

# Access Denied; Alternative routes of IV and arterial access in the small animal critical patient

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What's blood  
got to do with  
it?

Physiological status, organ function

Testing for possible infection

Cell morphology

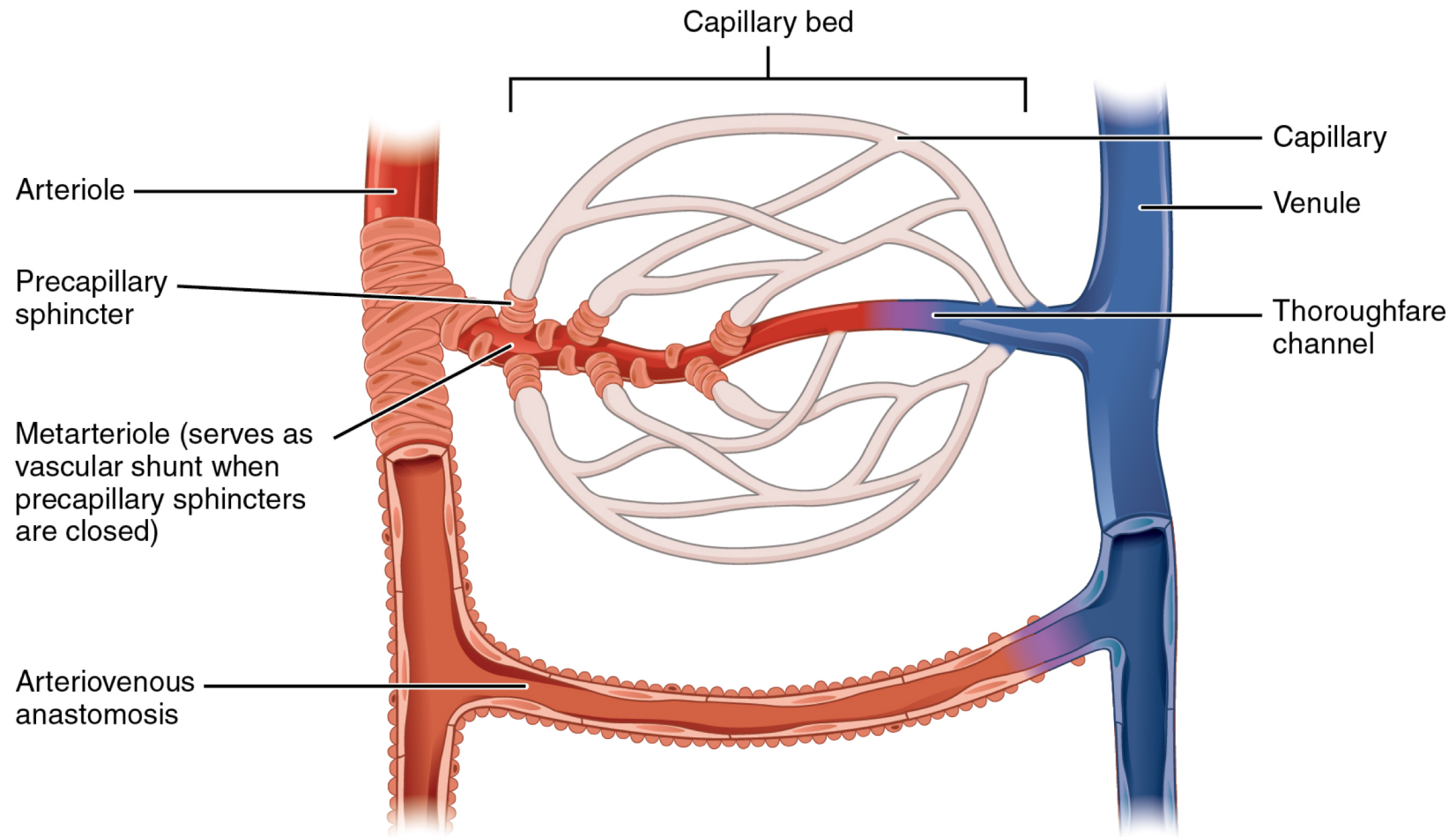
Serum levels of medications; PK studies

Hormone levels

Collecting stem cells

Looking for parasites

Etc.....



Technique

**+**  
**KEEP**  
**CALM**  
**AND**  
**STAY**  
**STERILE**

# Anticoagulants

- Heparin; use 5 to 10 units of heparin per 1 mL of blood. recommended anticoagulant for chemical measurement in blood or plasma tests because of its minimal chelating properties, minimal interference with water, and relatively low cation concentration. Heparin is the anticoagulant of choice for measuring pH, blood gases, electrolytes, and ionized calcium. However, heparin should not be used for coagulation or hematology tests.
- Lithium Heparin; has been shown to have a greater precision for electrolyte testing
- Sodium Heparin
- Ammonium Heparin

# Anticoagulants

- Ethylene diaminetetra acetic acid (EDTA); recommended as the anticoagulant of choice for hematological testing because it allows the best preservation of cellular components and morphology of blood cells.
- Sodium Citrate; is a reversible anticoagulant, and these tubes are used for coagulation assays. Because the liquid citrate dilutes the blood, it is important the tube is full so the dilution is properly accounted for.

# SPECIMEN REQUIREMENT CHART

## Order of Draw

LIGHT BLUE TOP (Contains Sodium Citrate)	RED TOP (Plain Tube - Silicone Coated)	ROYAL BLUE TOP (No Additive)	SST/MOTTLED RED TOP (Contains Inert Separator And Clot Activator)	SST/MOTTLED RED TOP (Contains Inert Separator And Clot Activator)	SST/MOTTLED RED TOP (Contains Inert Separator And Clot Activator)	GREEN TOP (Contains Sodium Heparin)	LAVENDER TOP (Contains Liquid EDTA)	ROYAL BLUE TOP (Contains K <sub>2</sub> EDTA)	GREY TOP (Contains Potassium Oxalate & Sodium Fluoride)
Anti-Thrombin III Factor Assays ♦ Fibrinogen Lupus anticoagulant ♦ Partial Thromboplastin Time (PTT) Protein C ♦ Protein S ♦ Prothrombin Time (PT/INR)	Antibody Identification* Antibody Screen* Blood Grouping* CEA Cold Agglutinins Coombs Direct Digoxin Dilantin Lithium Phenobarbital Primidone Rh Antibodies Rh Genotype Theophylline Valproic Acid	Amitriptyline Clomipramine Copper Doxepin Imipramine Zinc	Acetone AIDS (H.I.V.)* Albumin Alkaline Phosphatase Aminophylline Amylase Anti DNA Anti Nuclear Antibody Ascorbic Acid ASOT Beta HCG Bilirubin BUN CA-125 Calcium Chloride Cholesterol/HDL/LDL CO <sub>2</sub> (Bicarbonate) Complement C3 & C4 Cortisol CPK CPK Fractionation CPK-MB C-Reactive Protein Creatinine	Electrolytes Estradiol Estrinol Femim Folate (Serum) Also collect Lavender top Free T4 FSH Gastrin GGT Globulin Hepatitis* H. Pylori* IgA, IgD, IgE, IgG, IgM Immunoelectrophoresis & Quantitation Insulin Iron/TIBC L.H. LDH Isoenzymes Lipoprotein Electrophoresis Lipoprotein Phenotype Magnesium Mono Test MSS/IPS/IPS2*	Phosphorus Potassium Prenatal Screen* Protocin Protein Electrophoresis PSA PSA Ratio RA Latex Rubella Salicylates SGOT (AST) SGPT (ALT) Sodium Tagetol (Carbamazepine) Testosterone Total Protein Transferrin Triglycerides Triiodothyronine (T3 total) TSH Urea Uric Acid VDRL* Vitamin B12 Vitamin D25 & 125 ♦ Public Health Serology*	Chromosome* ♦ Collect 2 tubes LE Cell Prep	Blood Film and Differential E.S.R. Eosinophil Count Folate (RBC) Also collect Red top G-6-P-D* Glycosylated Hemoglobin (A1C) Heinz Bodies Hematocrit Hemoglobin Electrophoresis* HLA-B27* ♦ Collect 2 tubes Homocysteine Leukocytes Malaria Smear MCH/MCHC/MCV Platelet Count PTH* ♦ R.B.C. Reticulocytes Sedimentation Rate Sickie Cell Prep Thrombocytes W.B.C.	Arsenic Cadmium Lead Magnesium Mercury	Ethanol* Glucose Glucose Challenge Tolerance Tests Glucose Lactose Xylose Lactic Acid

\* REQUIRES DEDICATED TUBE(S). ♦ PLEASE REFER TO SPECIAL INSTRUCTIONS IN SPECIMEN REQUIREMENT MANUAL.

ALL SPECIMENS COLLECTED MUST BE CLEARLY LABELLED WITH THE PATIENT'S FIRST AND LAST NAME AND ONE OTHER UNIQUE IDENTIFIER (e.g. D.O.B. OR OHIP NUMBER).  
SPECIMENS RECEIVED WITHOUT THE ABOVE PATIENT IDENTIFIERS WILL BE REJECTED

**INSTRUCTIONS:**

- Use the above test list to select the correct specimen container(s).
- **COLLECT BLOOD IN CORRECT ORDER OF DRAW AS INDICATED ABOVE.** If blood culture is required, it should be the first collection in the order of draw.
- **ALLOW BLOOD TUBES TO FILL COMPLETELY TO ENSURE ACCURATE RESULTS.**
- Royal Blue with K2 EDTA, Lavender, Light Blue, Grey and SST Tubes should be mixed by gently inverting 6-8 times immediately following collection.
- It is recommended that the SST Tube be centrifuged. (Note: Allow blood to clot at room temperature for 30 minutes before centrifuging.)
- If more than 6 tests are requested, a second SST Tube is required.

**APTT & PT/INR INSTRUCTIONS:**

1. PT/INR only – Transport unspan at room temperature within 24 hours.
2. PT/INR and APTT combination or APTT only – Combine and separate plasma into an aliquot tube and cap. Transport refrigerated/iced within 4 hours of collection.
3. If mixing in #1 and #2 cannot be met, prepare plasma as in #2 and freeze rapidly. Sample must be transported in frozen state.

For sample requirements for unlisted tests, call 416-449-2166.

## Collection Volumes

- 1% (2%) of body weight or 10% (20%) of total blood volume

- TEBV

- Mammals: 50-78mL/kg

- Birds: 55-70mL/kg

- Reptiles: 60ml/kg

Replacing Fluids?



Food for  
thought

**Mammalian RBC life span:**

**Small exotic mammals 22-55 days**

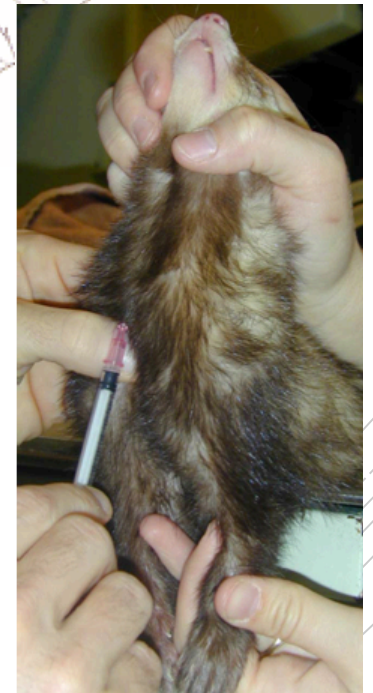
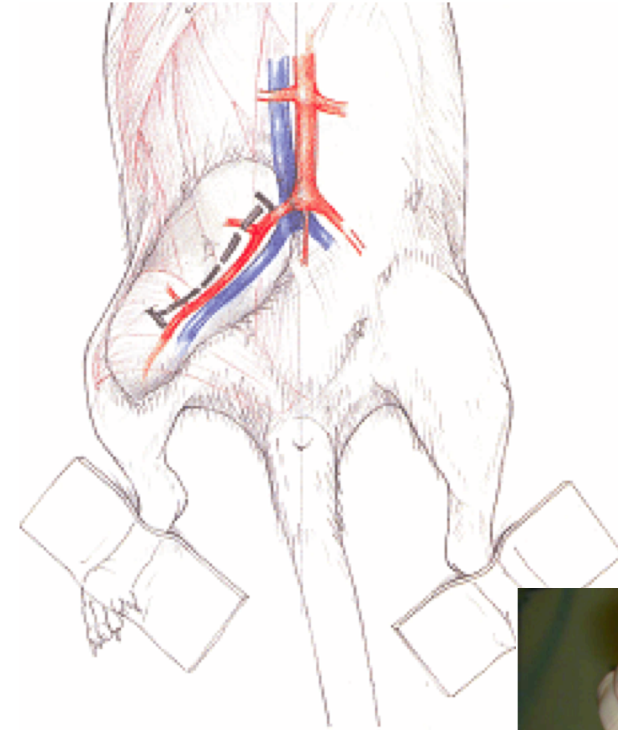
**Larger species 100-120 days**

**Avian RBC life span: 28-45 days**

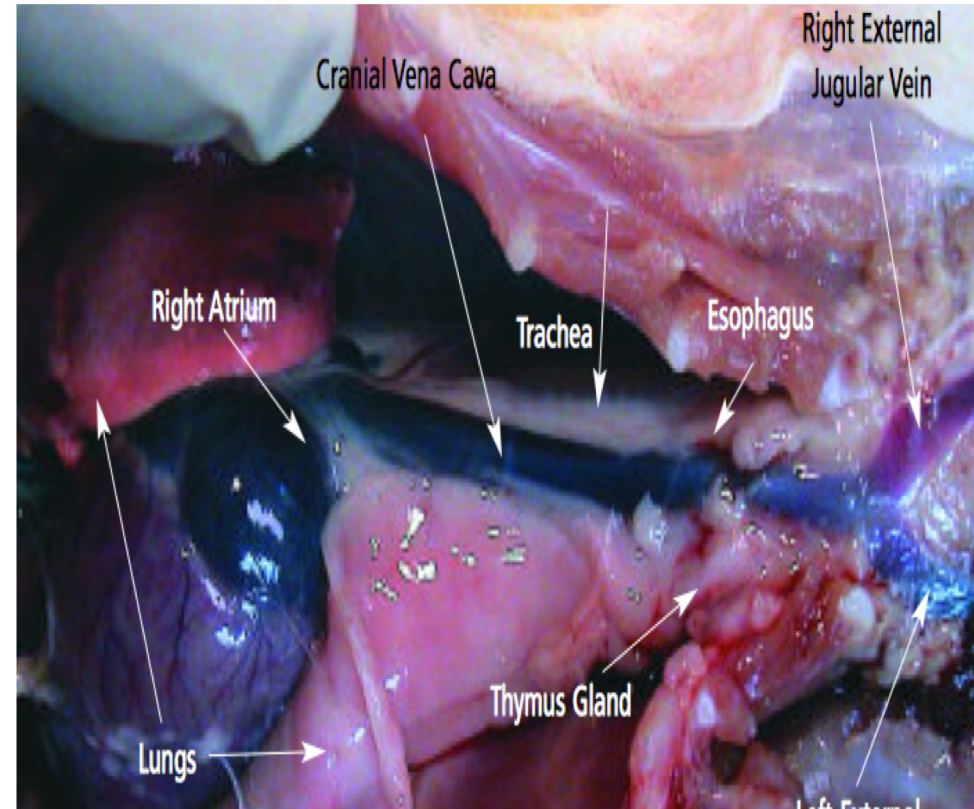
**Reptilian RBC Life span: 600-800  
days**

# Blood Collection from tiny mammals

- Jugular
- Femoral vein/artery
- Cardiac (anesthetized only)
- Anterior vena cava/subclavian vein



# Cardiac and Jugular Collection

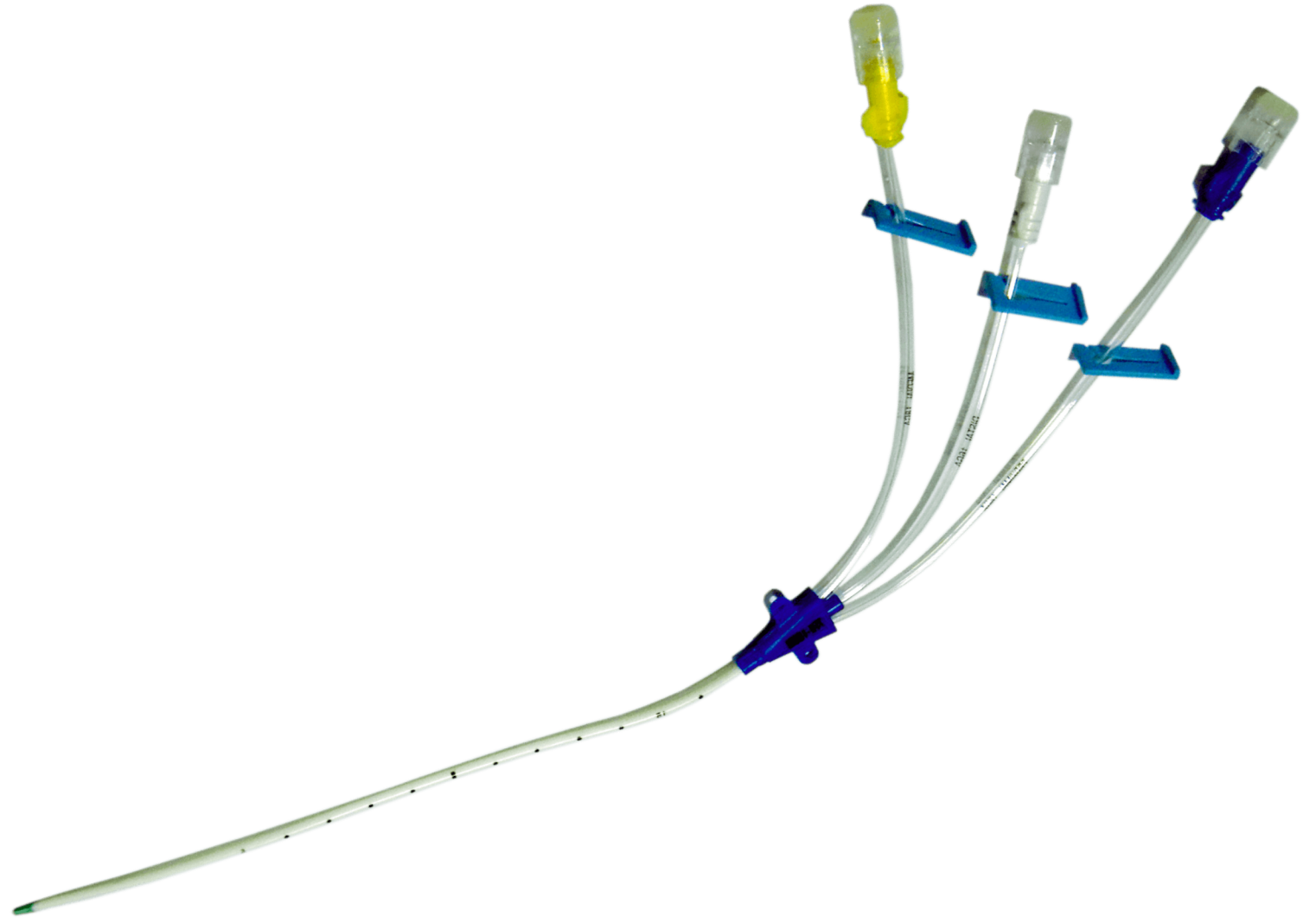




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# Jugular Veins

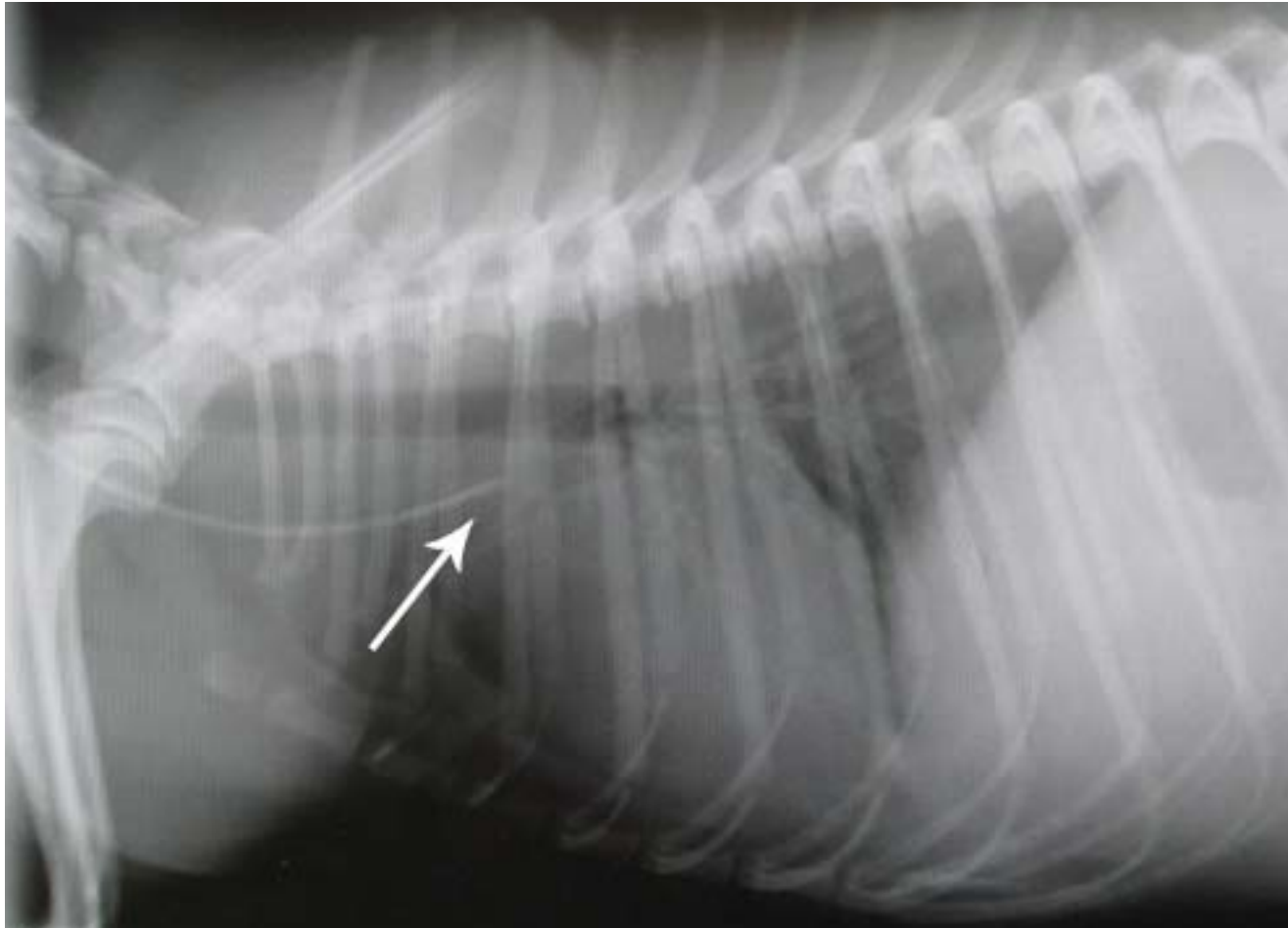








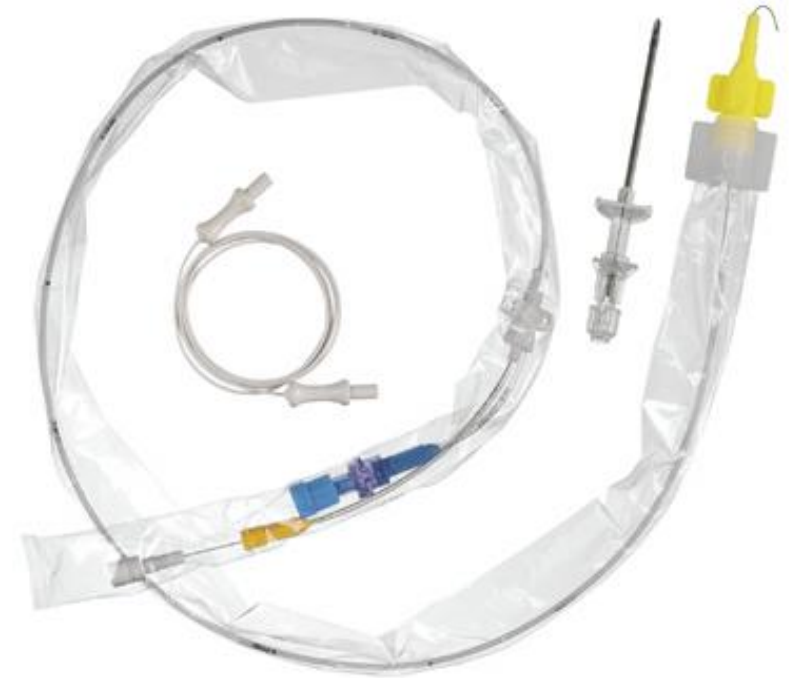






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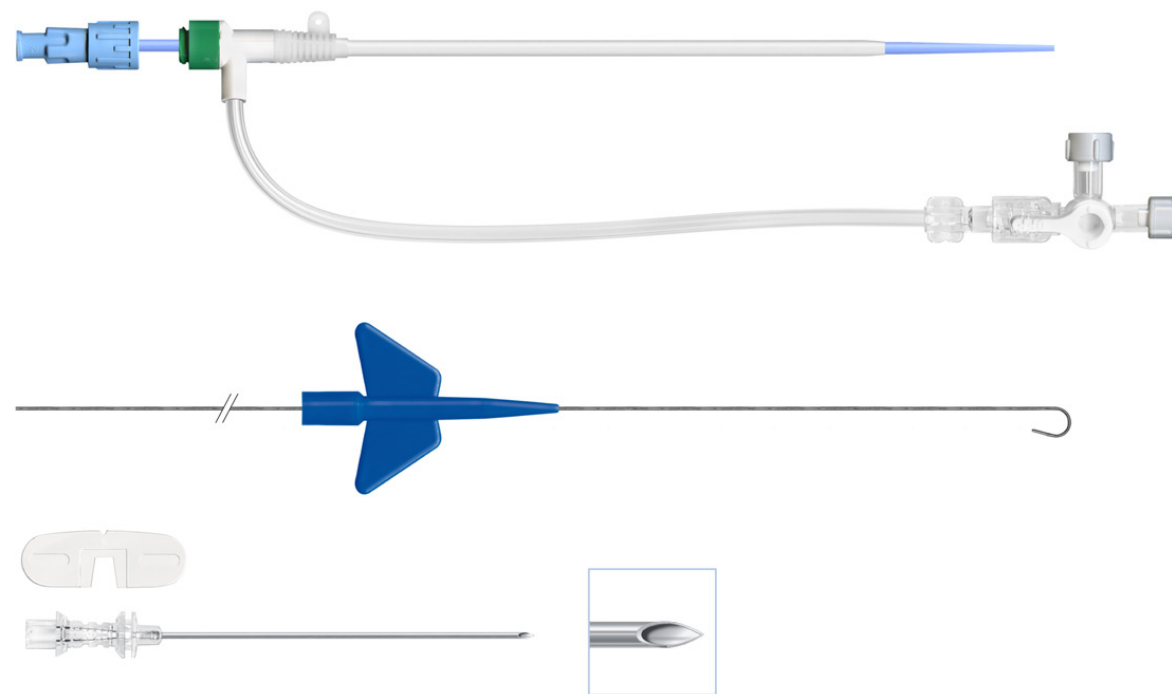
# Intra-cath techniques

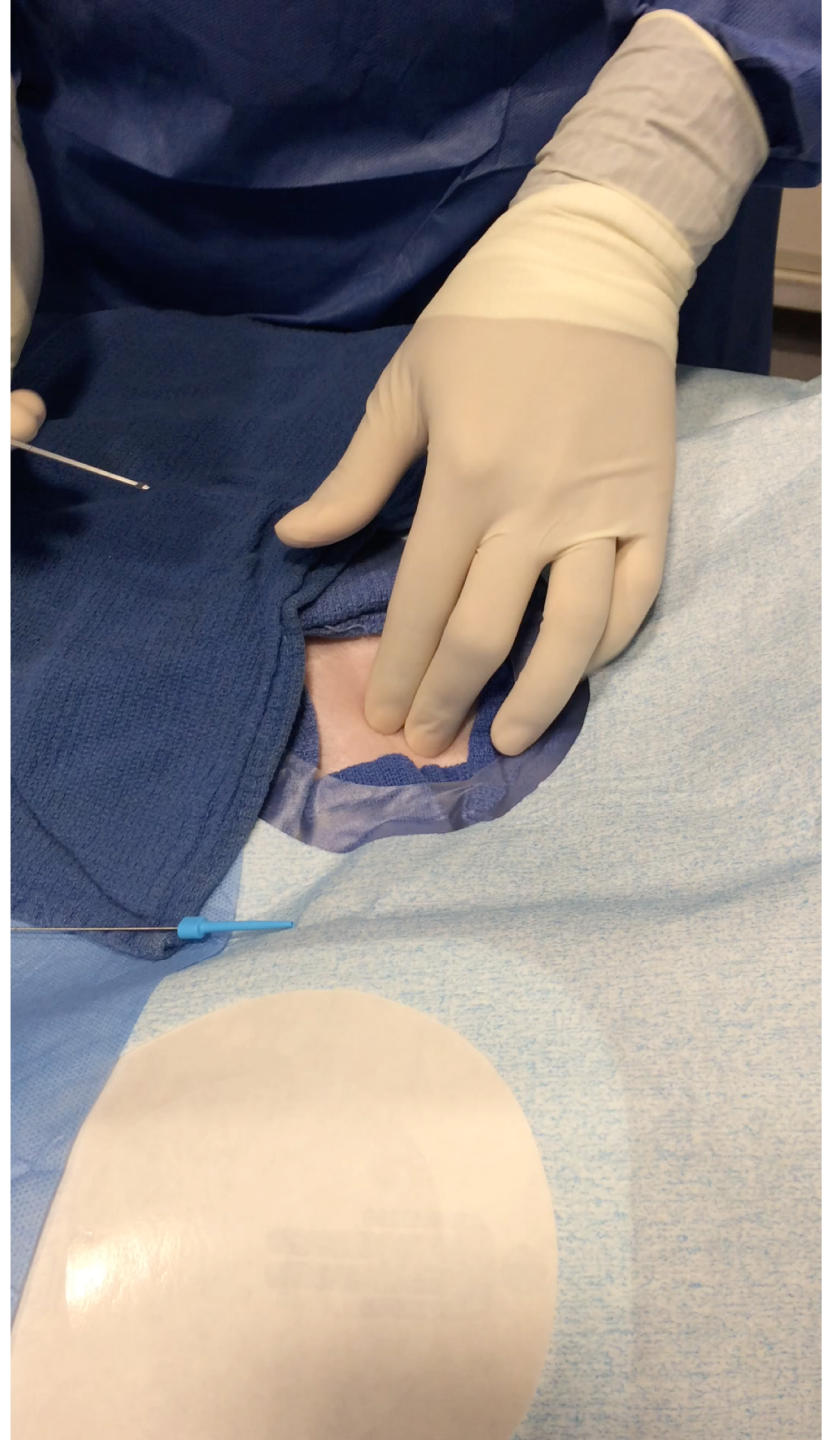


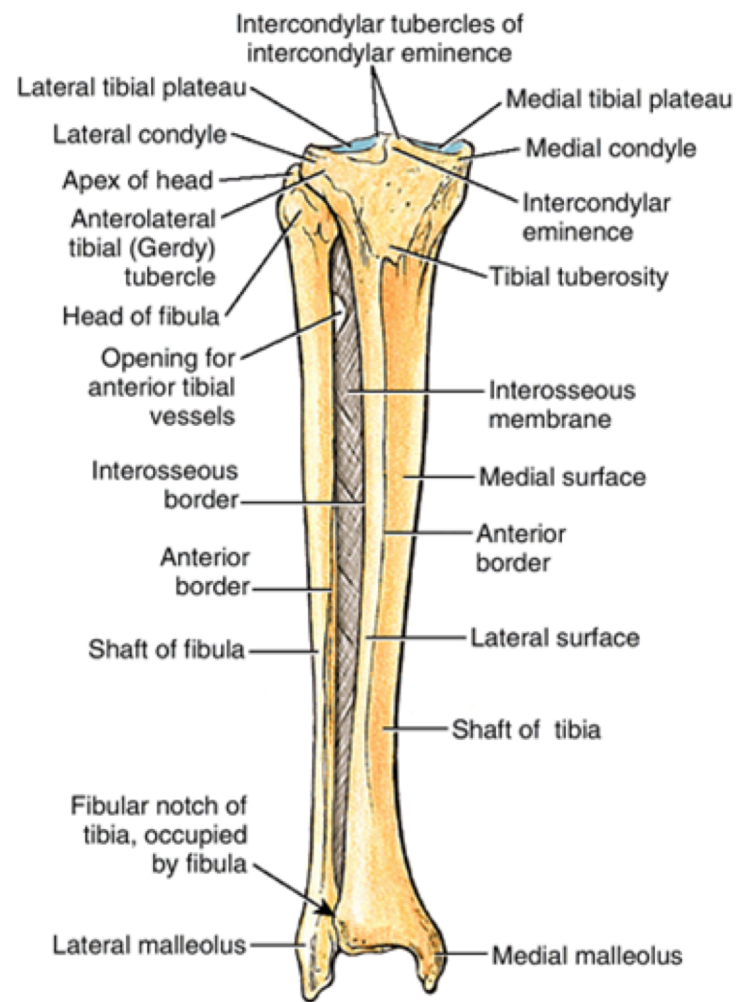
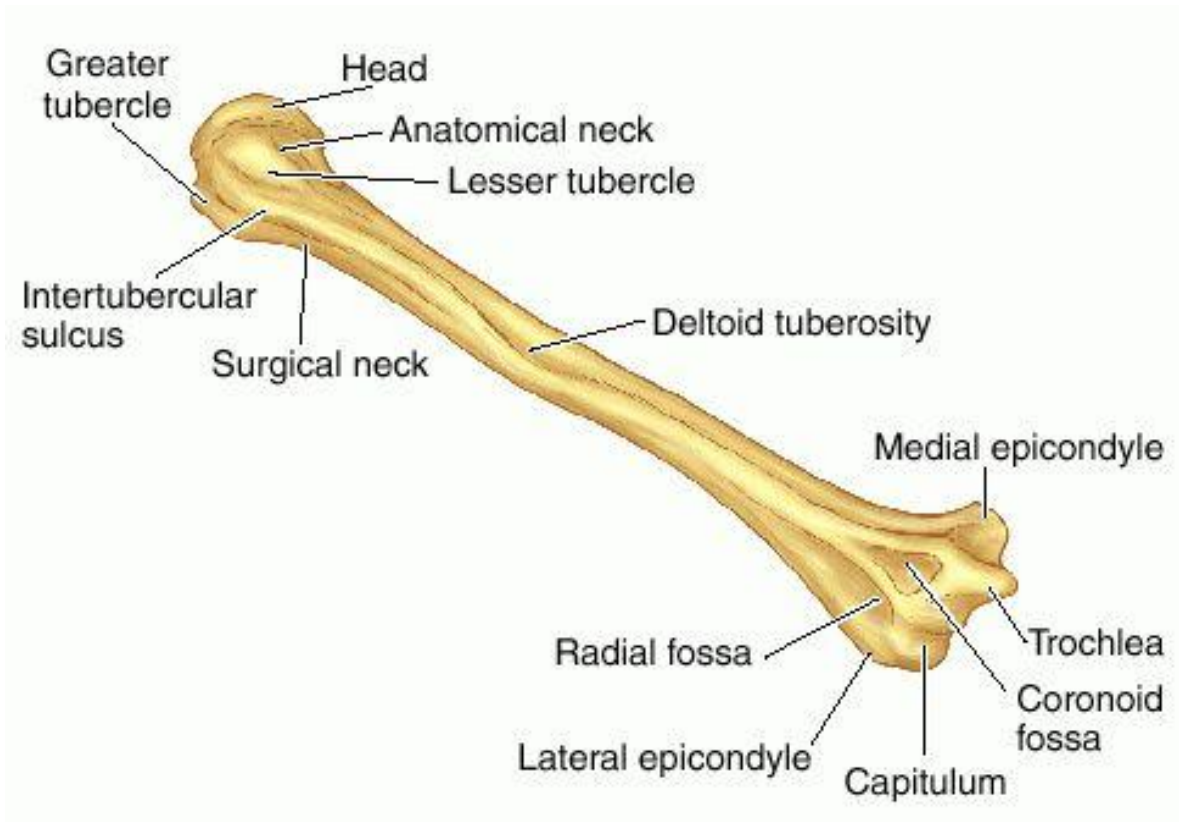




# Introducer sheathes

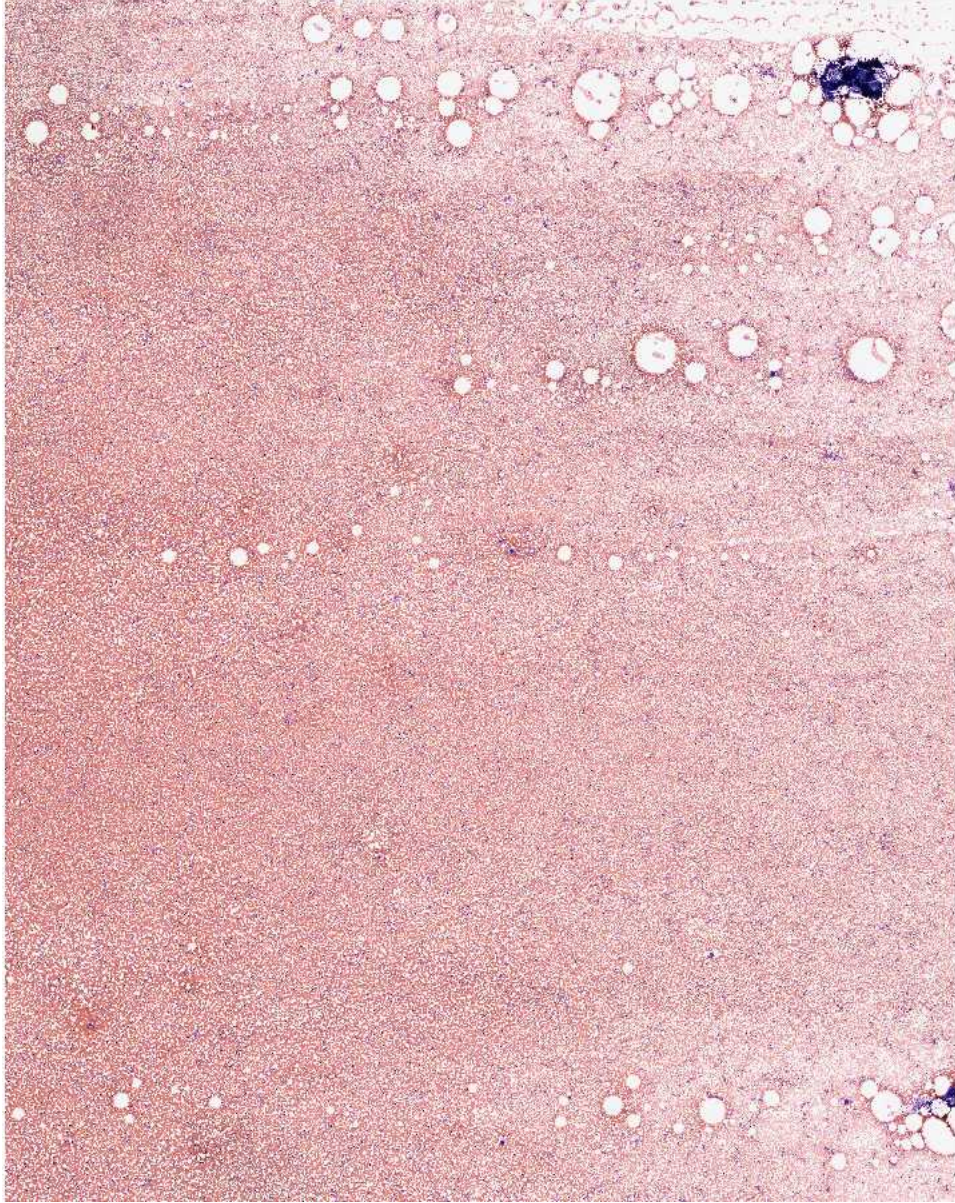
















**Interosseous  
access with the  
EZ-IO device**







A large red speech bubble graphic with a white outline, pointing downwards. It contains the text 'Gracias!' and the website address 'www.stephencital.com'. The background features faint, concentric circles and dashed lines.

Gracias!

[www.stephencital.com](http://www.stephencital.com)