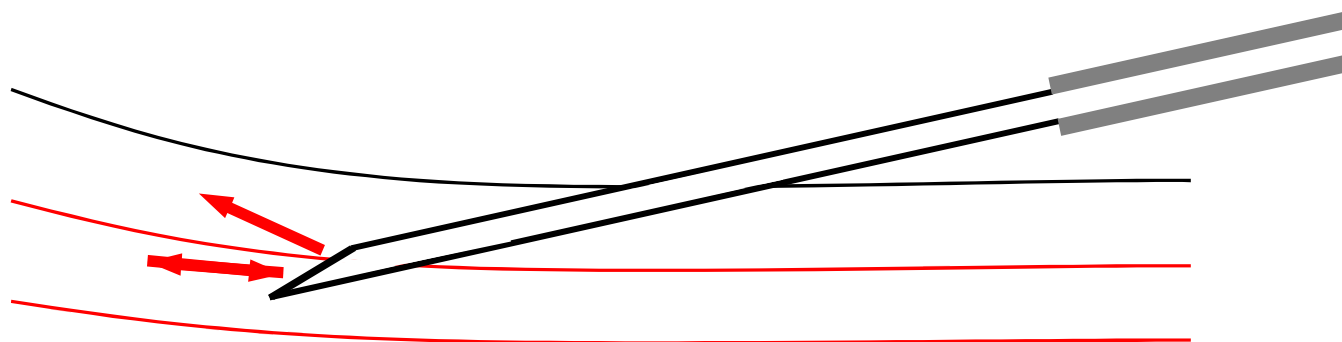
# Peripheral venous access



# Peripheral venous access



# Peripheral venous access





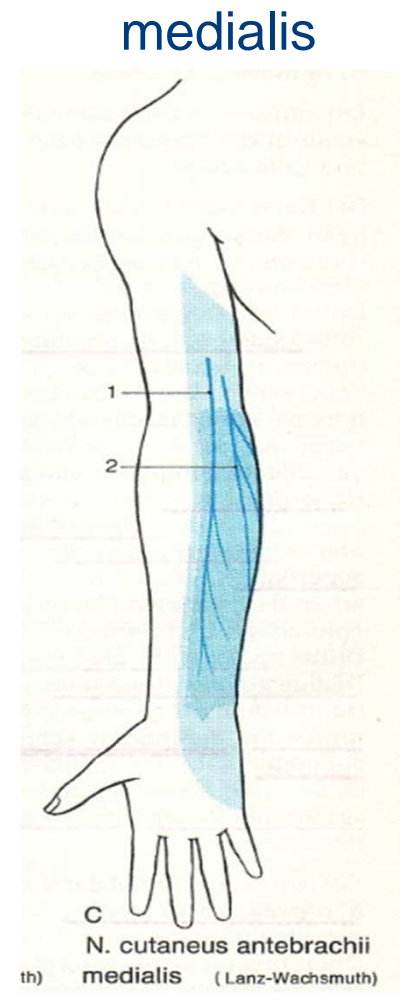
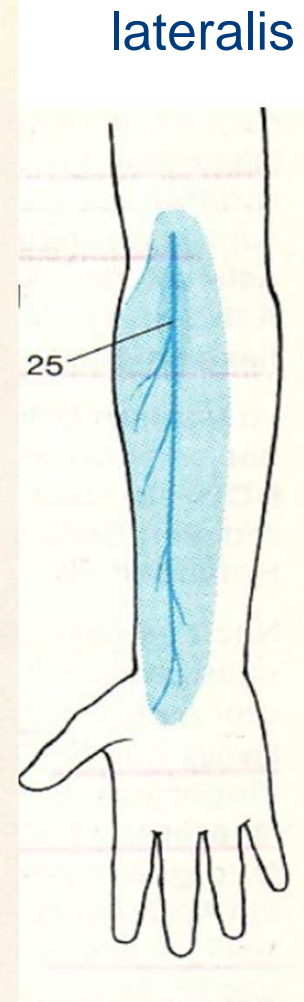
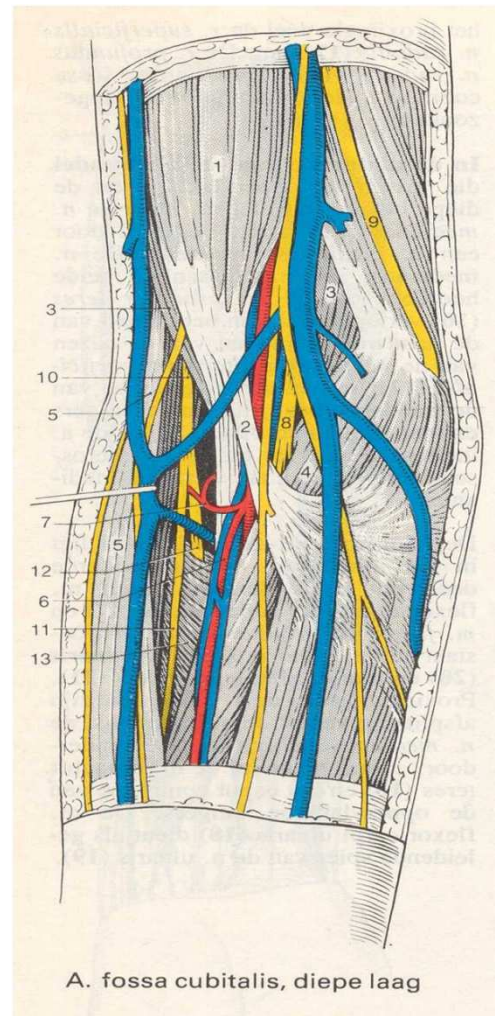
# Local Adverse Events

Local anatomy is complex

veins

artery

nerves



# Local Adverse Events

Hematoma

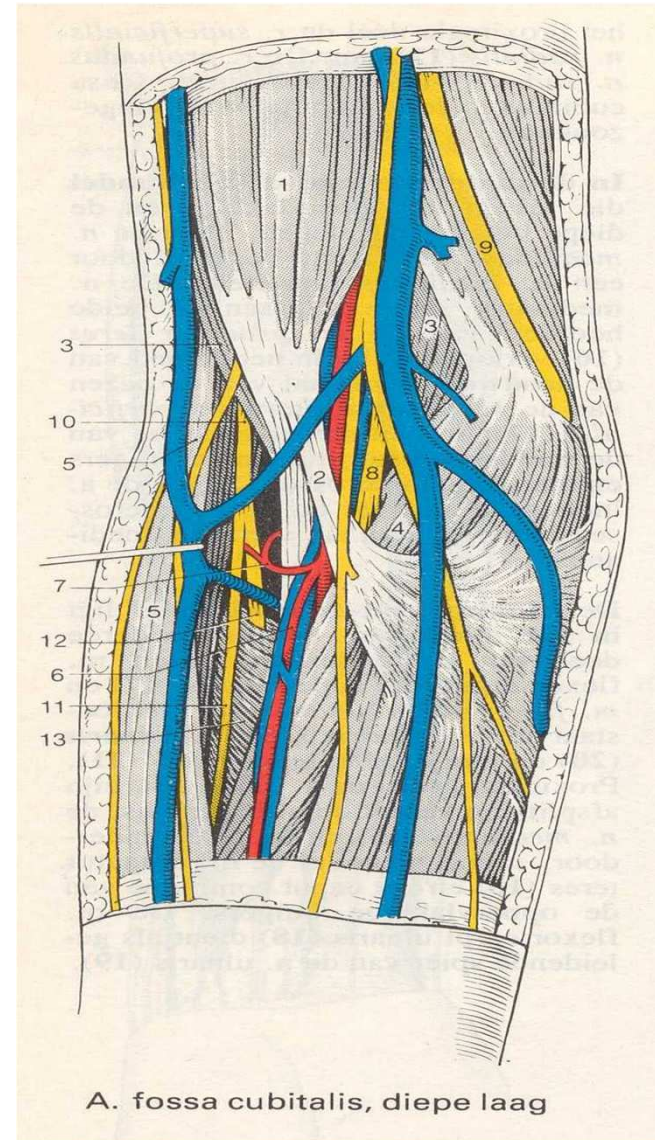
Injury of nerves





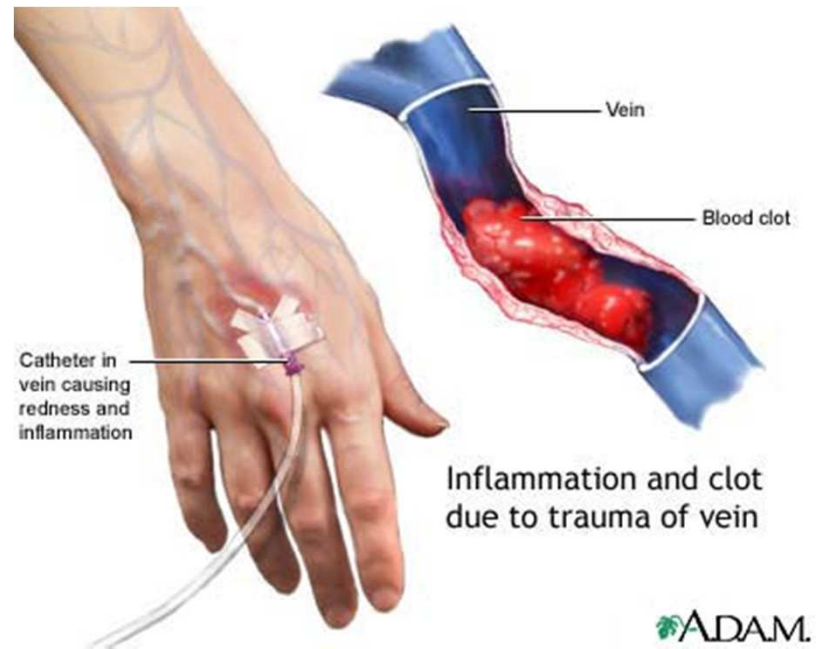
# Local Adverse Events

- Arterial puncture
- Phlebitis
- Thrombosis





# Phlebitis



# Peripheral venous access

Draw:

Apheresis needle 16 G

Draw Flowrate: 250-300 ml/min



Closed IV catheter system

Draw flowrate: 35-45 ml/min



return

20 G



22 G



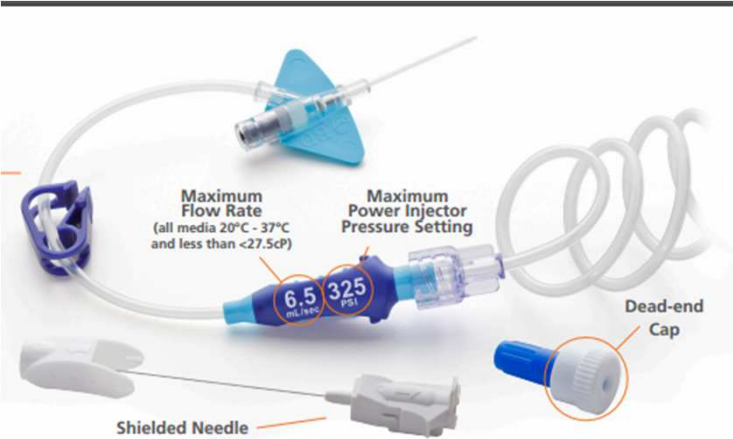
# Peripheral venous access

- New: BD Nexiva™DIFFUSICS™ Closed IV Catheter System
- Enable high flow rates with patients that may require a smaller IV catheter
- Enables higher flow rates with a smaller gauge catheter (20 G - 22G)





# Peripheral venous access



me/9nqqgkhg

## Power Injection Flow Rates

| Gauge and Length | BD Catalog # | Max Flow Rate (mL/sec) | Max Injector Setting (PSI) |
|------------------|--------------|------------------------|----------------------------|
| 24 G 0.75 IN     | 383590       | 3.0                    | 325                        |
| 22 G 1.00 IN     | 383591       | 6.5                    | 325                        |
| 20 G 1.00 IN     | 383592       | 10.0                   | 325                        |
| 20 G 1.25 IN     | 383593       | 10.0                   | 325                        |

# central venous access

Subclavian vein

Internal Jugular vein

Femoral vein

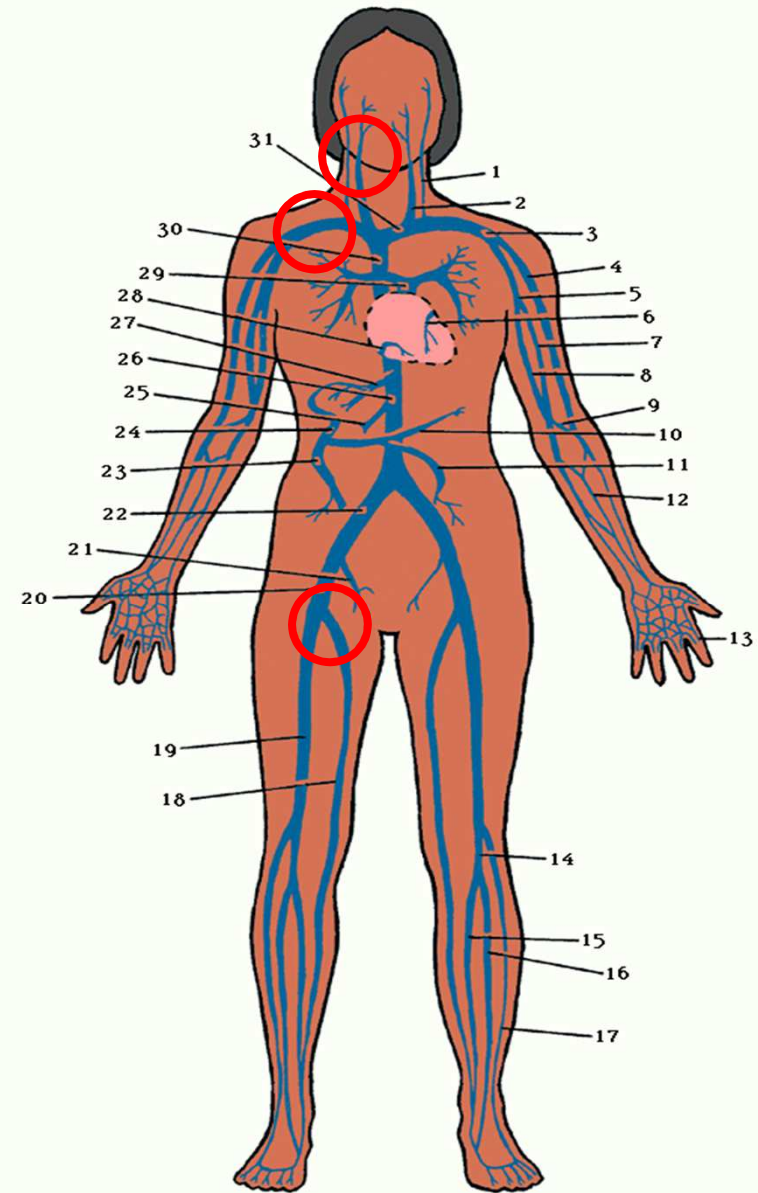
Local anesthesia

Sterile situation

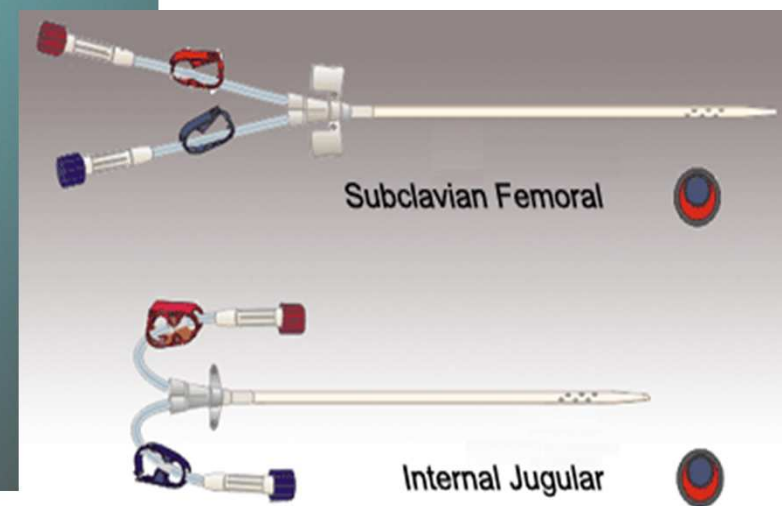
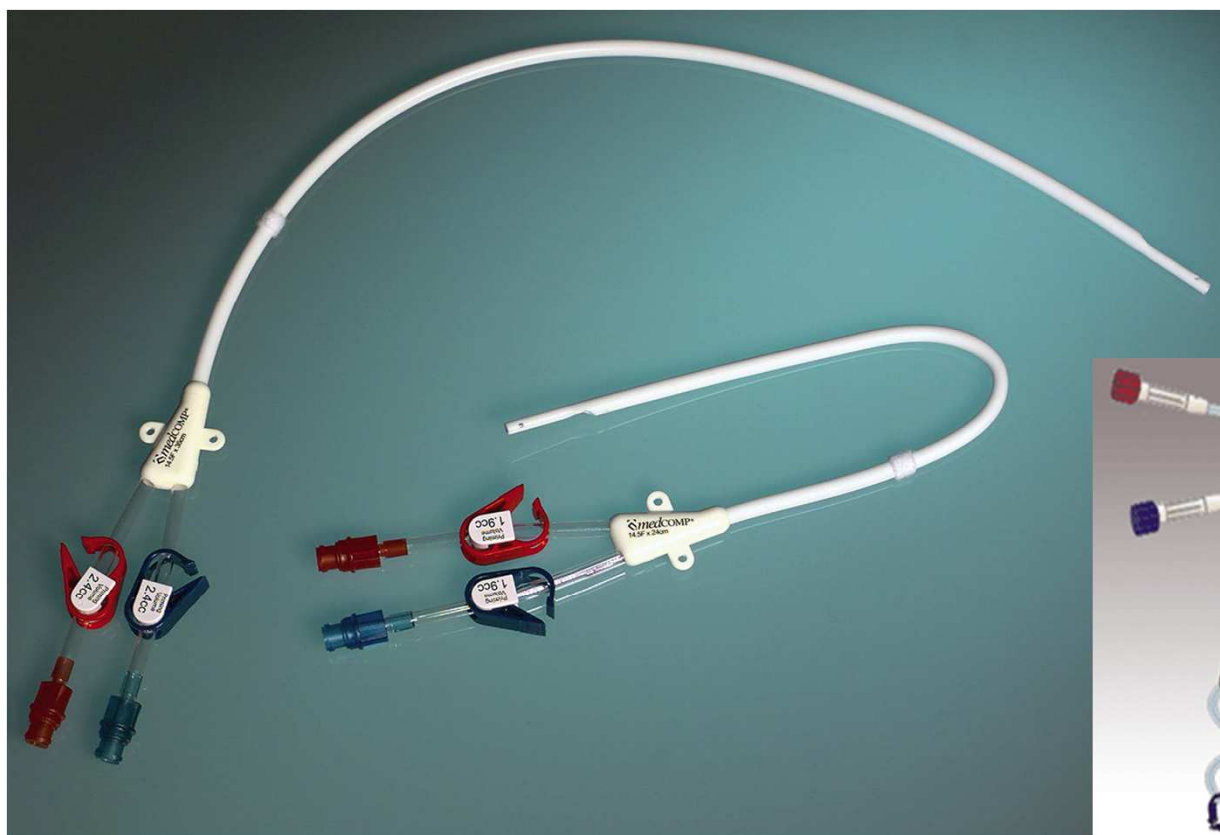
Double lumen catheter

Ultrasound guided

X-ray



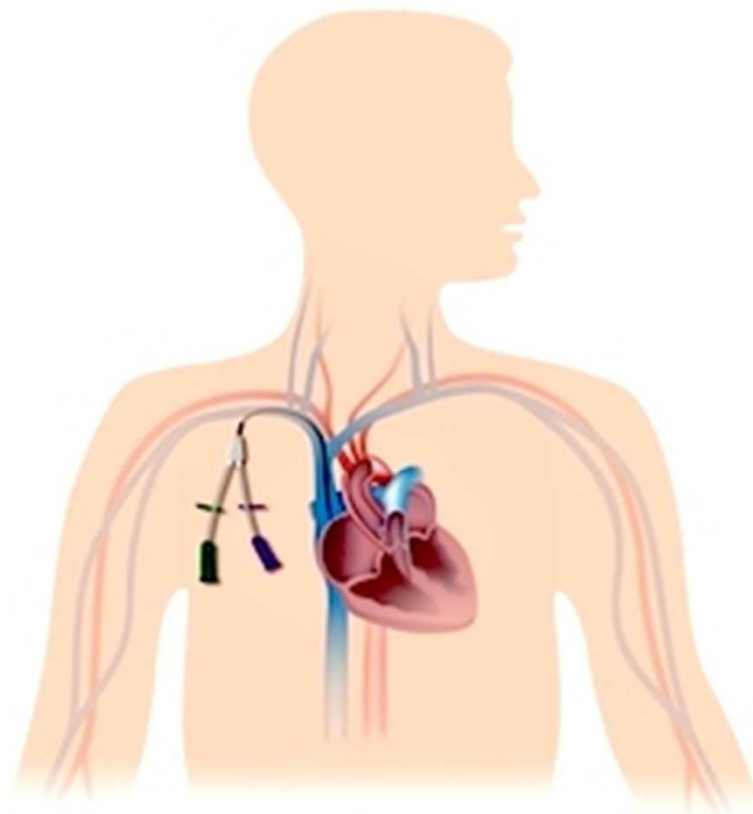
# central venous access



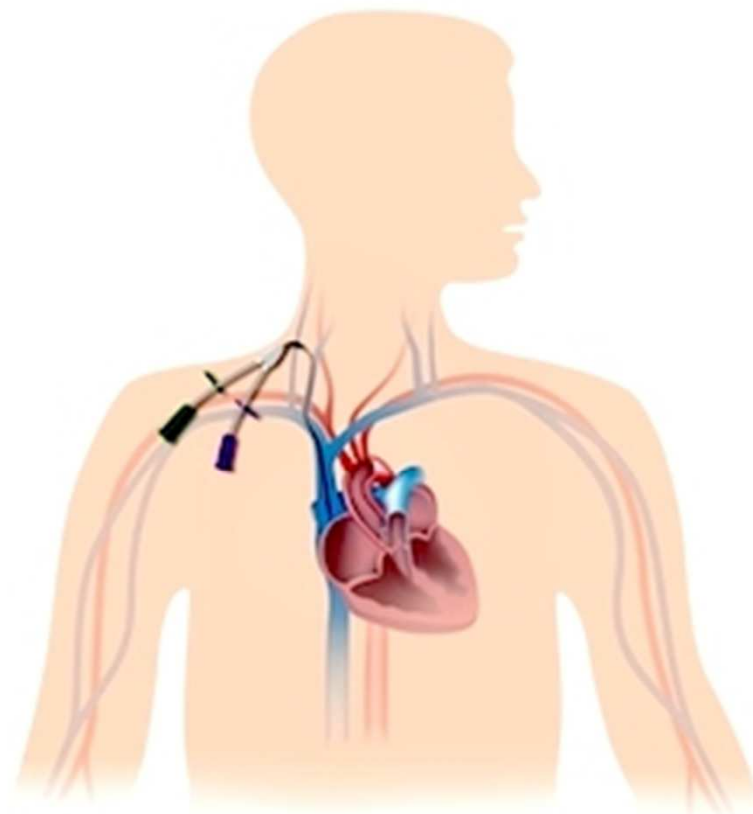
Adult 11,5 F  
Child 7-10 F



# central venous access



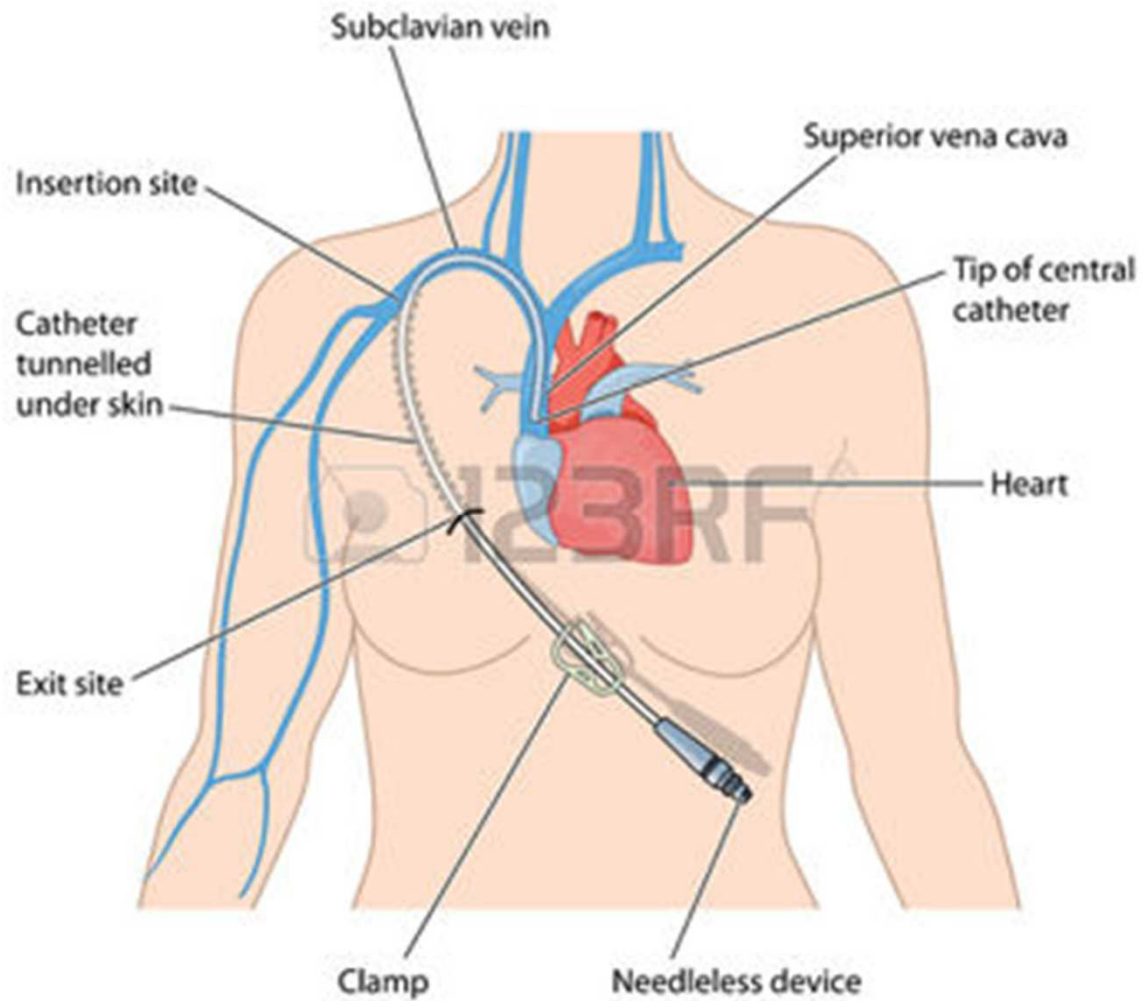
Subclavian vein insertion



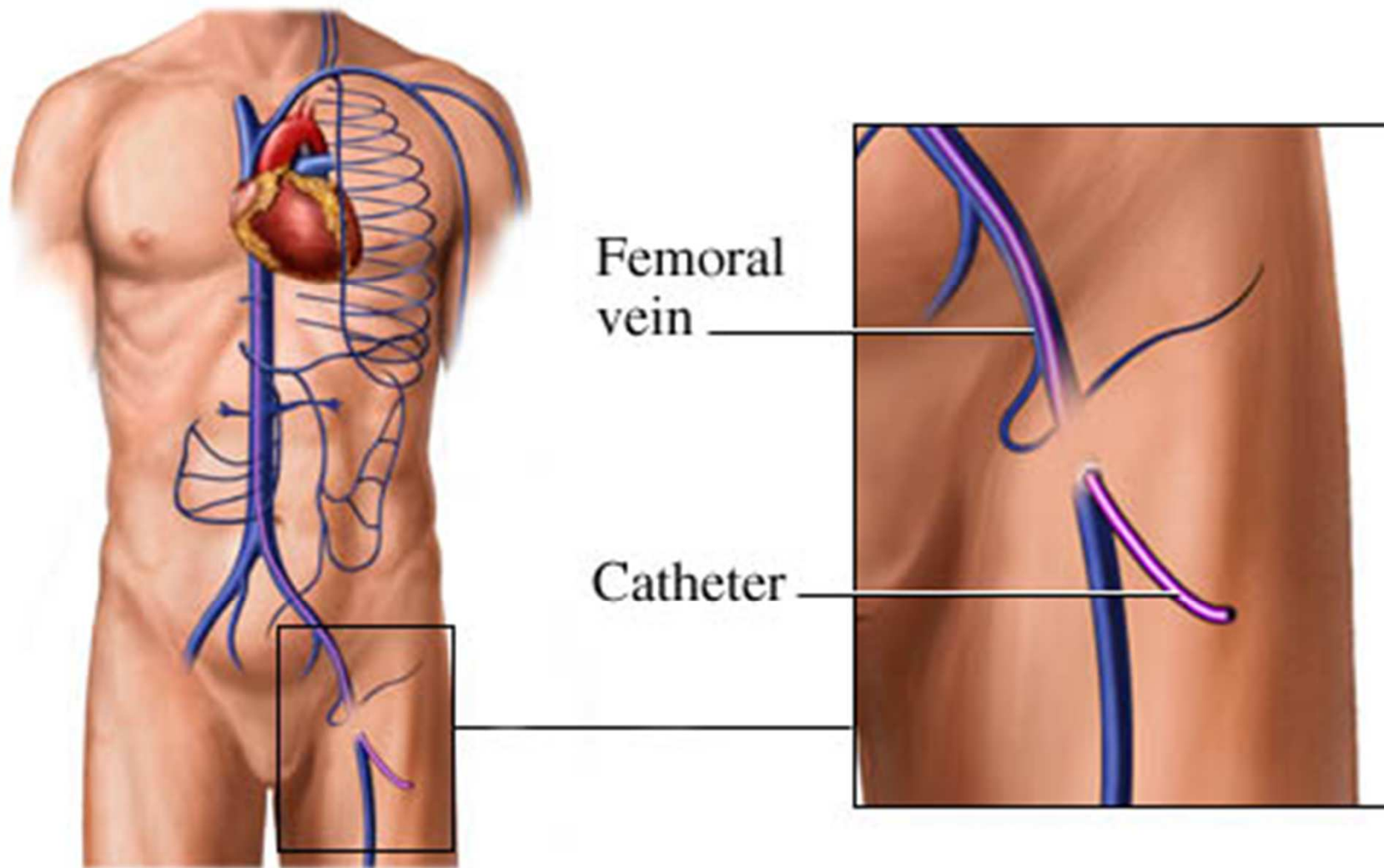
Internal jugular vein insertion

# central venous access

## Tunneld subclavian catheter



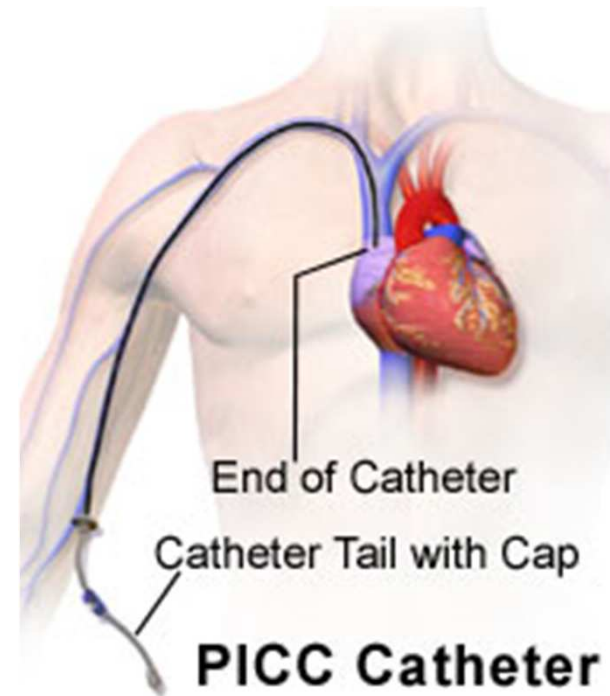
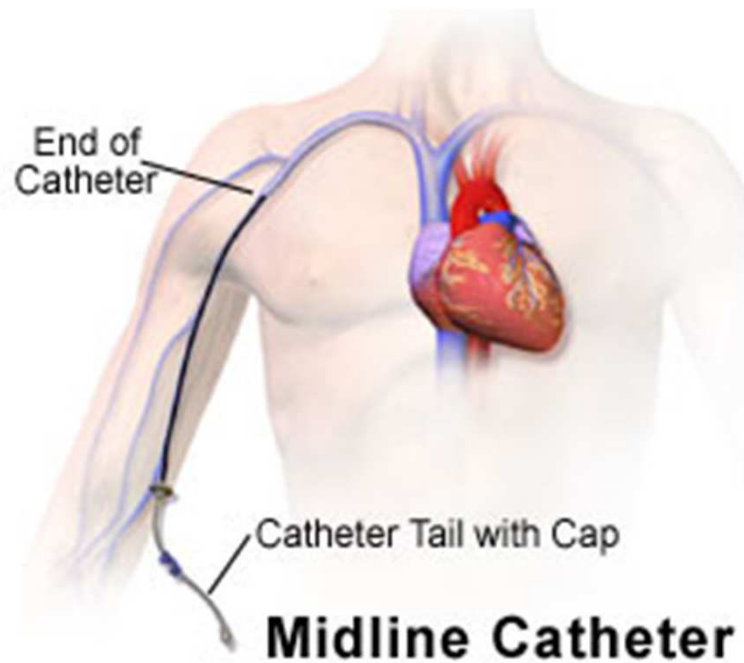
# central venous access





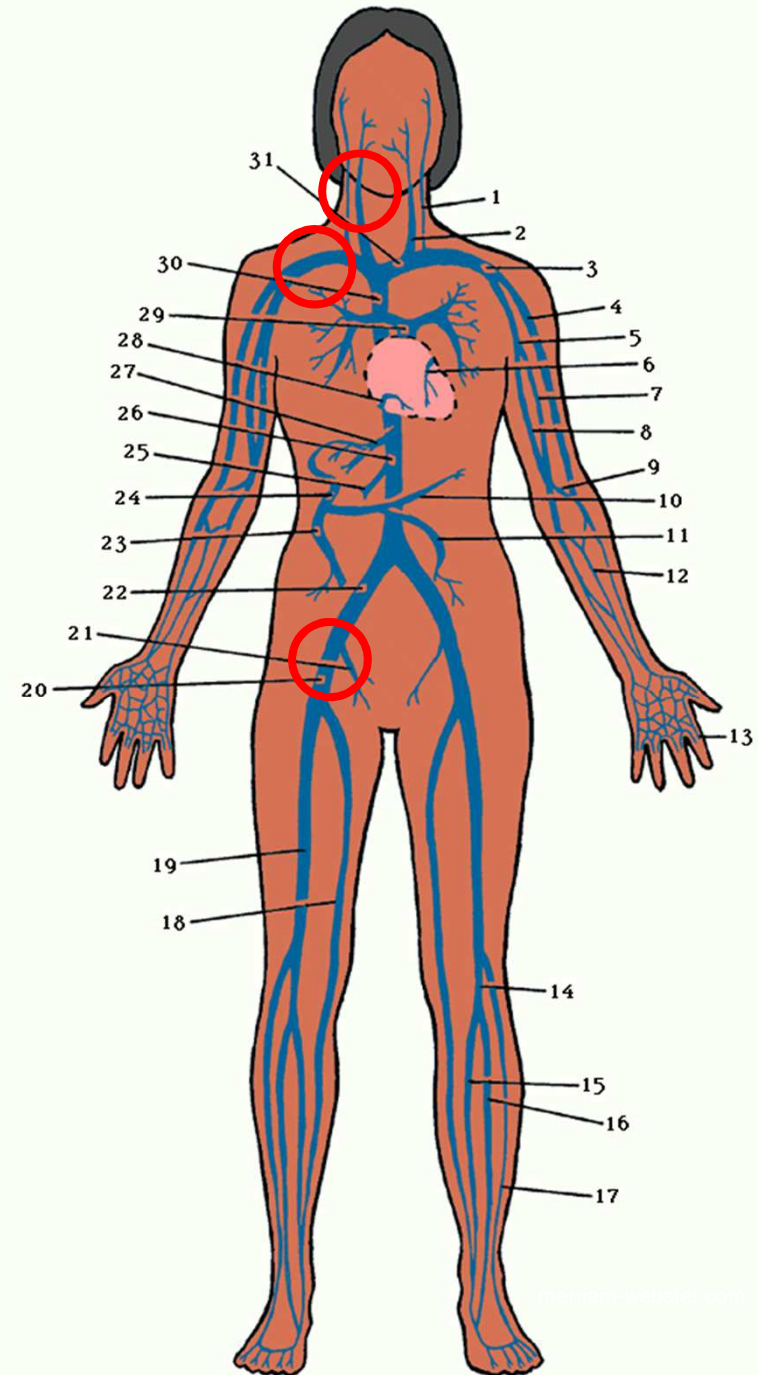
# central venous access

peripherally inserted central catheters and midline catheters are too small to get a sufficient flowrate.

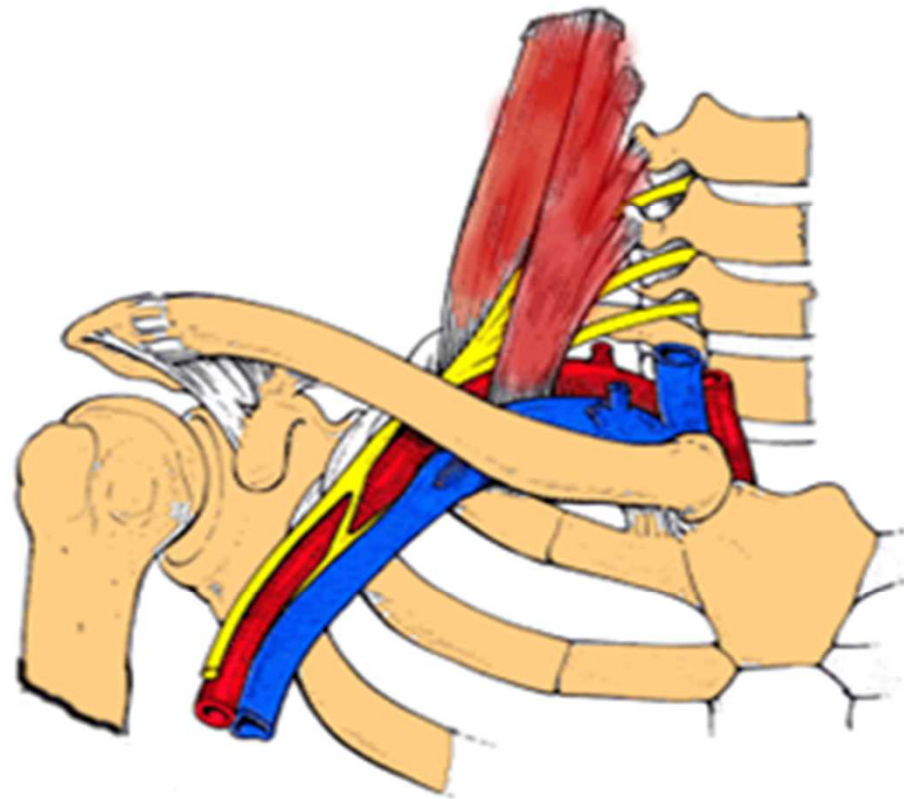


# central venous access

- Side effects central venous catheter
- Pneumothorax
- Infections
- Air embolism
- Hemorrhage
- Arrhythmia
- Thrombosis

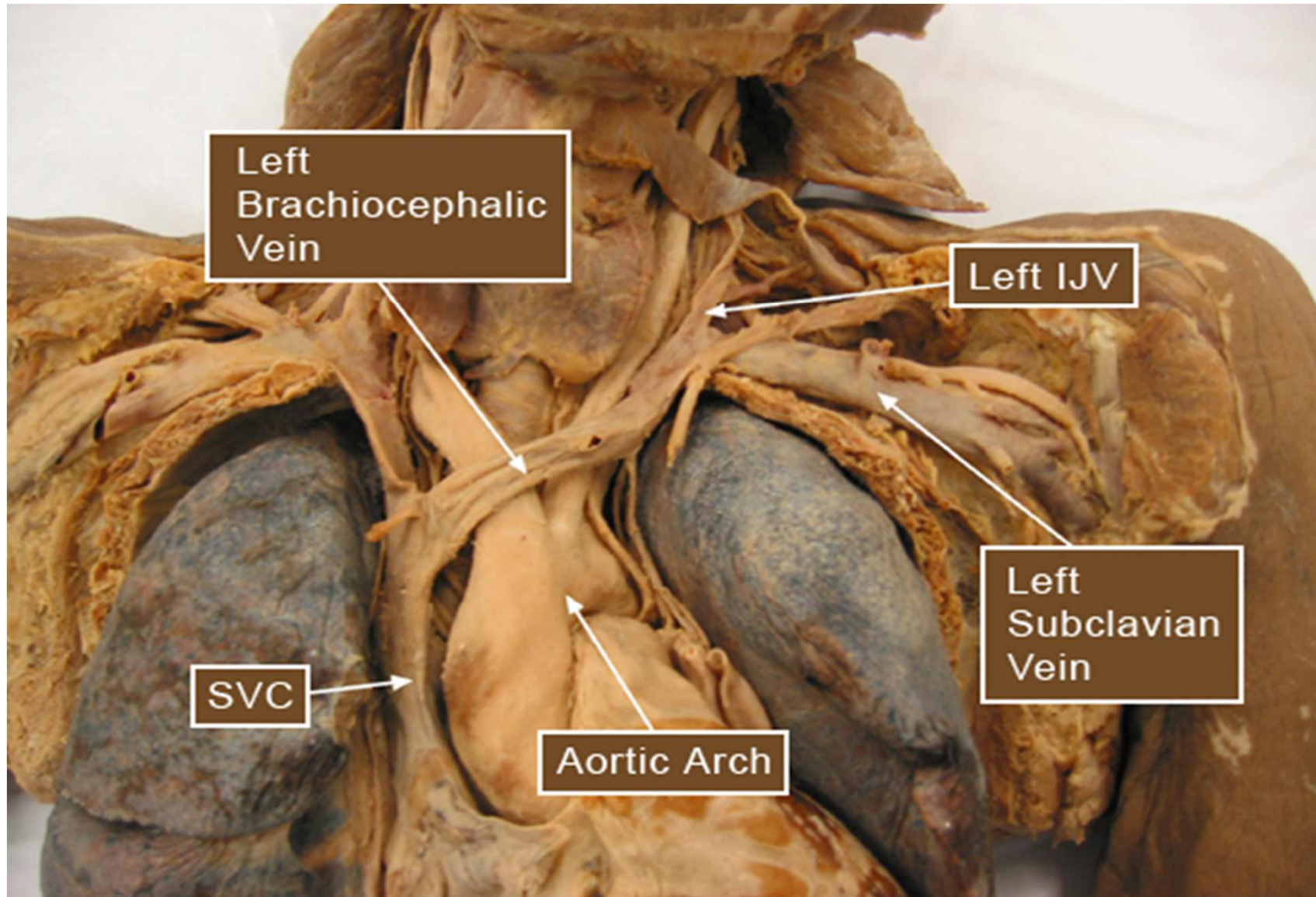


# pneumothorax



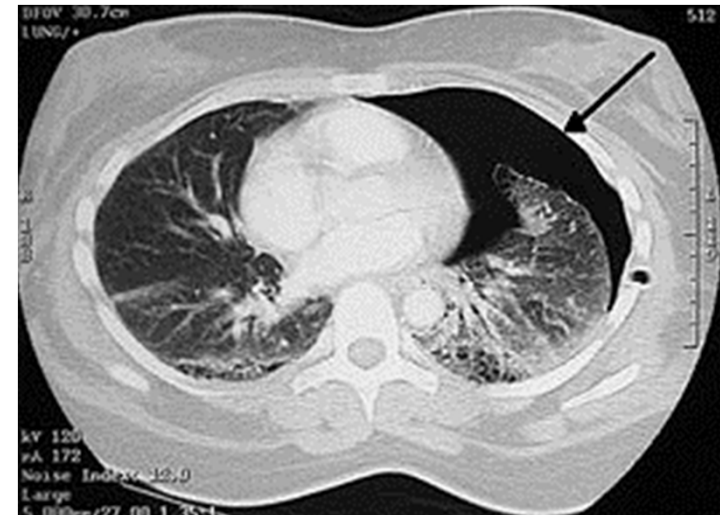
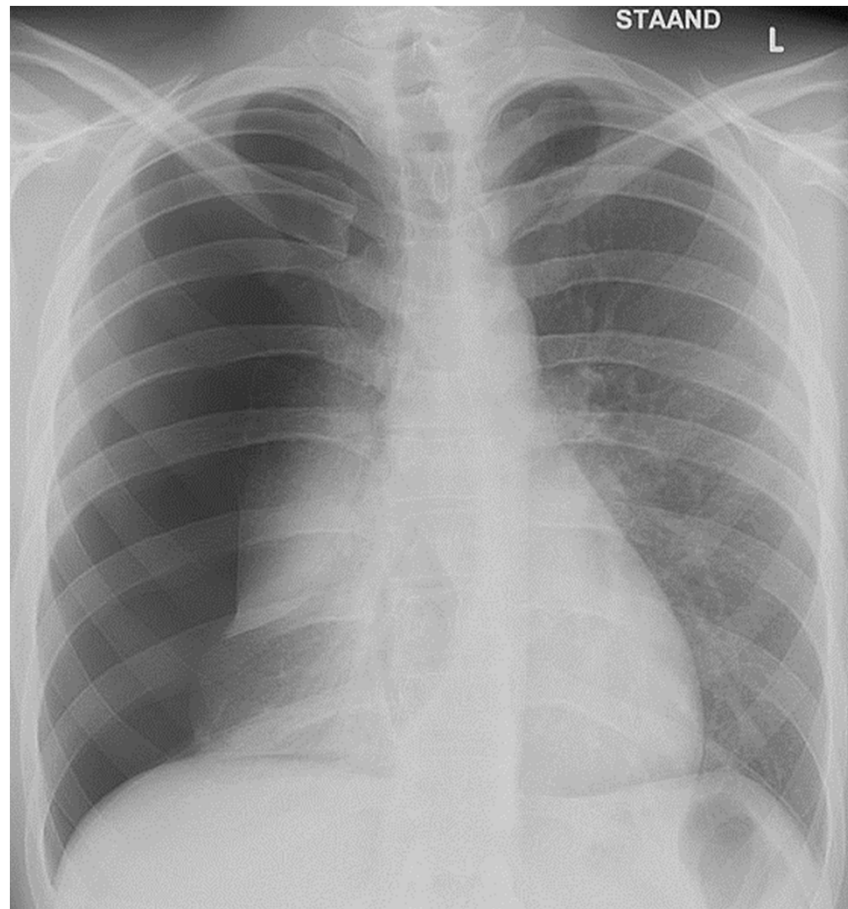


# pneumothorax





# pneumothorax



# infections

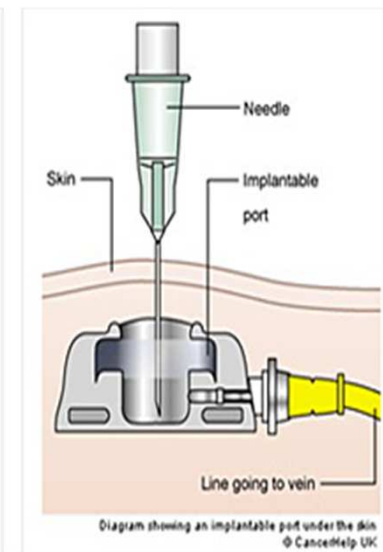
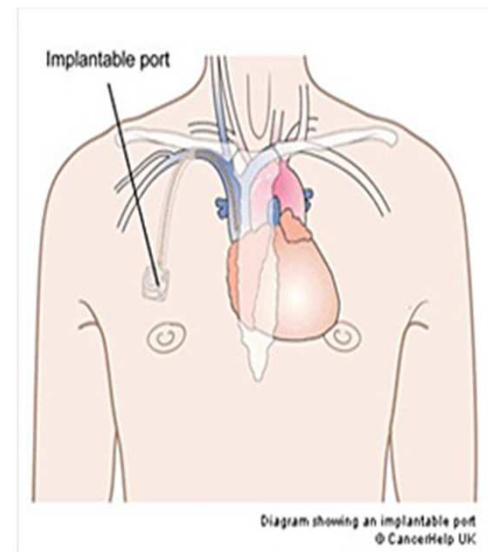
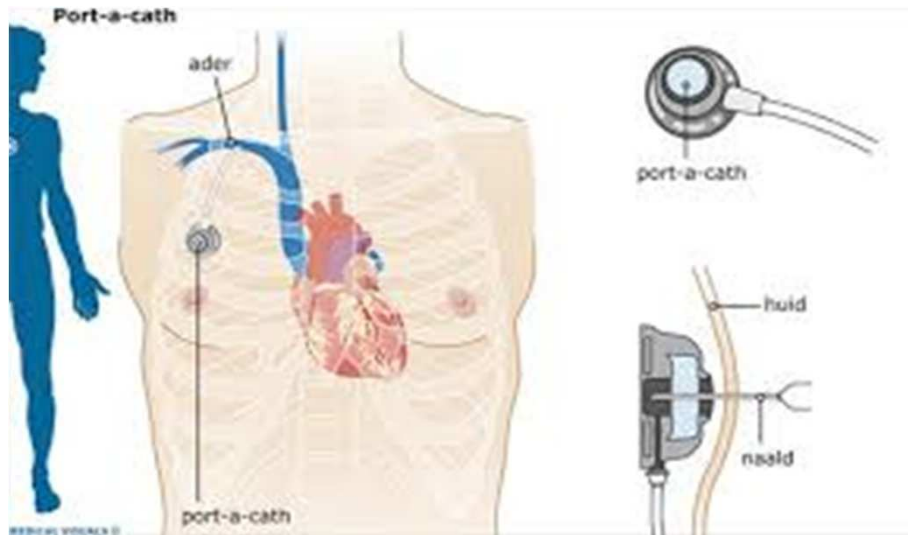
Staphylococcus aureus and Staphylococcus epidermidis sepsis



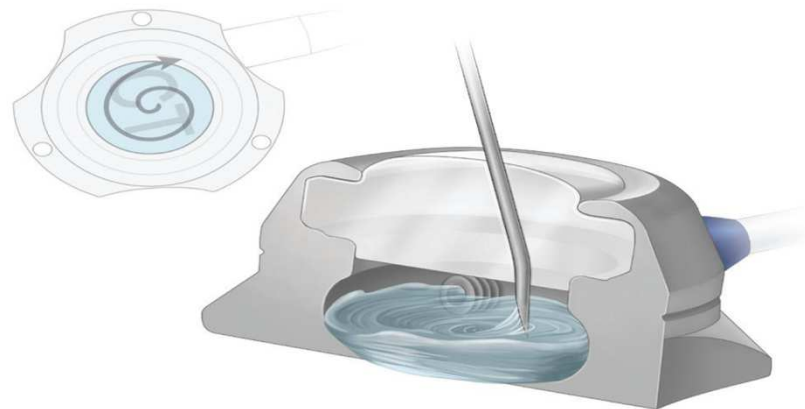


# Central venous access

## Implanted ports



# Central venous access



# Power ports

- ❖ Titanium / silicone
- ❖ “MRI safe”
- ❖ catheter 11.4G
- ❖ ca. 200 punctures with a 16G-needle per lumen
- ❖ erythrocytapheresis with a flow rate of 50ml/min
- ❖ “non-coring” needle: point doesn’t damages the membrane /as little as possible





## In summary

Various venipuncture sites and needles to achieve a sufficient flow/successful apheresis procedure

the choice of place and needle type depends on:

procedure

Anatomy of the human body

Donor or patient

Competence of the nurses and physicians

Adverse events