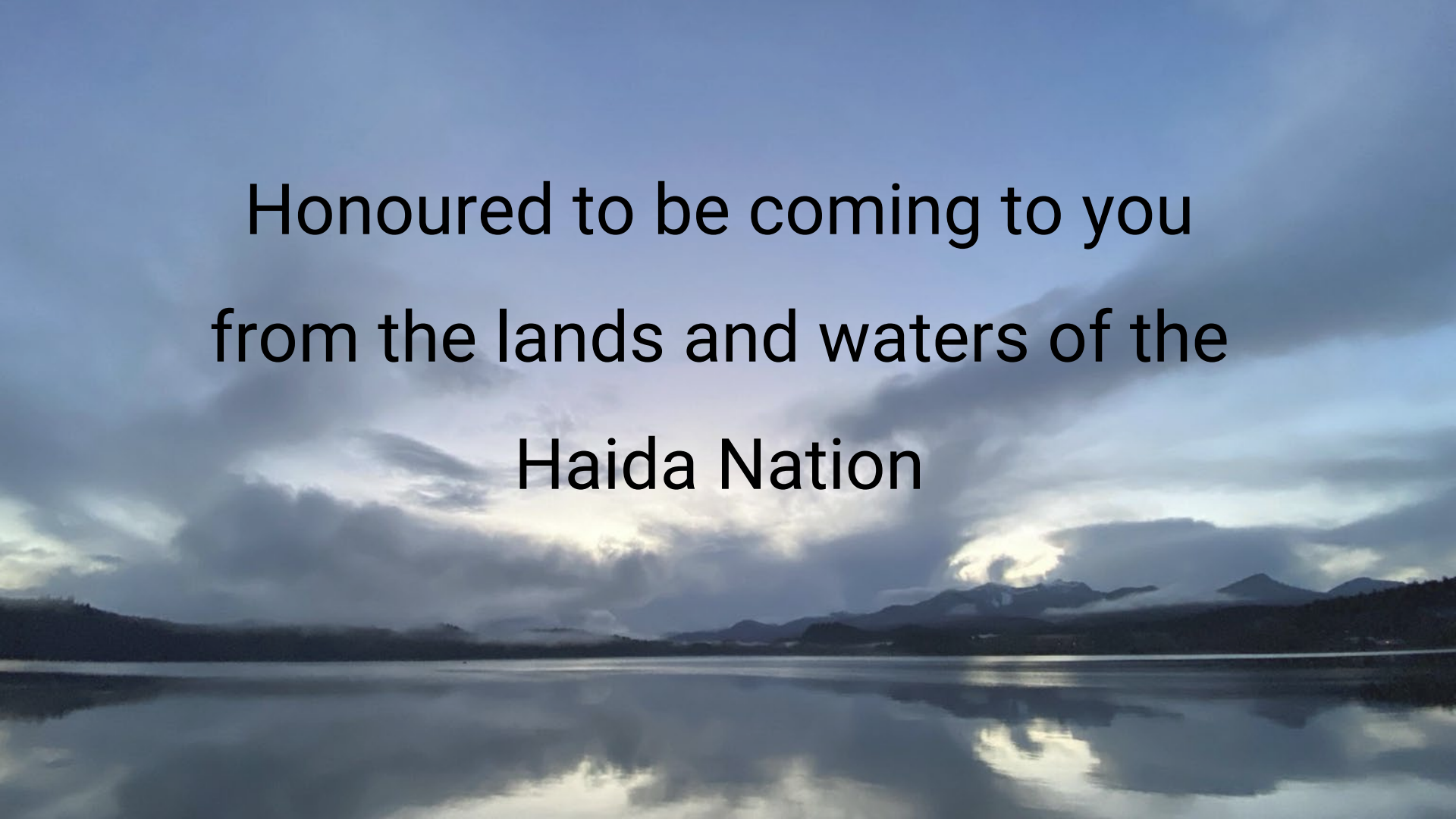
A grayscale B-mode ultrasound image showing a cross-section of a deep vein. The vein lumen is the dark, anechoic region on the left, while the vessel wall and surrounding tissues are shown in various shades of gray on the right. The text is overlaid on the lower half of the image.

# Point-of-Care Ultrasound: Deep Vein

Tracy Morton MD CCFP  
Haida Gwaii, BC



Honoured to be coming to you  
from the lands and waters of the  
Haida Nation



# Presenter DISCLOSURES

Tracy Morton MD CCFP GP Oncology

Clinical Assistant Professor, UBC Department of Family Practice

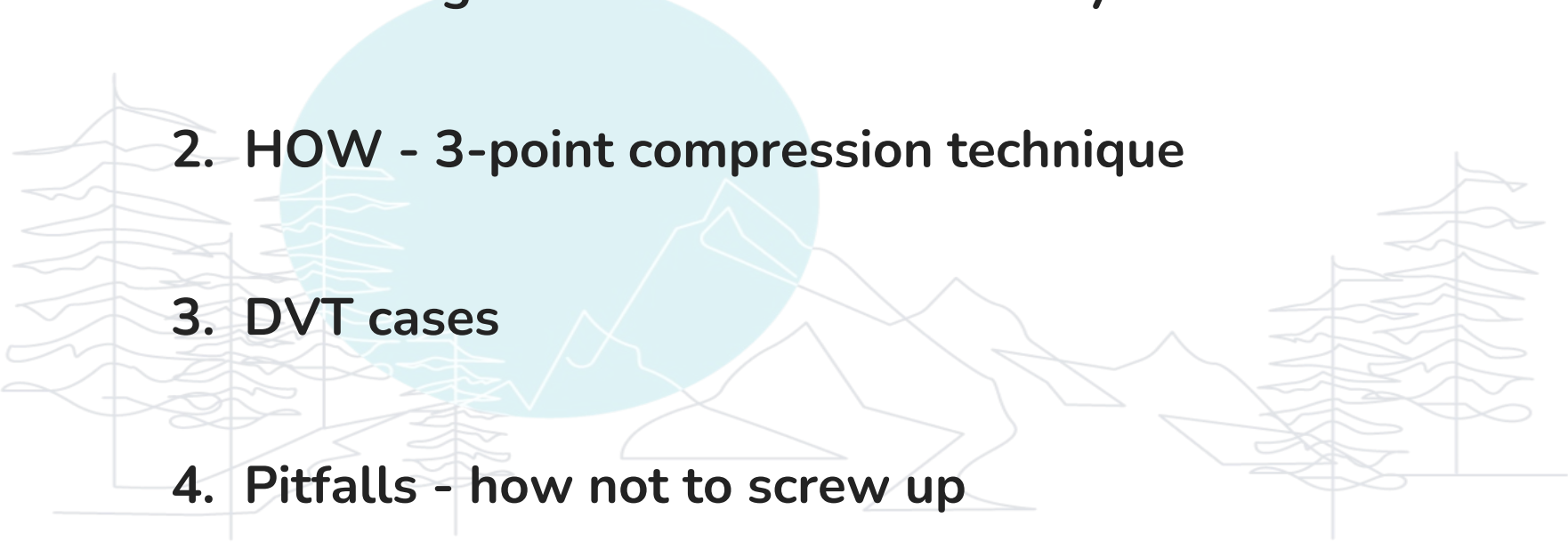
## Financial relationships

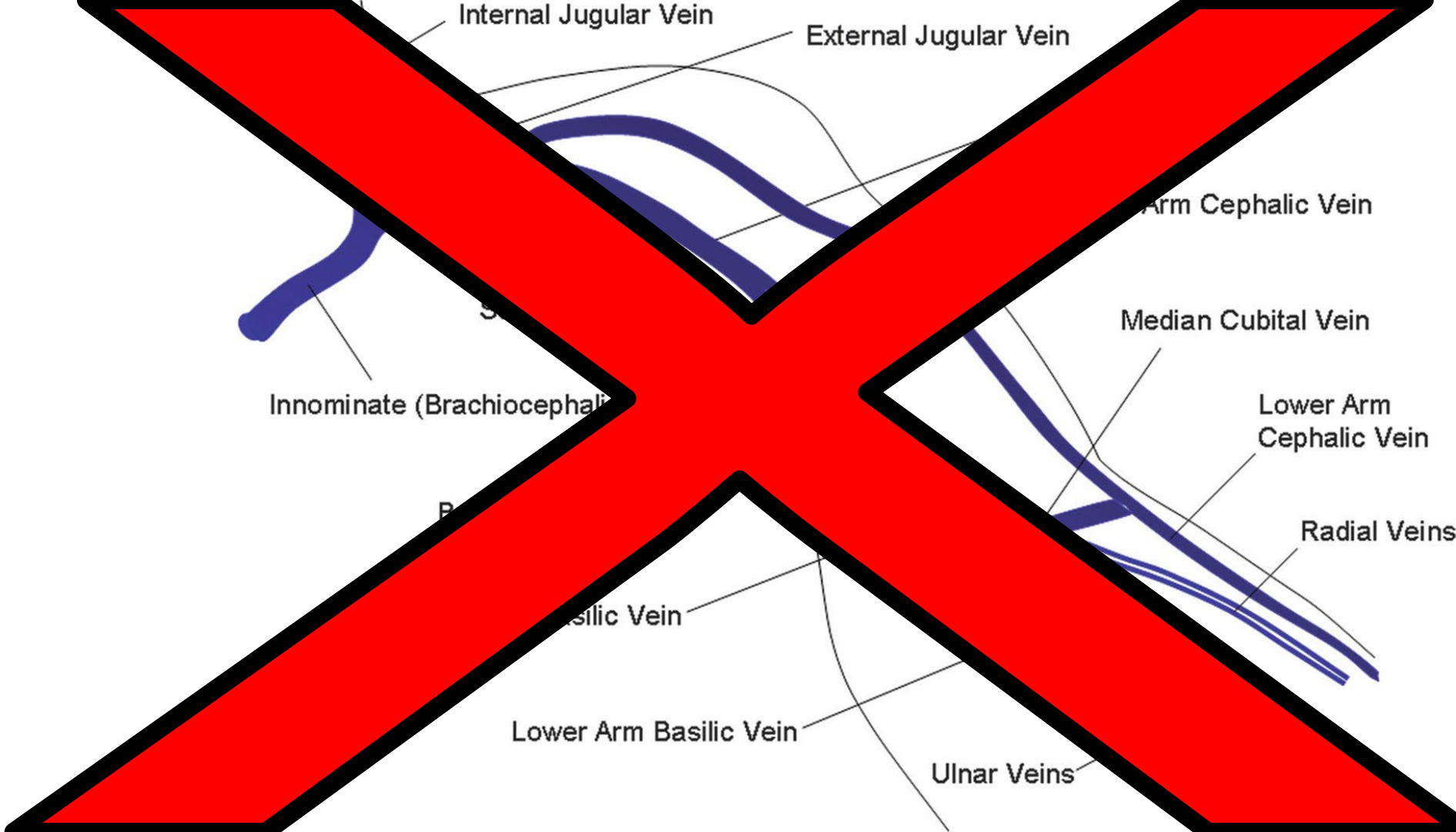
1. Rural Coordination Centre of BC POCUS Co-Lead:  
sessionals, teaching honoraria
1. UBC Continuing Professional Development:  
teaching honoraria



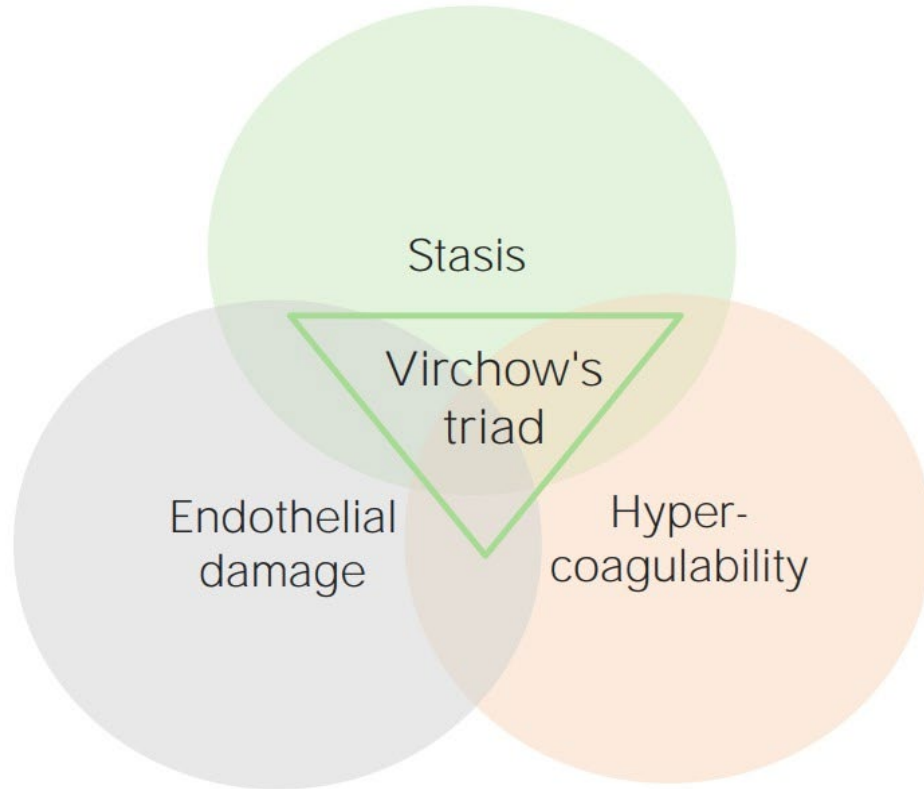
**UBC**  
**CPD**

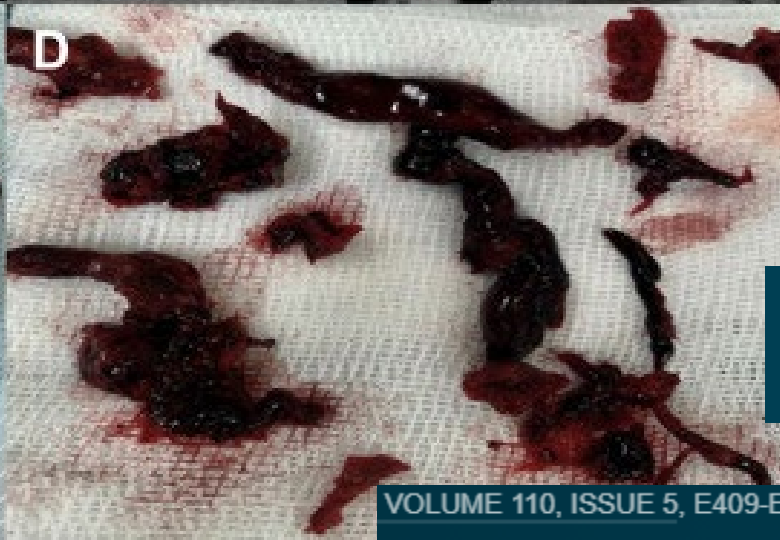
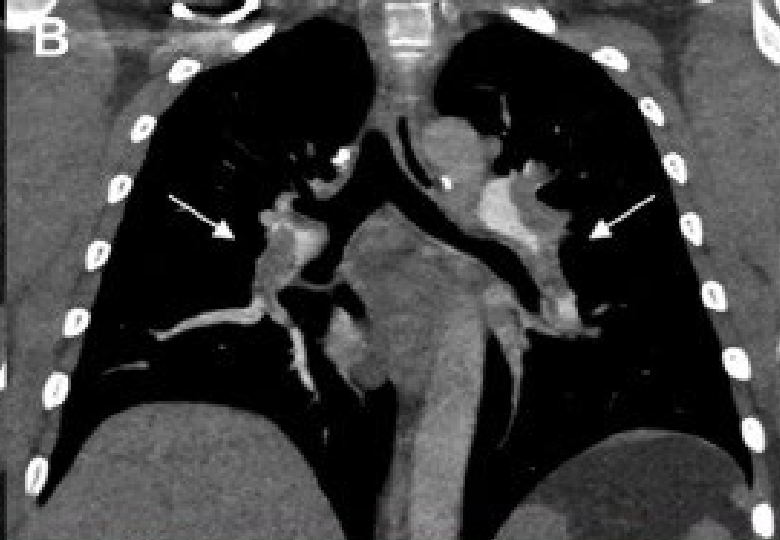
# OBJECTIVES

1. DVT diagnosis and venous anatomy
  2. HOW - 3-point compression technique
  3. DVT cases
  4. Pitfalls - how not to screw up
- 



# Pathogenesis





# Why learn POCUS for DVT?

Physical exam limitations

Earlier treatment

Time & money

Mortality and morbidity



# The Rational Clinical Examination<sup>®</sup>

## The Rational Clinical Examination

### Does This Patient Have Deep Vein Thrombosis?

Sonia S. Anand, MD, MSc; Philip S. Wells, MD, MSc; Dereck Hunt, MD;  
Pat Brill-Edwards, MD, MSc; Deborah Cook, MD, MSc; Jeffrey S. Ginsberg, MD

*JAMA*. 2006;295(2):199-207. doi:10.1001/jama.295.2.199

“The clinical examination alone is unreliable without objective testing”

“3/4 of patients presenting with suspected DVT have nonthrombotic causes of leg pain”



## Likelihood Ratio

Unilateral leg  
swelling

2.1

Redness

NS

Calf tenderness

NS

“Homan’s sign”

NS

Absence of  
swelling

0.5

# Well's criteria

Active cancer Treatment or palliation within 6 months	No 0	Yes +1	Localized tenderness along the deep venous system	No 0	Yes +1
Bedridden recently >3 days or major surgery within 12 weeks	No 0	Yes +1	Pitting edema, confined to symptomatic leg	No 0	Yes +1
Calf swelling >3 cm compared to the other leg Measured 10 cm below tibial tuberosity	No 0	Yes +1	Paralysis, paresis, or recent plaster immobilization of the lower extremity	No 0	Yes +1
Collateral (nonvaricose) superficial veins present	No 0	Yes +1	Previously documented DVT	No 0	Yes +1
Entire leg swollen	No 0	Yes +1	Alternative diagnosis to DVT as likely or more likely	No 0	Yes -2

D-dimer

Ultrasound



Source:  
CBC Saskatchewan



Source:  
BC Ferries





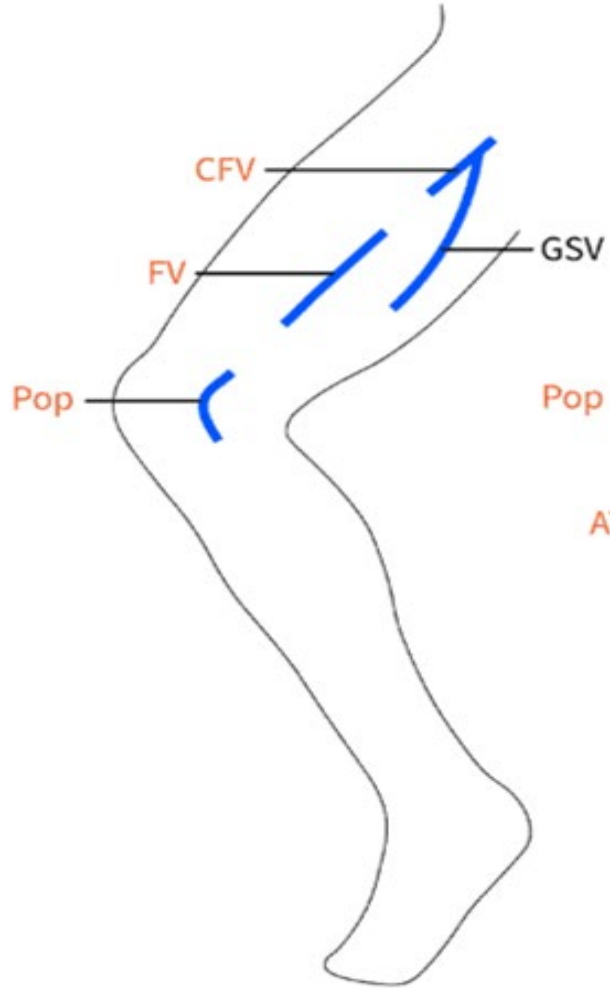
Source:  
Babcock Canada

# 3-point compression US

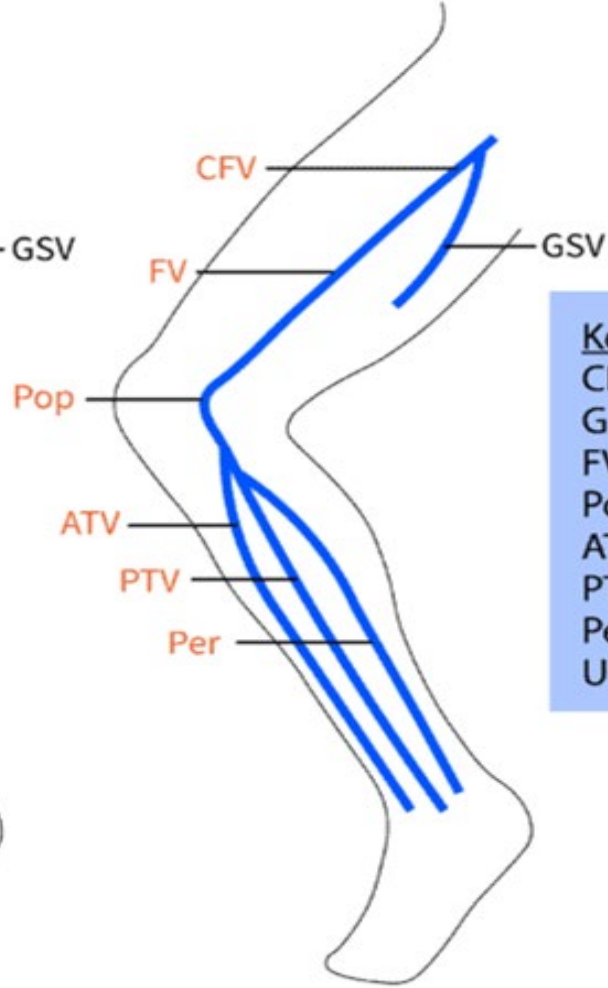
1. Common femoral vein

1. Femoral vein

1. Popliteal vein



3-Point Leg US



Whole Leg US

#### Key

CFV: Common Femoral Vein  
 GSV: Great Saphenous Vein  
 FV: (Superficial) Femoral Vein  
 Pop: Popliteal Vein  
 ATV: Anterior Tibial Vein  
 PTV: Posterior Tibial Vein  
 Per: Peroneal Vein  
 US: Ultrasound



POCUS 101

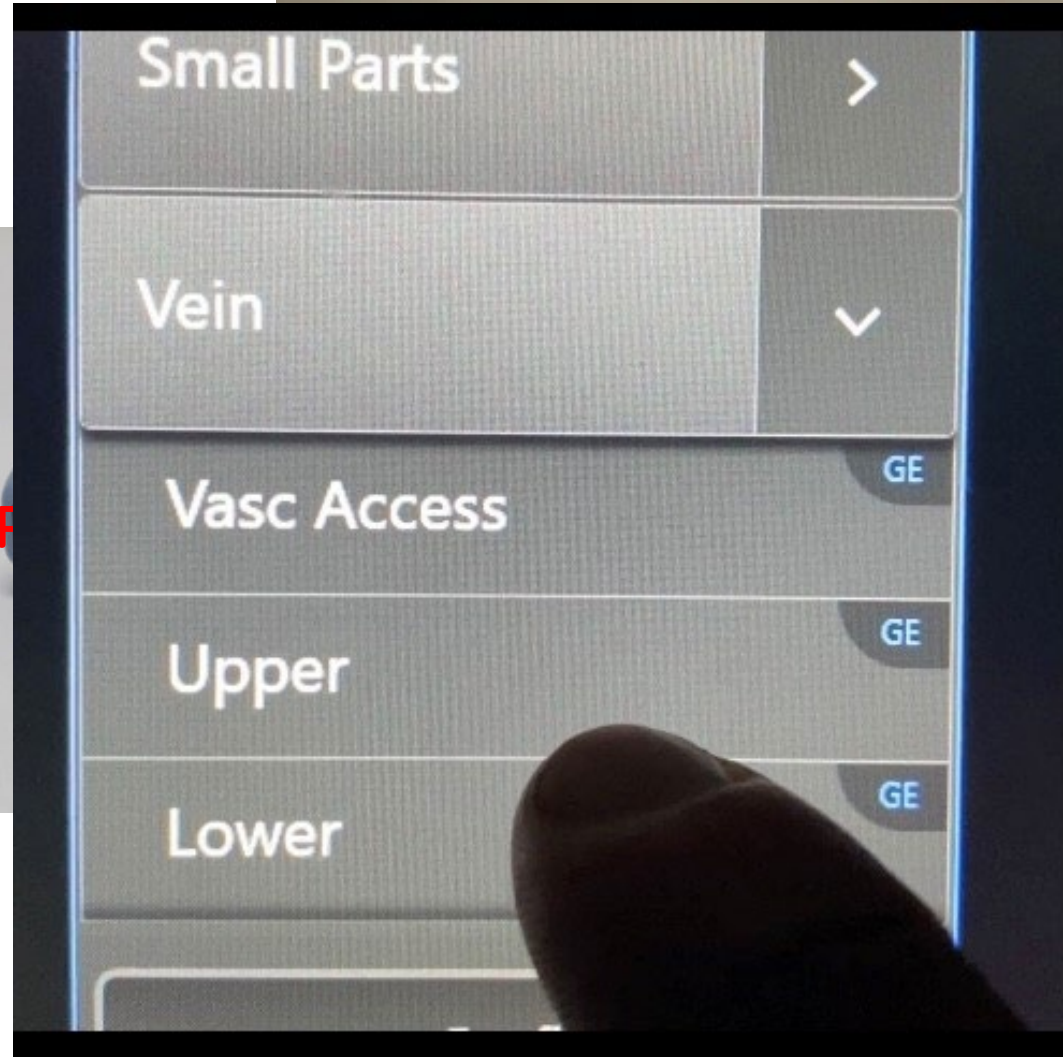


# SETUP

Probe = linear or curvilinear

Positioning = 'frog leg'

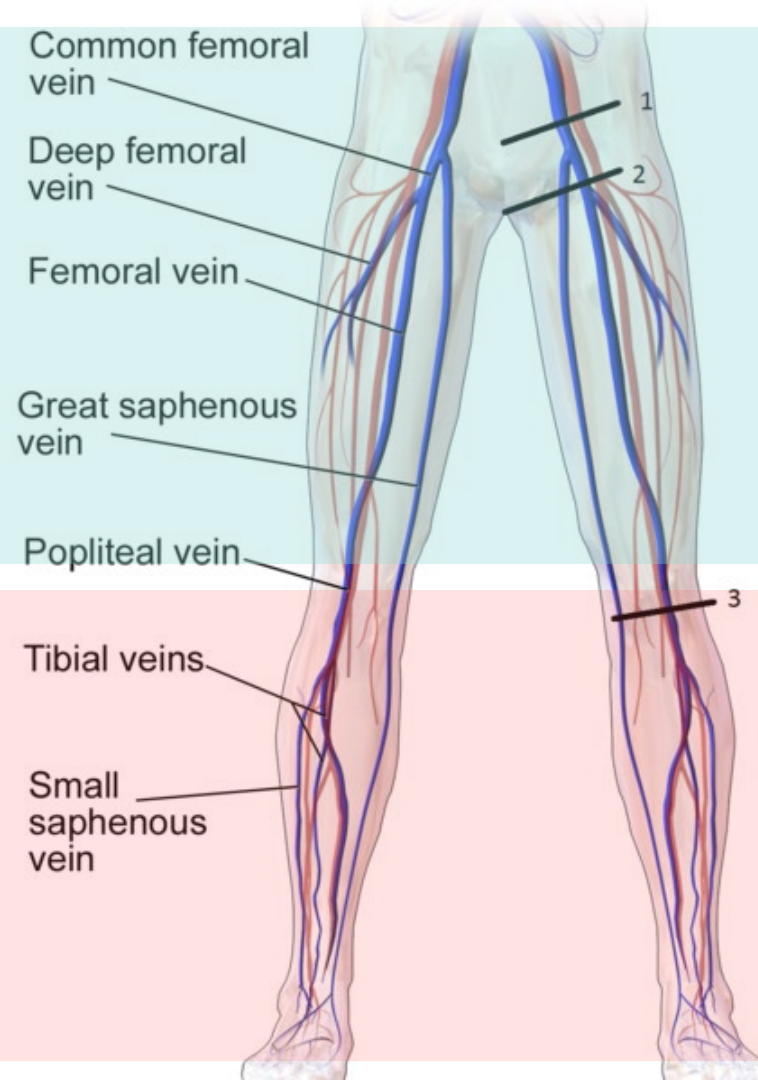
Machine setup = vein or vascular preset



# **Venous ANATOMY**

# PROXIMAL

# DISTAL

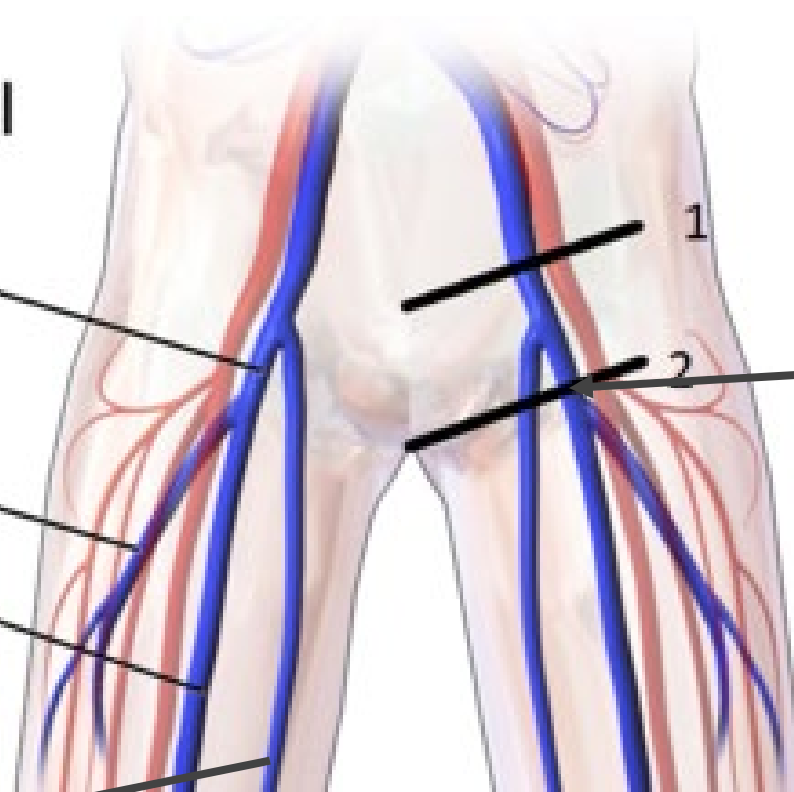


Common femoral  
vein

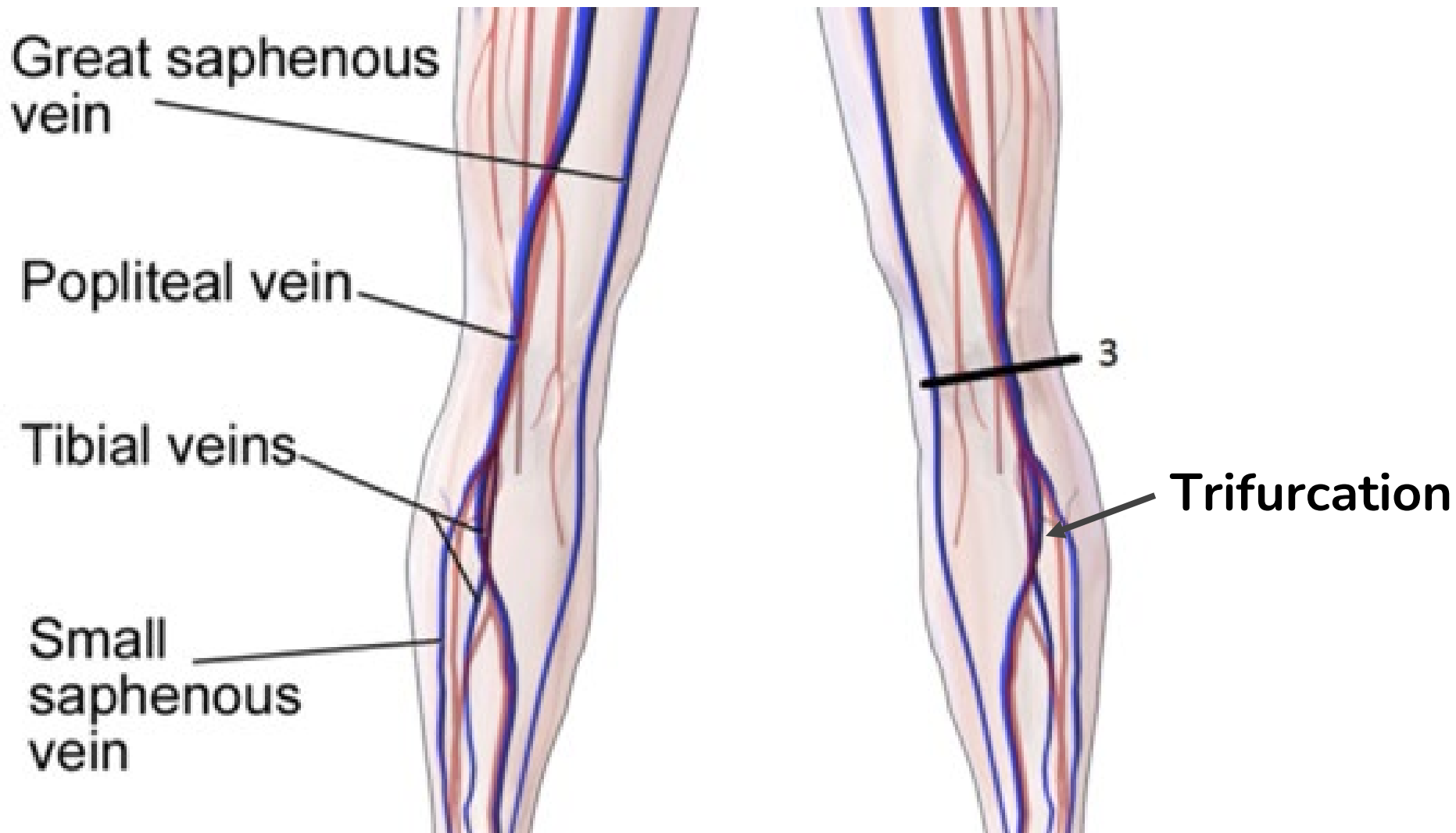
Deep femoral  
vein

Femoral vein

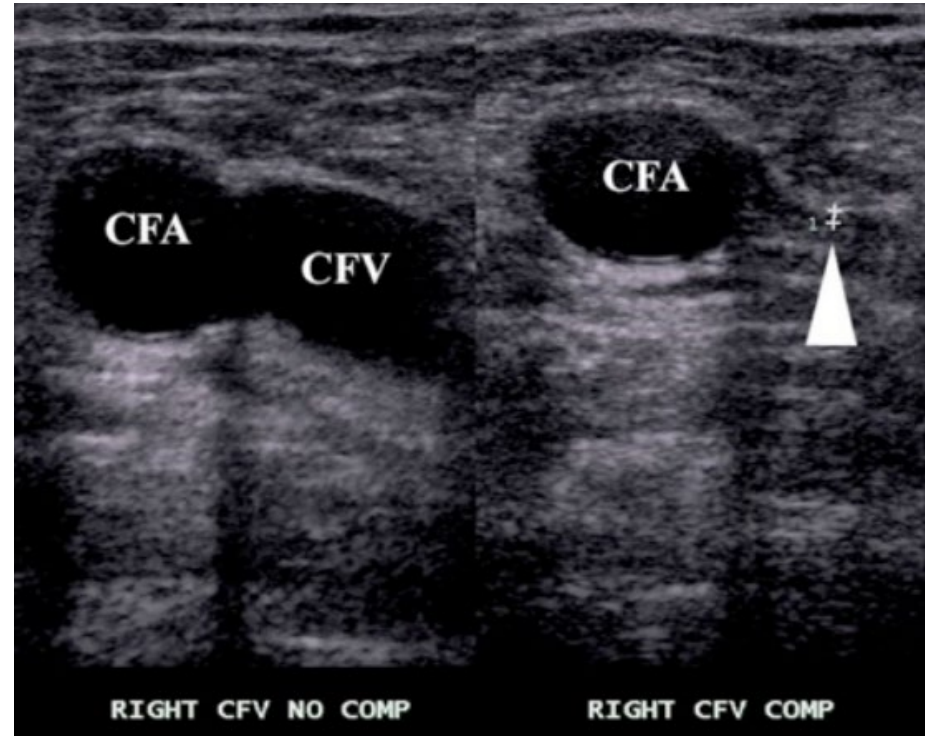
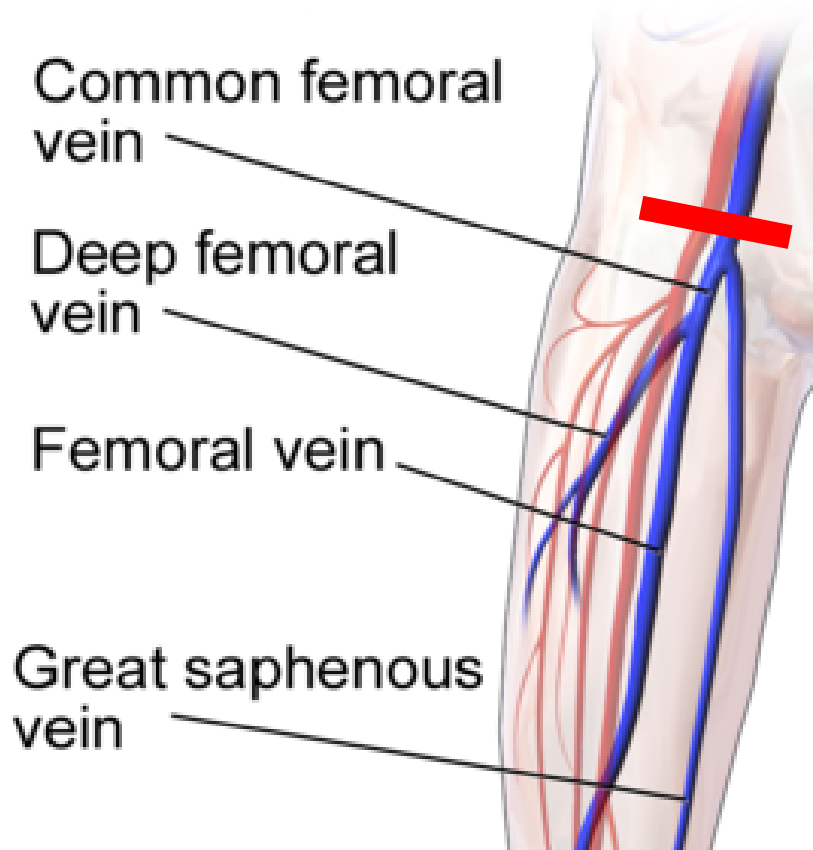
Great saphenous  
vein



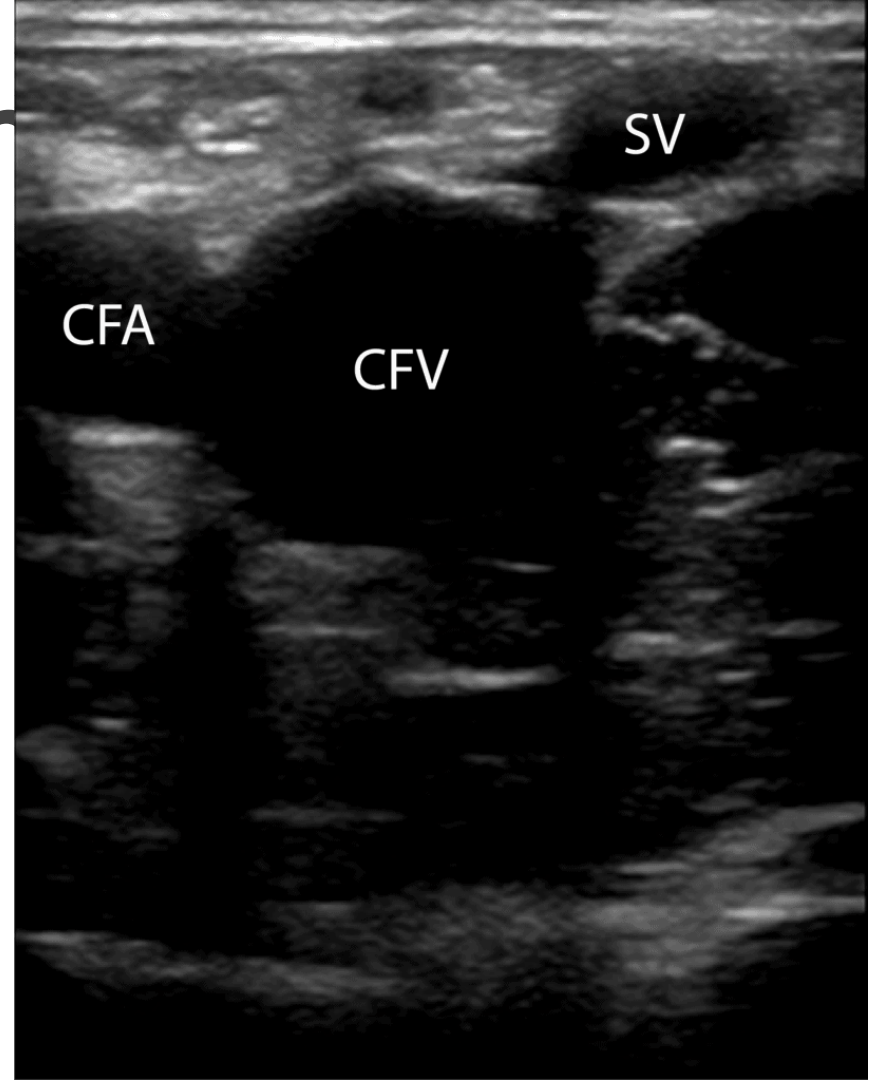
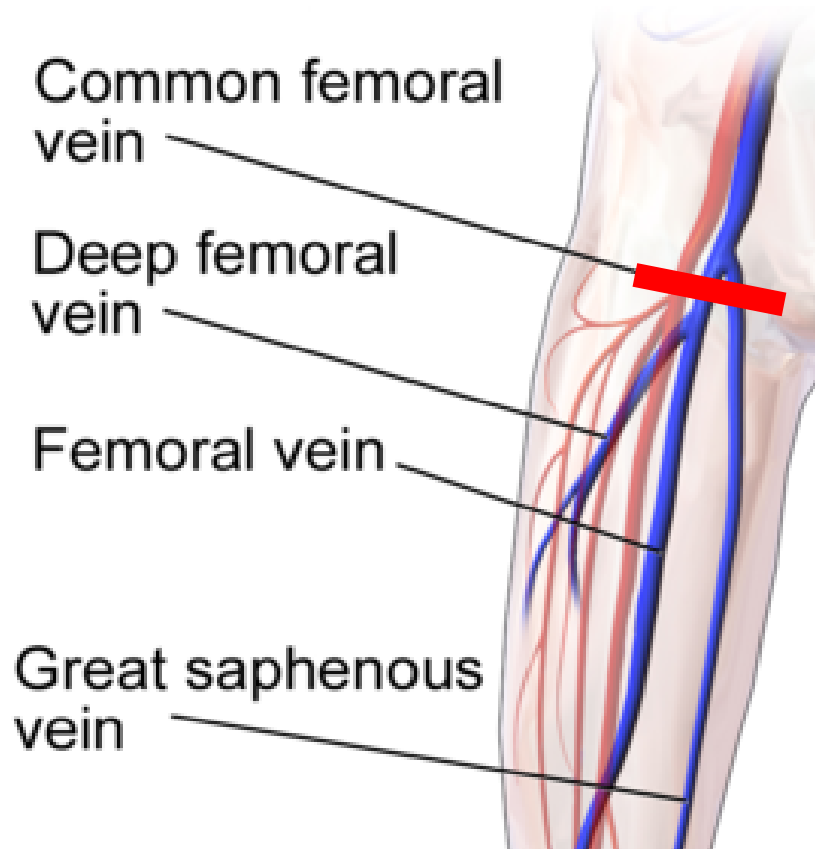
**Bifurcation**



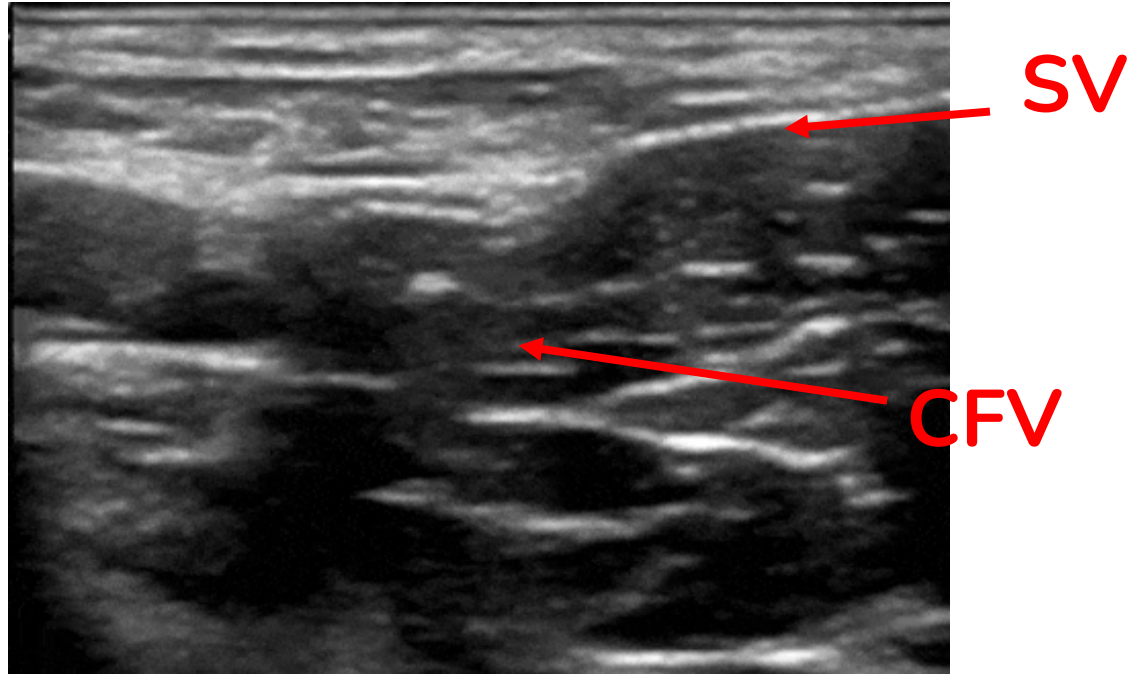
# 3-point compression US



# Great Saphen



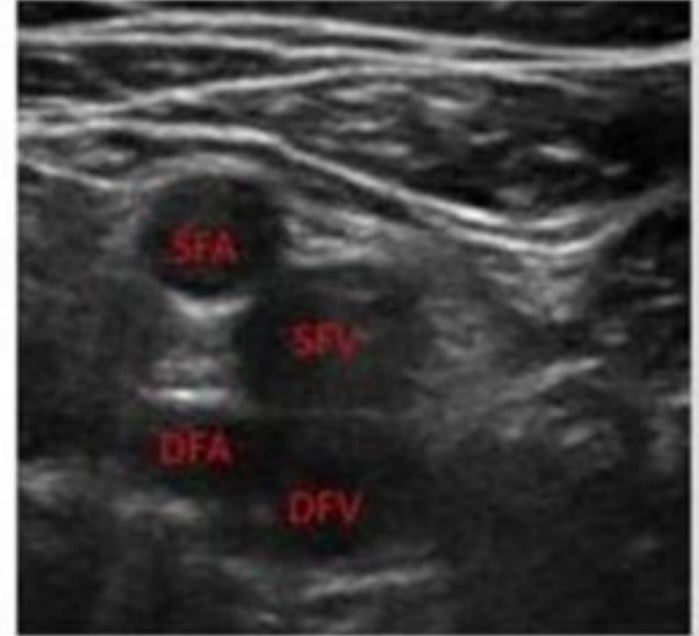
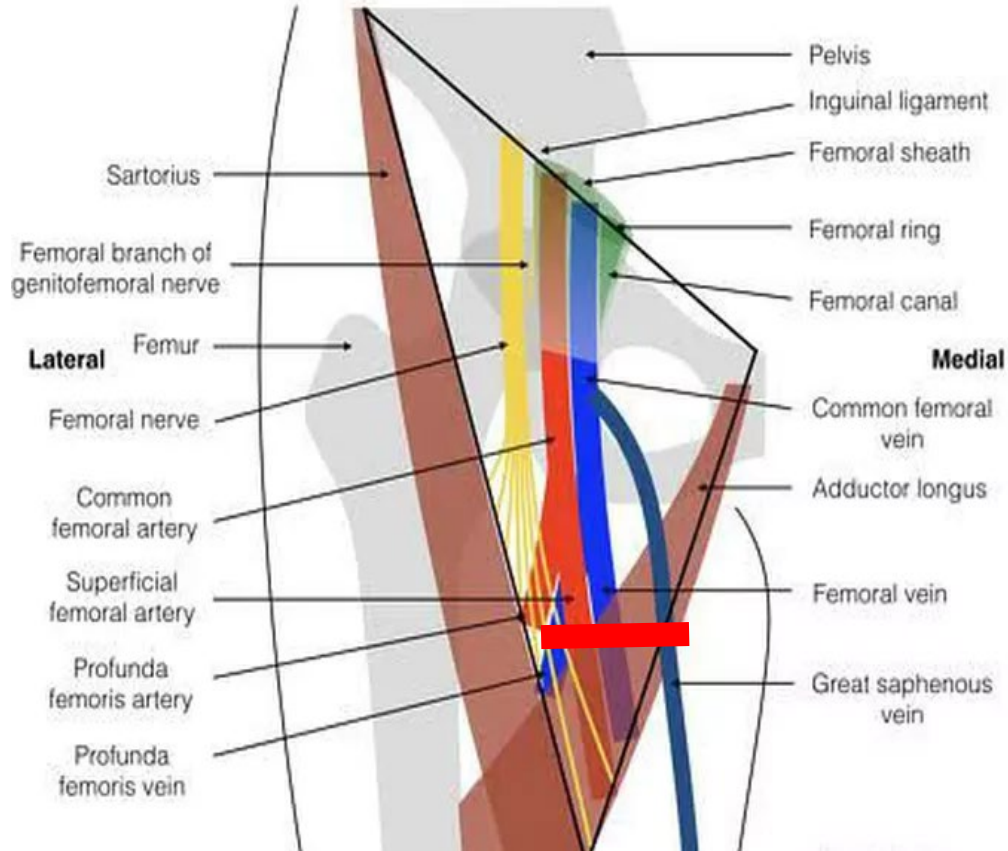
# Saphenous and CFV



**COMPRESSIBLE = GOOD**

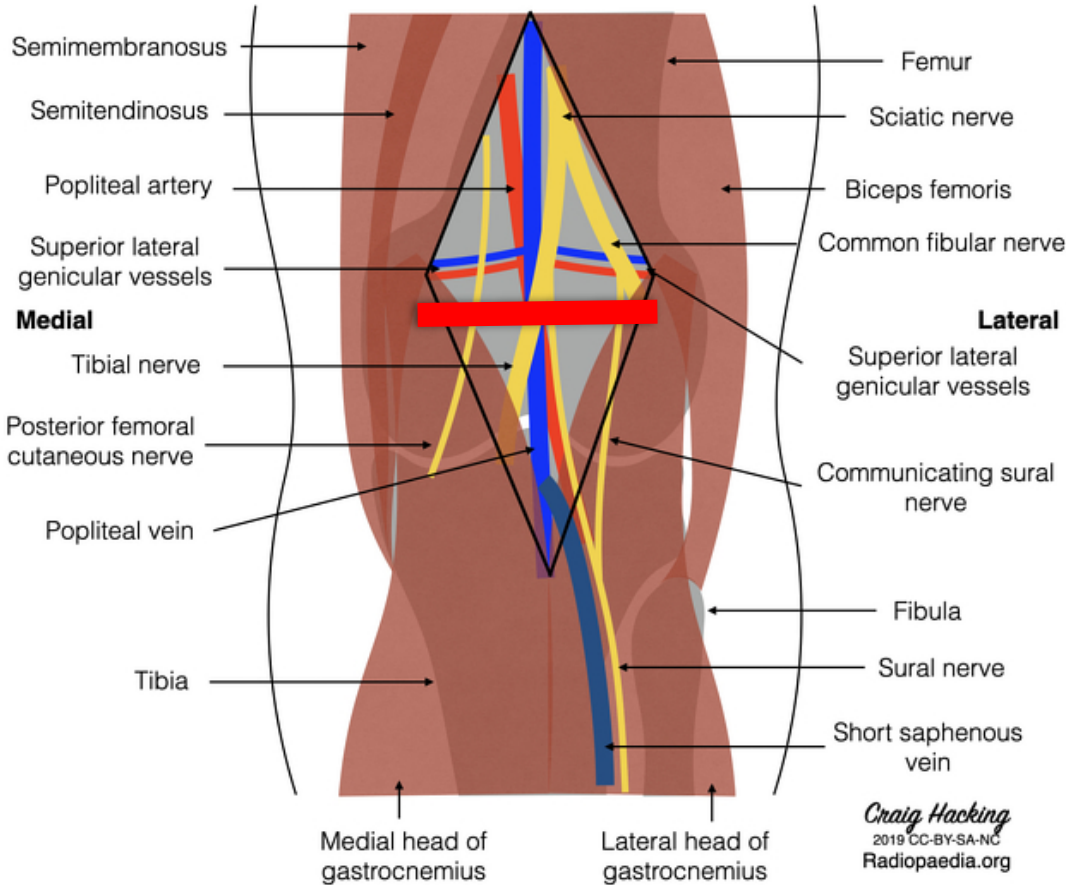


# FEMORAL TRIANGLE



# POPLITEAL FOSSA

ession US



# “Pop on top”

PV

PA



Just enough to  
compressing to



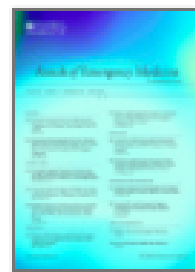


**EVIDENCE**



# Annals of Emergency Medicine

Volume 56, Issue 6, December 2010, Pages 611-613



Imaging/editorial

## Point-of-Care Ultrasonographic Deep Venous Thrombosis Evaluation After Just 'Ten Minutes' Training: Is This Offer Too Good to Be True?

Michael Blaivas MD  

# DVT

Proximal Compression Ultrasound (CUS),  
Complete CUS, or Color Flow Duplex US

Sensitivity

96.1

Specificity

96.8

Positive LR

30.03

Negative LR

0.04

Courtesy



# CASES





ZI

Vasc/GENTRAL LINE

L8-3/CH7MHz

DR65/M4/P2

G80/E2/100%

MI1.5 TIs0.2

3.5 cm

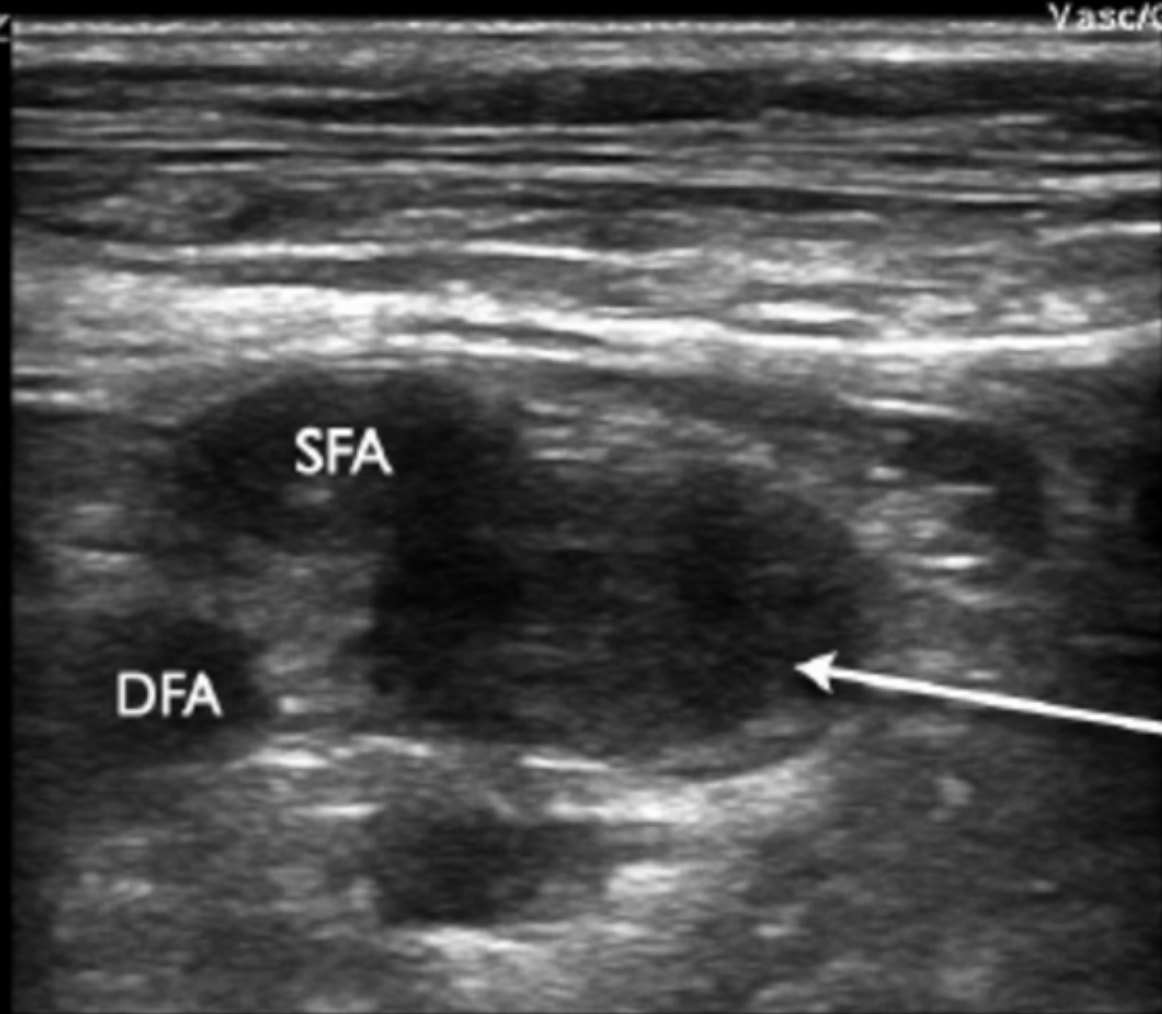
14 Hz

ZSI 0

SFA

DFA

CFV DVT



POP V



POP A



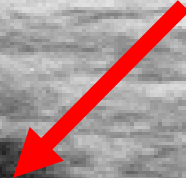
FV



DFV



CFA



Vasc Venous

TIS0.3 MI 1.1

L12-3

50Hz

RS

Z 1.0



X3

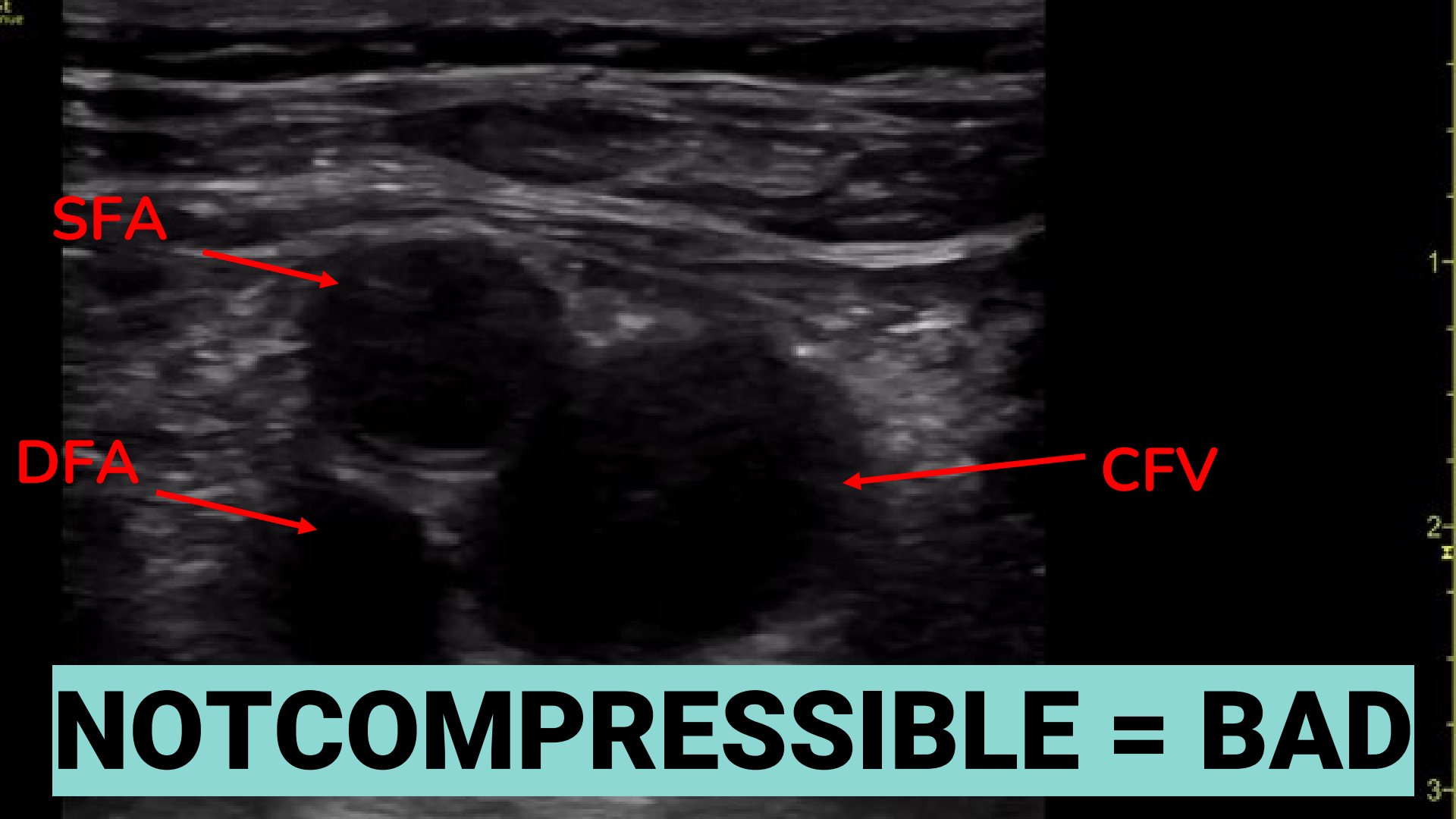
X

55M fit tourist  
SOBOE, “forgot puffers”  
No leg swelling

Sats 100%, BP N  
HR 100 with walking  
Mild cough

Remote DVT  
Asthma

Leg exam  
normal



SFA



DFA



CFV

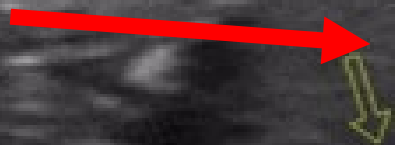


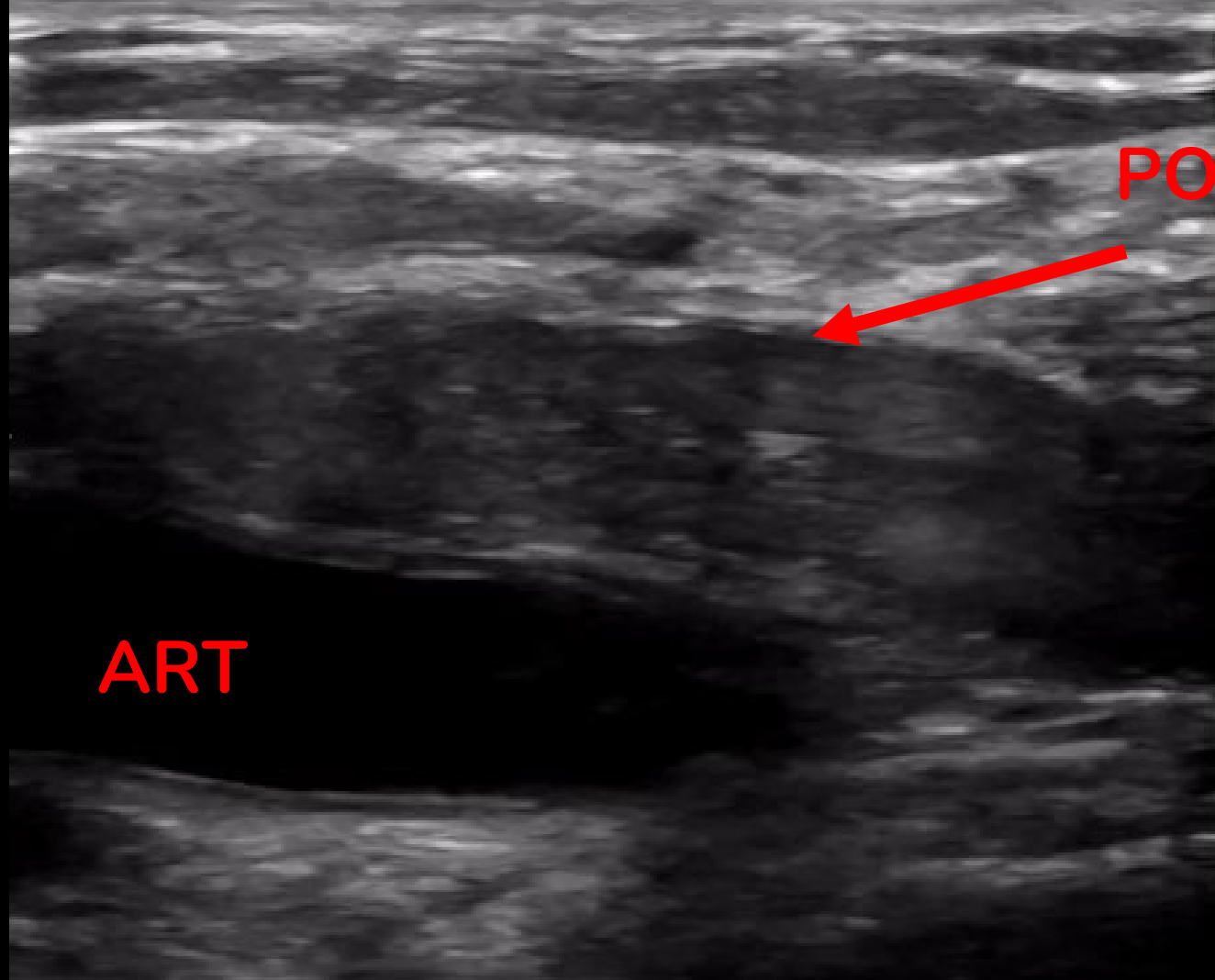
**NOTCOMPRESSIBLE = BAD**

POP V

clot query

ART





ART

POP V

1

2

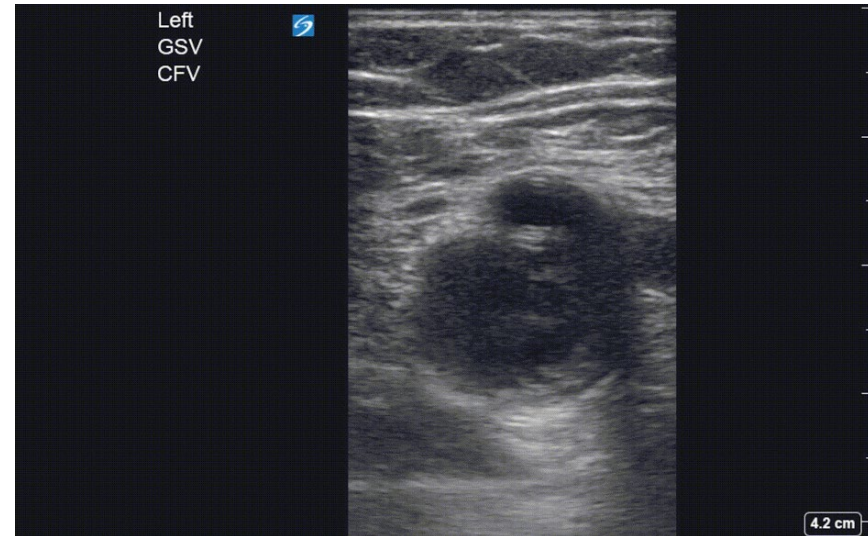
3



# Documentation

POCUS: B/L lower limb

- R femoral vein/popliteal patent with good flow on doppler
  - L femoral vein non-compressable 2cm below inguinal ligament with what looks like increased echogenicity within the vessel and decreased flow which extends down the leg
  - L popliteal vein \*non-compressable\* with increased echogenicity within the vessel
- (Completed with Dr. J. Chrones assisting and repeating)

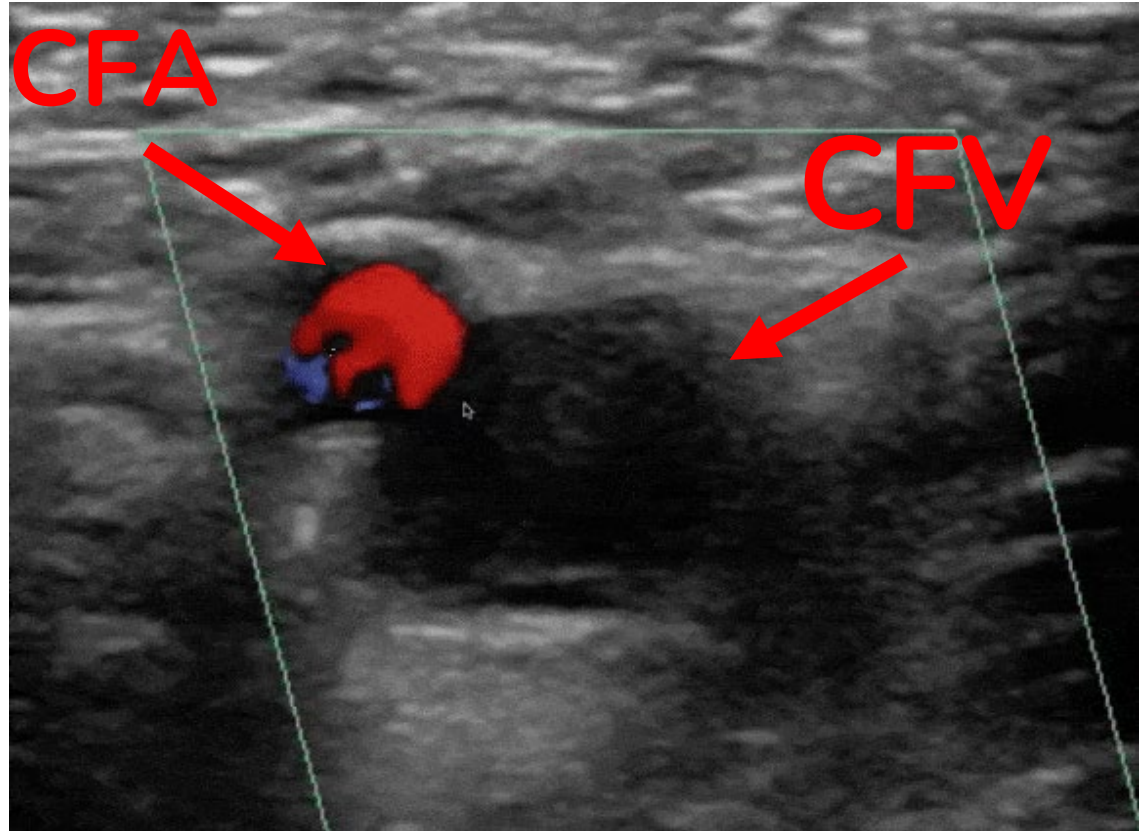


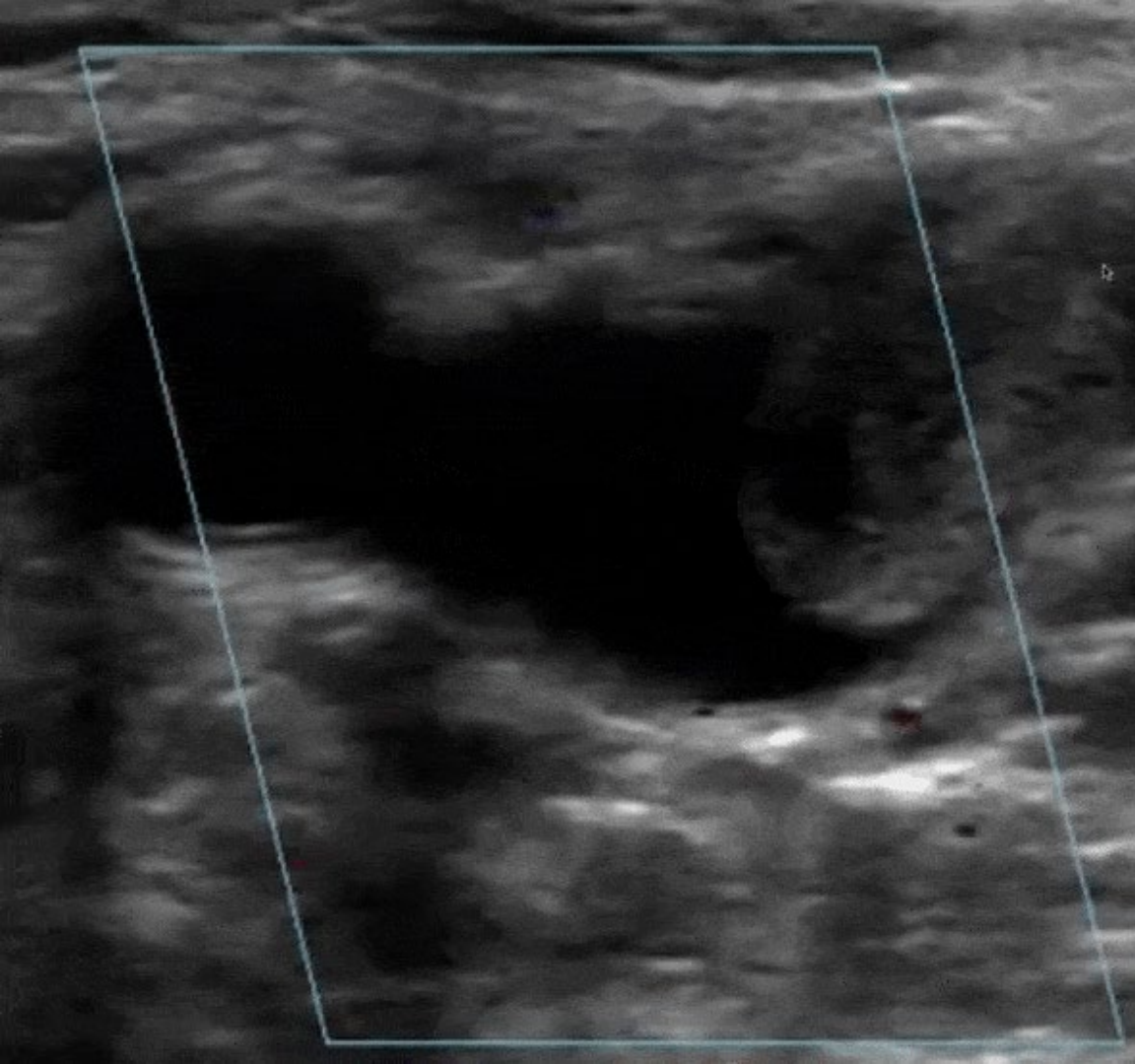
# DVT POCUS 2.0

Add long axis views

Add colour doppler

Augmentation with calf squeeze





**Greater saphenous vein clot**

**Colour shows patency of FV**

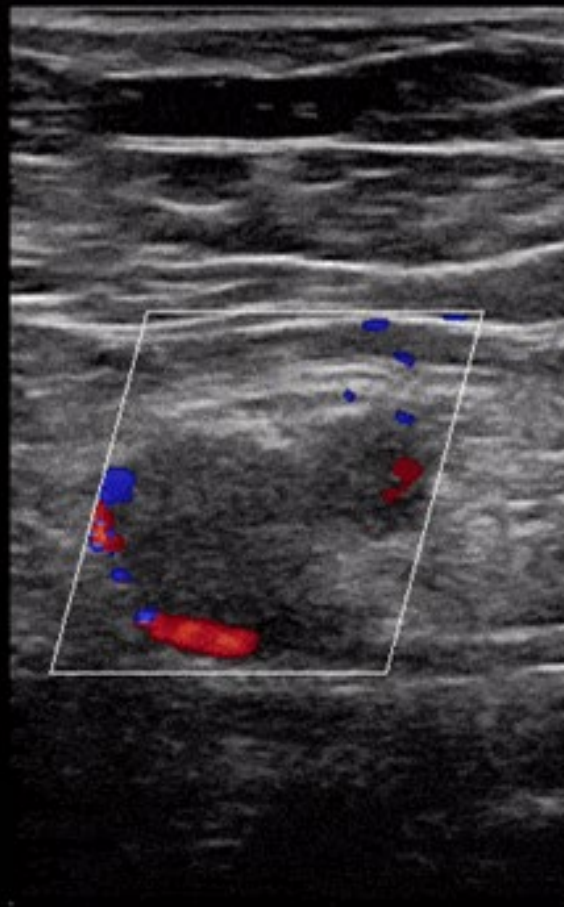
**Augmentation**

Venous.  
L12-4  
16Hz  
6.0cm

2D  
Gen  
Gn 50  
60  
1 / 3 / 2

Color  
4.4 MHz  
Gn 55  
3 / 5 / 4  
Filtr Low

P



+7.0  
cm/s  
-7.0

<x

5

6.0cm

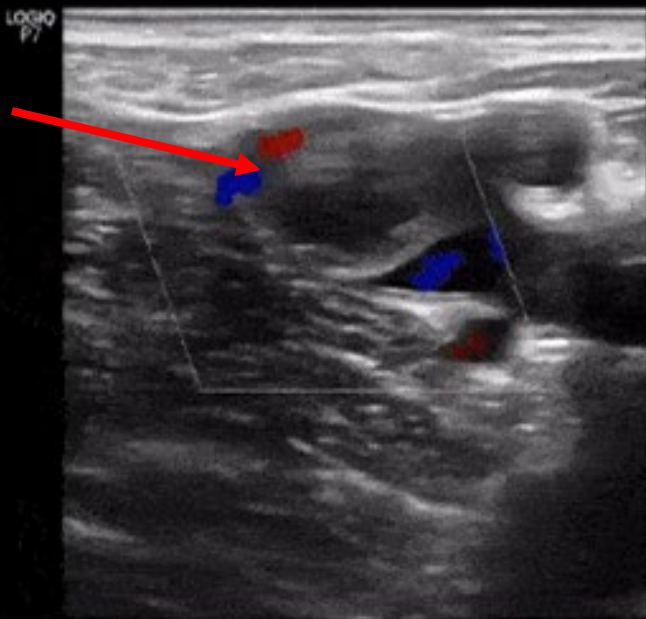
G  
P R  
4.0 12.0





# COMMON FEMORAL VEIN THROMBUS

CLOT



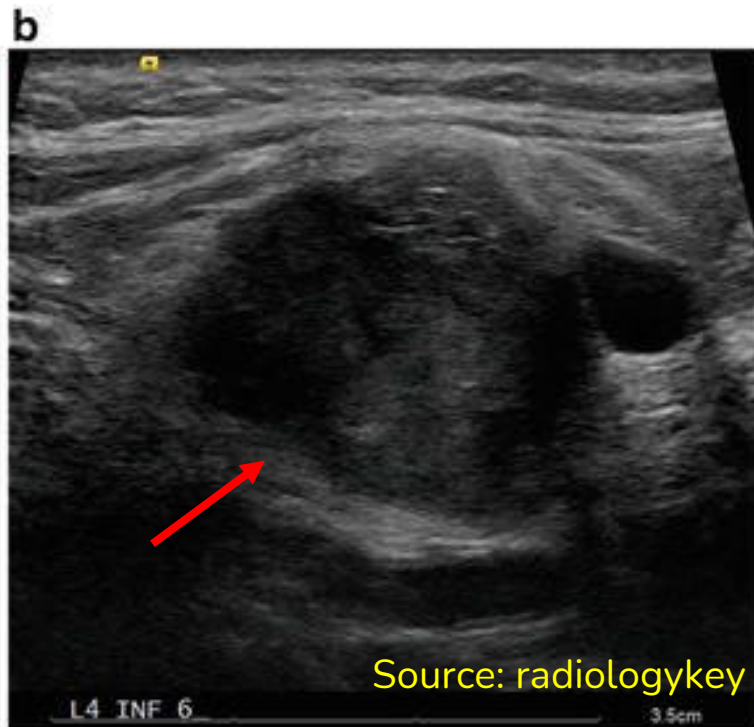
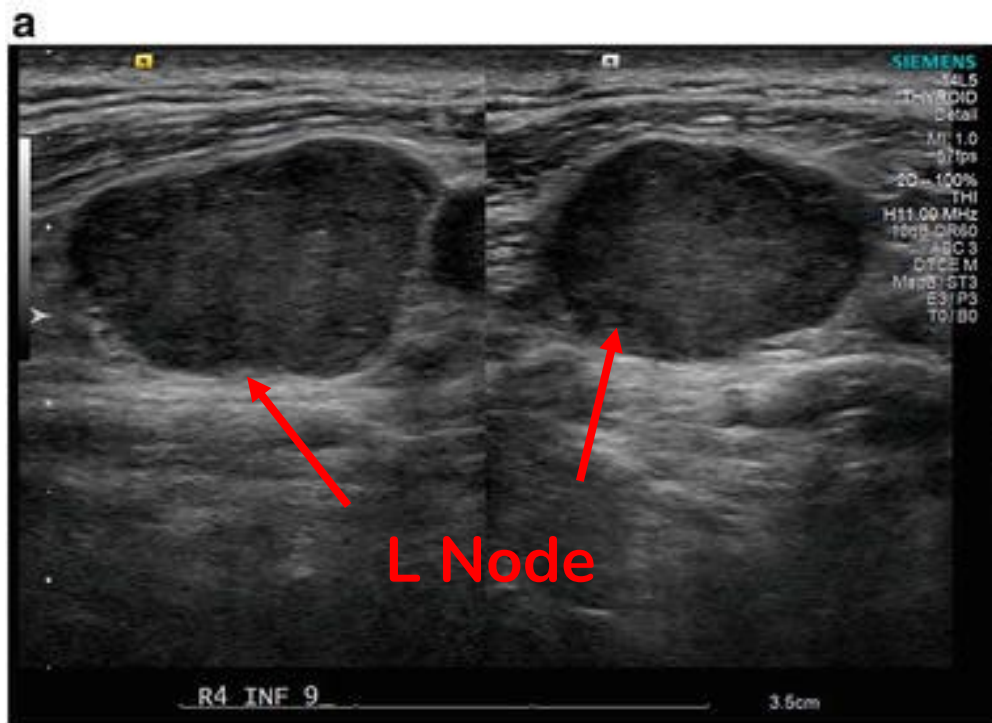
SHORT AXIS  
COLOR DOPPLER



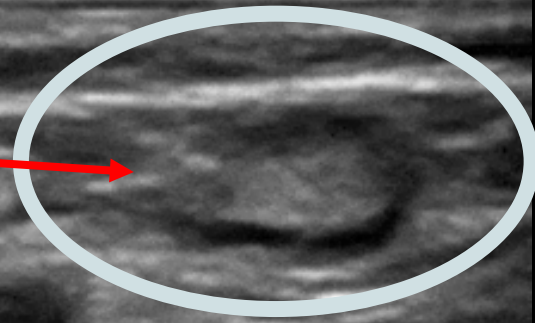
CLOT

LONG AXIS

# CLOT or NOT?

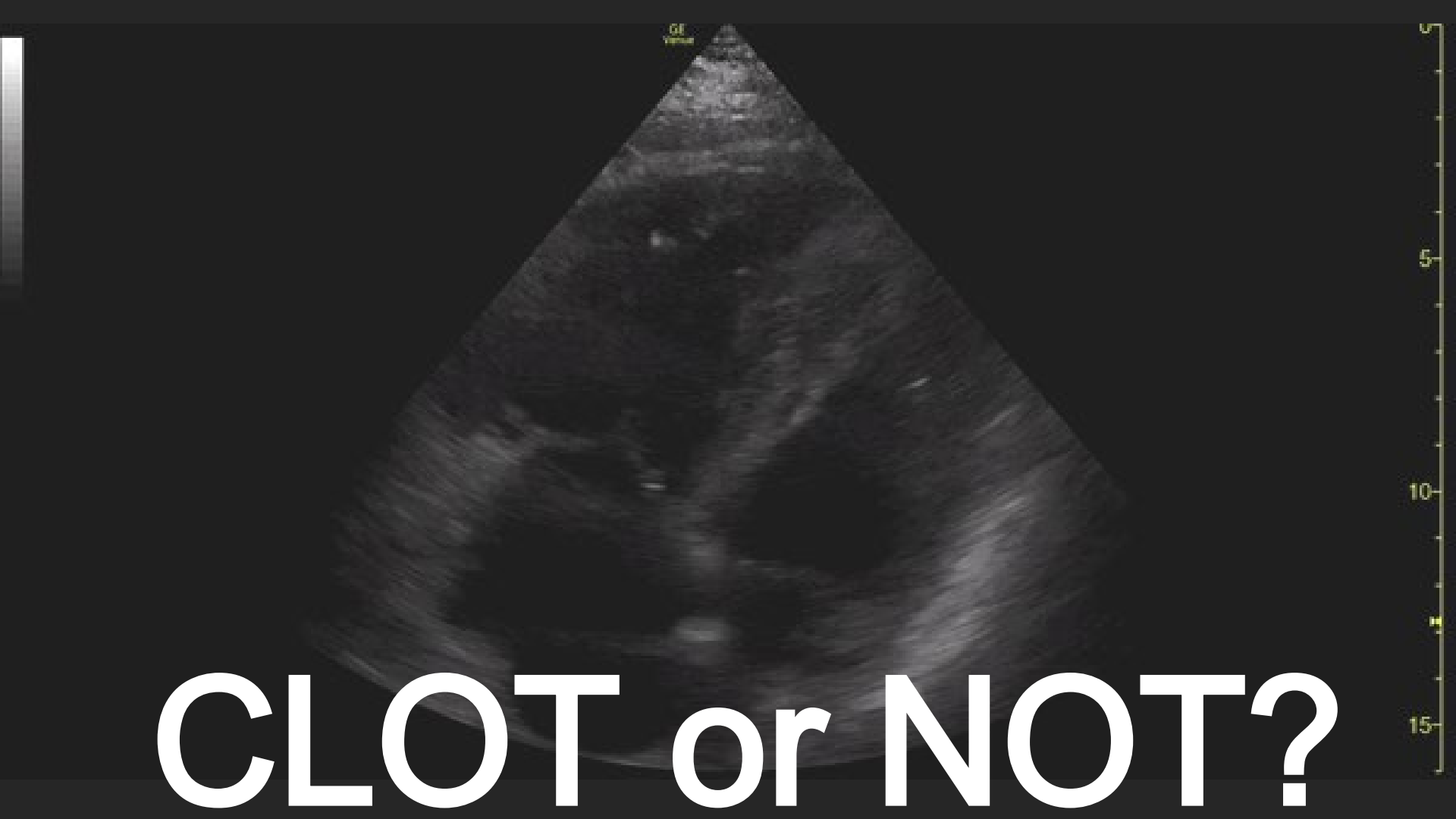


L Node

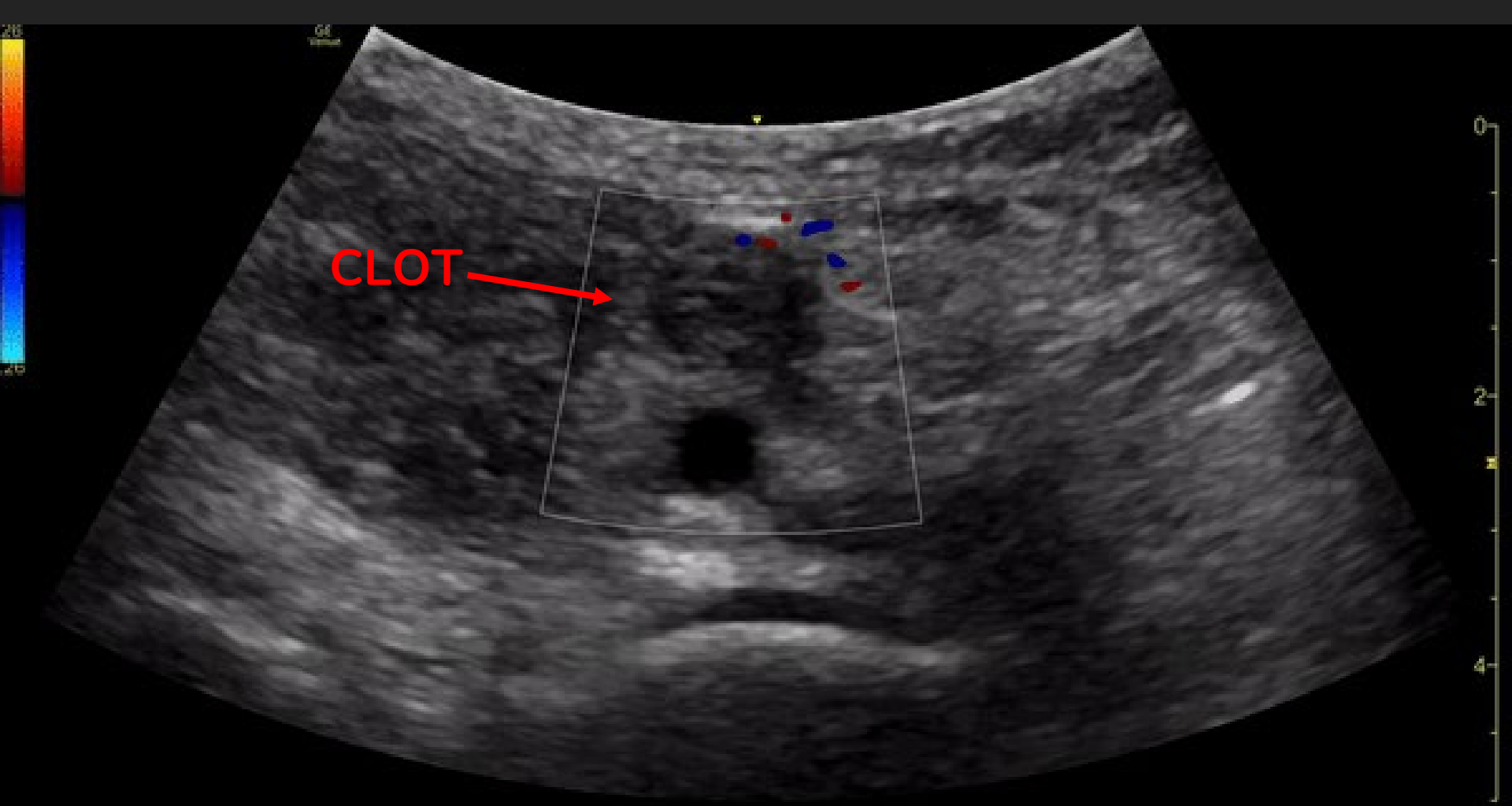


CLOT or NOT?





**CLOT or NOT?**



JC 2011Nov29 15:45

P

Sup

L25

MI

0.7

TIS

0.2

A

B

DVD

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

3.1

CLOT

CLOT

CEPHALIC V

G SAPHENOUS V

CLOT or NOT?

# Staying out of trouble - Pitfalls

Know the clot mimics - lymph nodes, hematoma, pseudoaneurysms

Superficial vs deep clots

Not seeing all the areas needed

Isolated mid-FV clots: 2-8%

Not assessing PV well (usually inadequate compression)

**Don't  
FORGET!**



Upper extremity

Jugular

Pelvic

Portal

Superficial

# Deep Vein Thrombosis Ultrasound Pocket Card

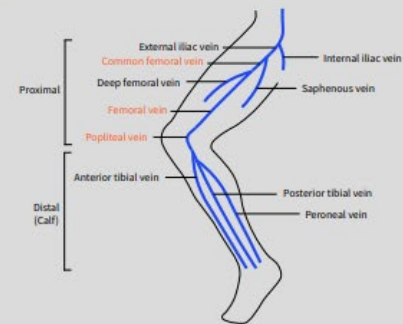
POCUS 101



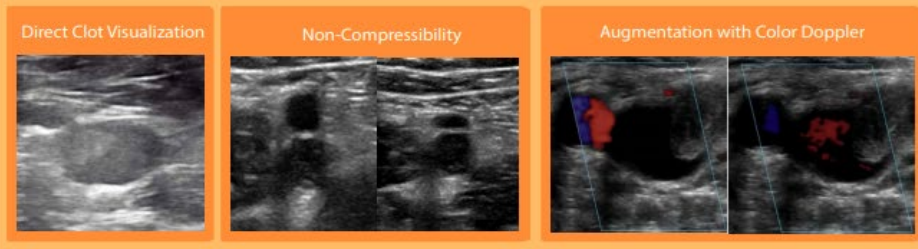
Courtesy

POCUS 101

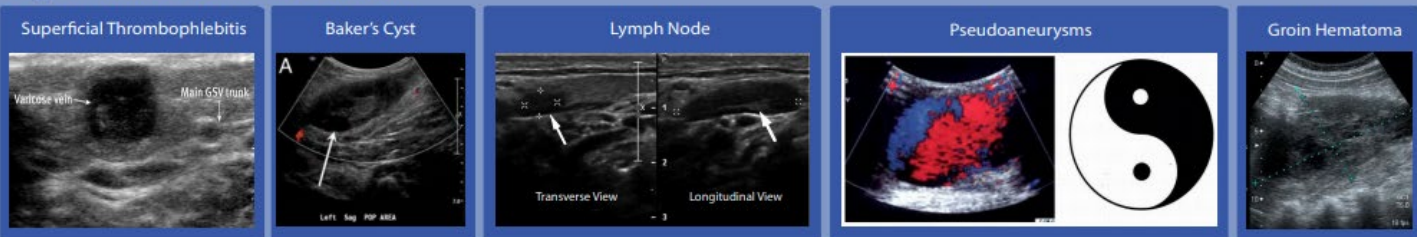
## Deep Vein Thrombosis Scanning Sites



## Deep Vein Thrombosis Pathology



## Deep Vein Thrombosis False Positives



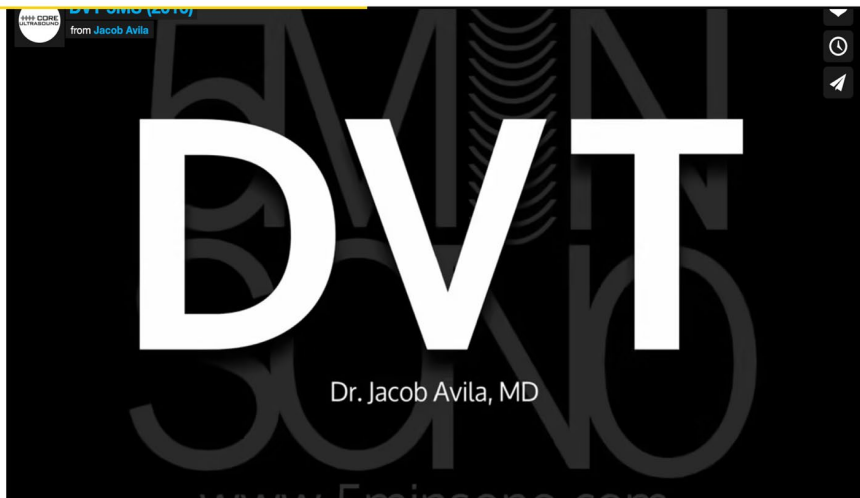
# WEB RESOURCES



COURSES 5 MIN SONG ▼ US OF THE WEEK US PODCAST ▼ MORE STUFF ▼



Tutorials ▼ Blog ▼



**DVT Ultrasound Made Easy: Step-By-Step Guide**



# References



JAMA Rational clinical exam article for DVT diagnosis: *JAMA*. 2006;295(2):199-207. doi:[10.1001/jama.295.2.199](https://doi.org/10.1001/jama.295.2.199)

MedCalc Wells' score for DVT: <https://www.mdcalc.com/calc/362/wells-criteria-dvt>

POCUS 101 DVT: <https://www.pocus101.com/dvt-ultrasound-made-easy-step-by-step-guide/>

Pulmonary Embolism: *N Engl J Med* 2022;387:45-57. <https://www.nejm.org/doi/full/10.1056/NEJMcp2116489>

Core Ultrasound DVT resources: <https://coreultrasound.com/dvt/> and <https://coreultrasound.com/dvt-part-1-with-jacob-avila-episode-150-ultrasound-podcast-archives/>



**Next  
UP**

**JUN 14 2024: ADULT ABDOMEN**  
**Dr Kevin Fairbairn, HOUSE Medical**  
**Director**

**MAY 23 2024: RURAL POCUS CONGRESS**

# PRE-CONFERENCE COURSE

## Rural PoCUS Congress

May 23, 2024 | 10:00am – 5:00pm  
Whistler Conference Centre, Whistler, BC

**Registration Fee: \$975 + GST \***

*Fee includes full conference day, instructed hands-on scanning time, resources from presentations, lunch, coffee breaks, and evening reception.*

The first Rural Point-of-Care Ultrasound Skills (PoCUS) Congress is happening one day before the BC Rural Health Conference. Join us at the Whistler Conference Centre for a full-day event focusing on PoCUS skills and applications. This event includes 5 hours of live scanning stations and key talks on ultrasound topics such as cardiology, MSK, ocular, and more. The goal of this program is to provide learners with increased confidence in their PoCUS skills and to cultivate meaningful connections through shared passion for PoCUS.

This event is intended for all PoCUS users from beginner to advanced. To view what topics will be covered, feel free to view [the agenda here](#).

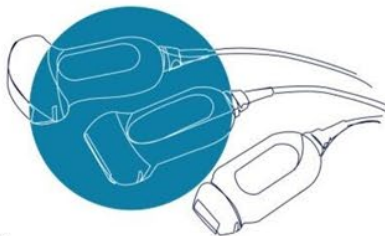
*\*Registrants of the Rural PoCUS Congress receive an exclusive 10% OFF discount to the RHC Physician/NP rate. Register for the PoCUS Congress first, and the discount code will be emailed to you in your confirmation email.*

**Rural PoCUS Congress is accredited for :**

Up to 5.75 Mainpro+ credits

**REGISTER NOW**

BRITISH COLUMBIA  
**RHC** Rural Health  
CONFERENCE





# HAAWA!

Tracy Morton: [zenbro@gmail.com](mailto:zenbro@gmail.com)

# Questions?