CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE

CONTROVERSIES & UPDATES IN VASCULAR SURGERY

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The definition of critical iliac vein stenosis needing an invasive treatment

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Disclosure

Speaker name: Fedor Lurie

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I do not have any potential conflicts of interest

The definition of critical iliac vein stenosis <u>needing an invasive treatment</u>

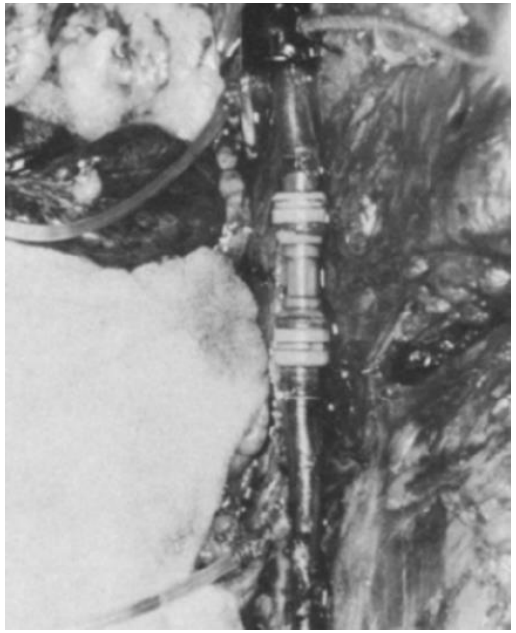
- Concept of “critical stenosis”
- Concept of optimal diameter
- Concept of optimal adaptive limits

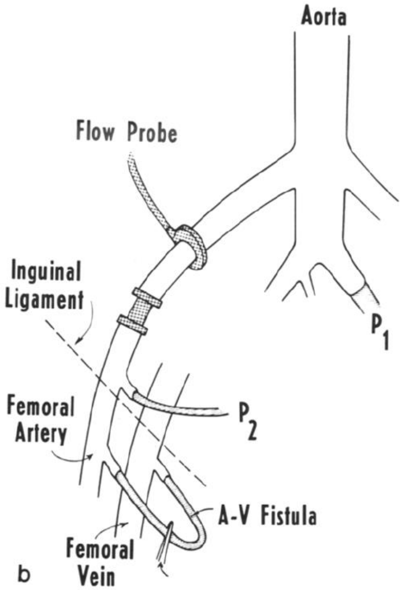
"Critical stenosis" concept

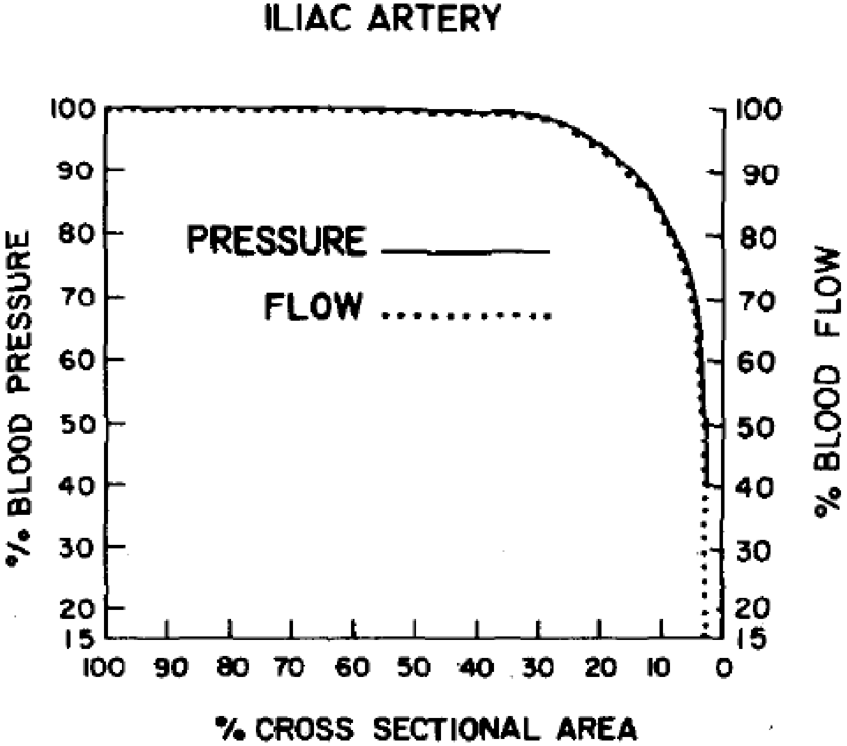
Mann, F. C., Herrick, J. F., Essex, H. E., Baldes, E. J. Surgery 4: 249-252, 1938

No change in ICA flow in <50% stenosis, 50% reduction in 90% stenosis

May AG, DE Weese JA, Rob CG. Surgery. 1963 Apr;53:513-24.

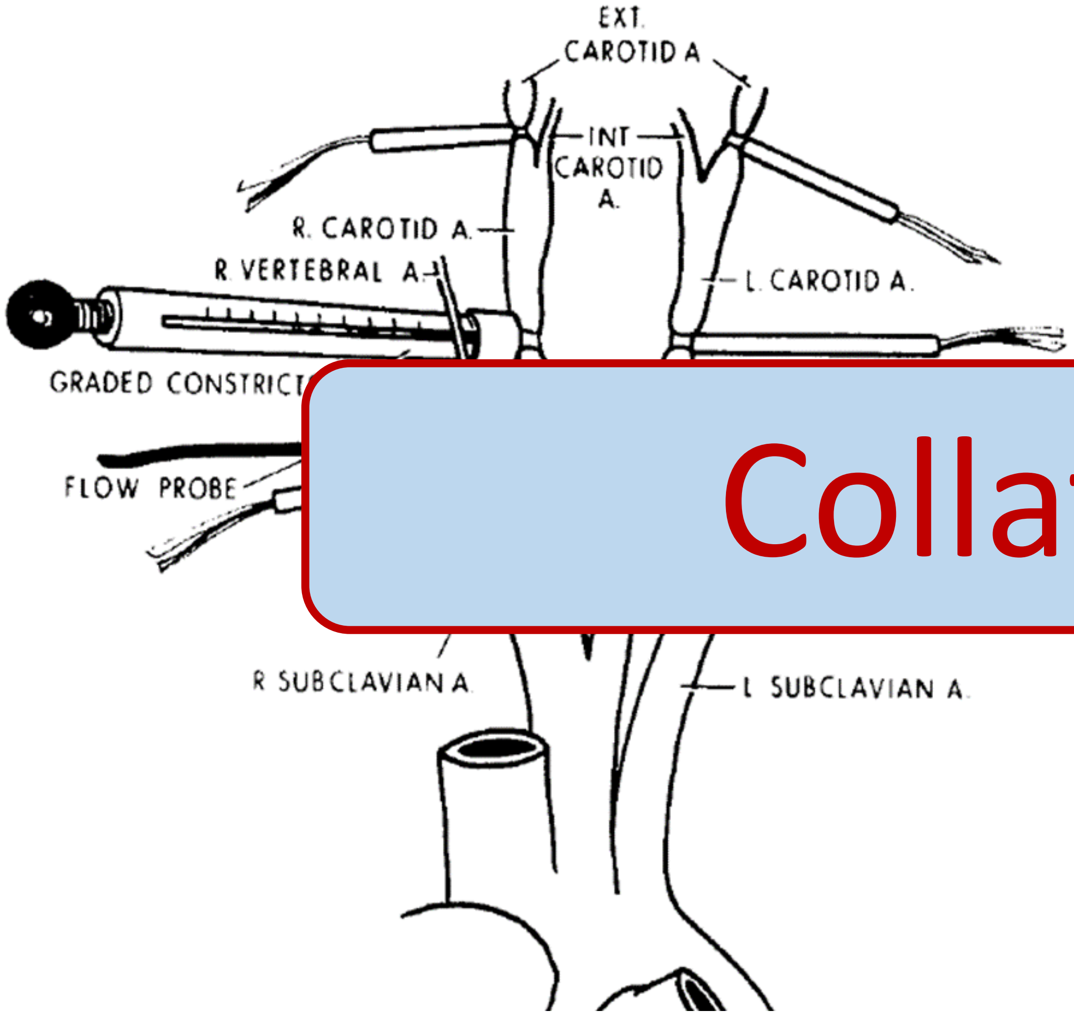


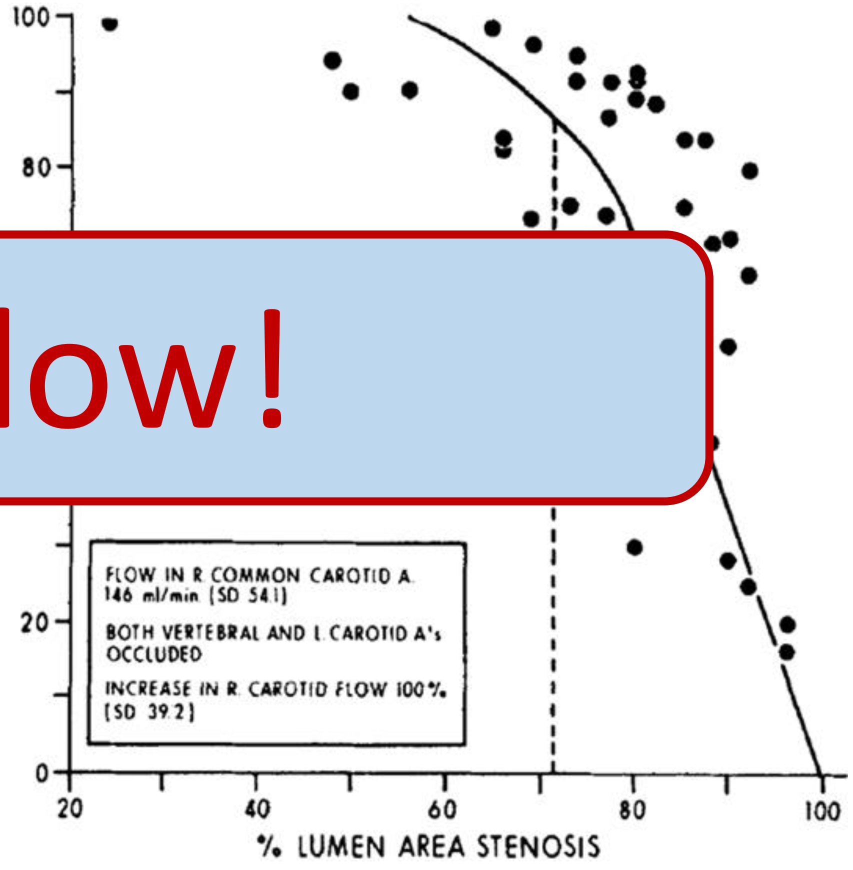




B. Eklöf, S. I. Schwartz. Arch Surg. 1969 Dec;99(6):695-701

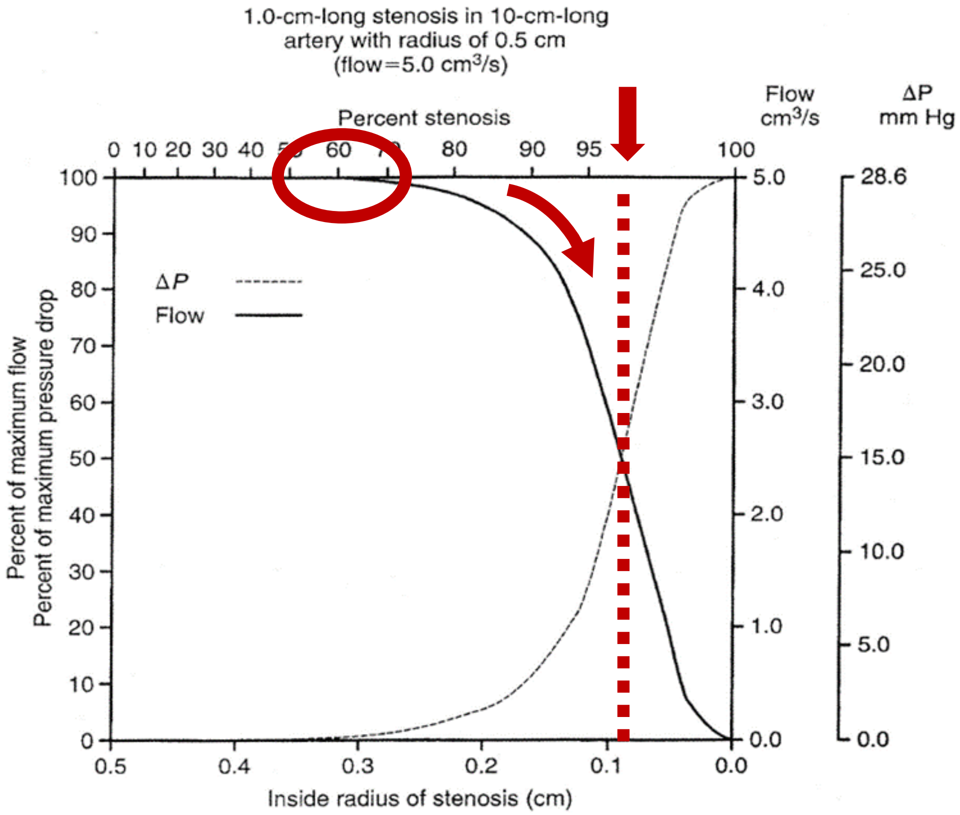
B. Eklöf, S. I. Schwartz. Scandinavian Journal of Clinical and Laboratory Investigation. 1970, 25:4, 349-353





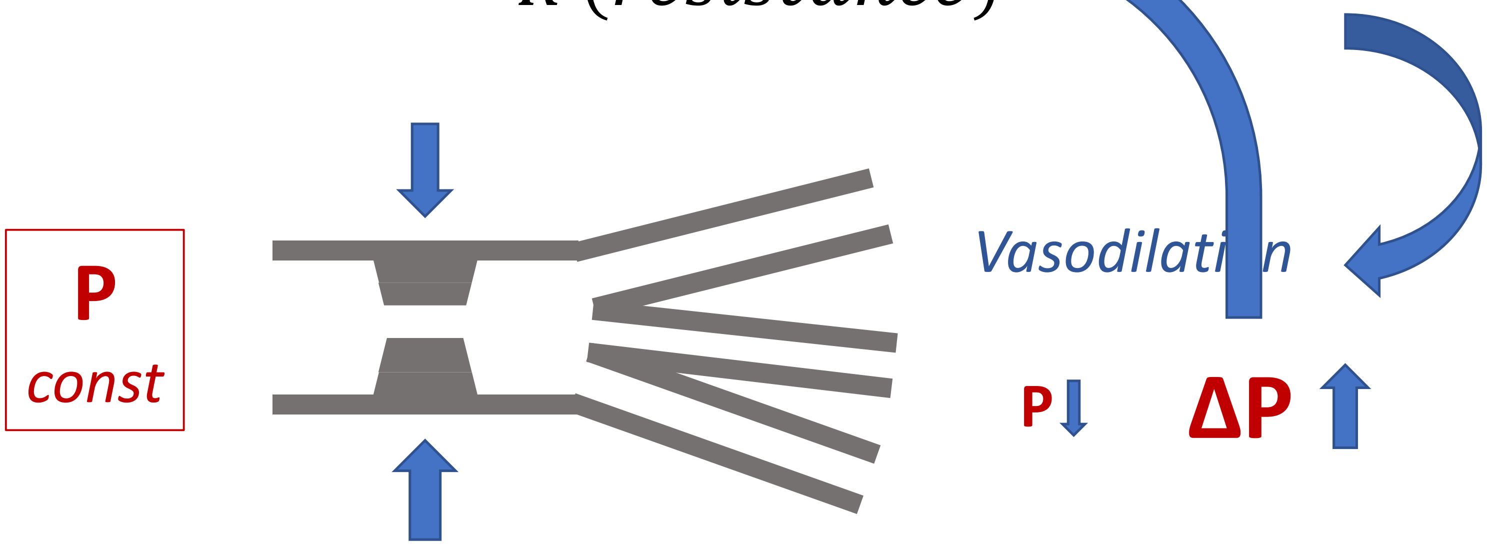
Collateral flow!

Hemodynamics of stenosis: Physiological effects of stenosis

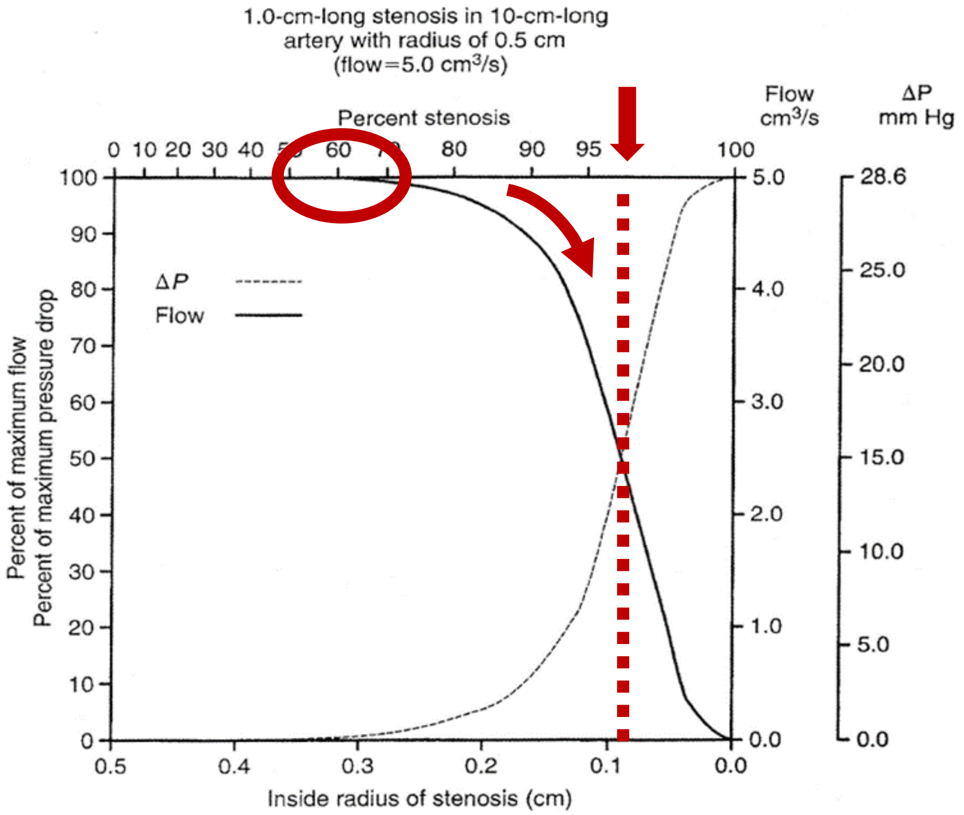


Flow rate
Poiseuille's law

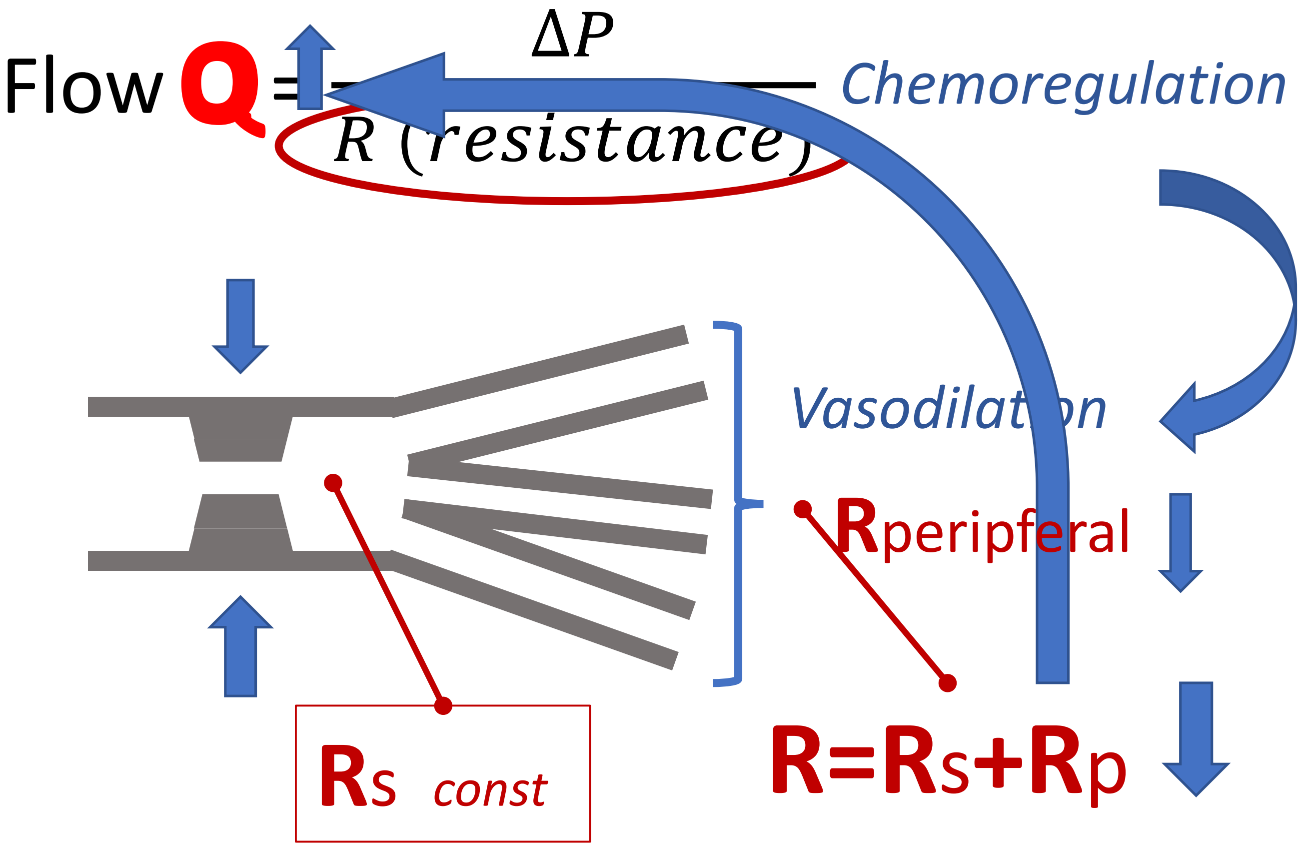
Flow **Q** = $\frac{\Delta P}{R\ (resistance)}$



Hemodynamics of stenosis: Physiological effects of stenosis



Flow rate
Poiseuille's law



Intravascular ultrasound scan evaluation of the obstructed vein

Peter Neglén, MD, PhD, and **Seshadri Raju, MD,** *Jackson, Miss*

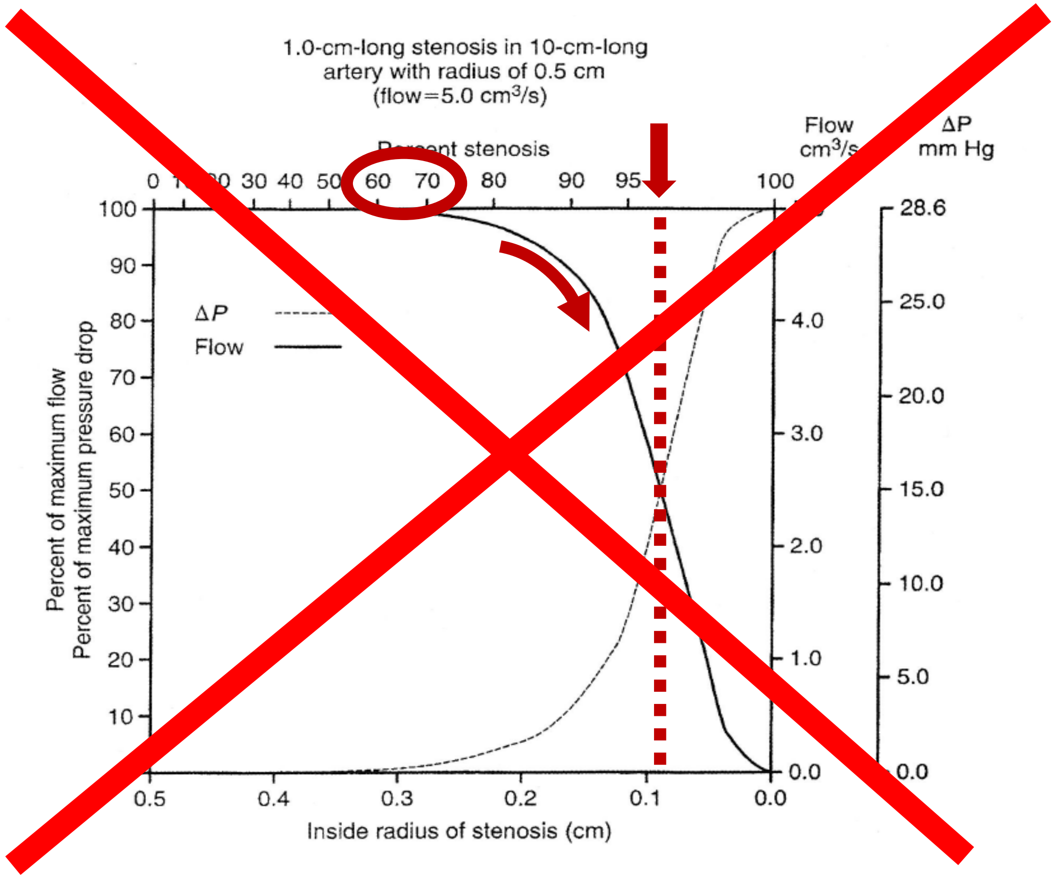
J Vasc Surg 2002;35:694-700

Conclusion: Venous IVUS appears to be superior to single-plane venography for the morphologic diagnosis of iliac venous outflow obstruction and is an invaluable assistance in the accurate placement of venous stents after venoplasty. No preoperative or intraoperative pressure test appears to adequately measure the hemodynamic significance of the stenosis. In lieu of adequate hemodynamic tests, IVUS determination of morphologically significant stenosis appears to be presently the best available method for the diagnosis of clinically important chronic iliac vein obstruction. Collateral formation should perhaps be looked on as an indicator of a more severe stenosis, although significant obstruction may exist with no collateral formation. (J Vasc Surg 2002;35:694-700.)

Hemodynamics of stenosis: Physiological effects of stenosis

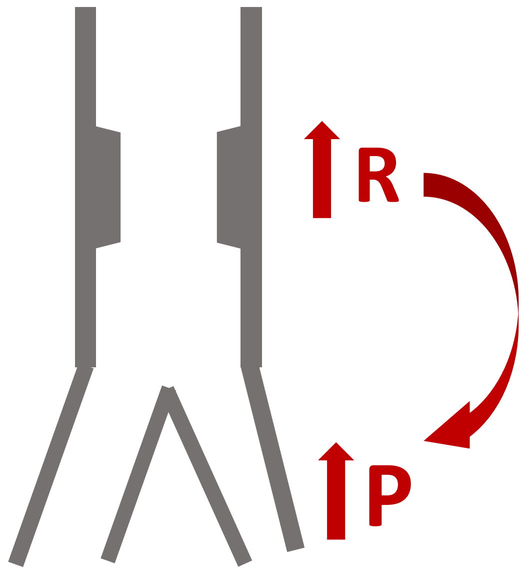
Flow rate

Venous



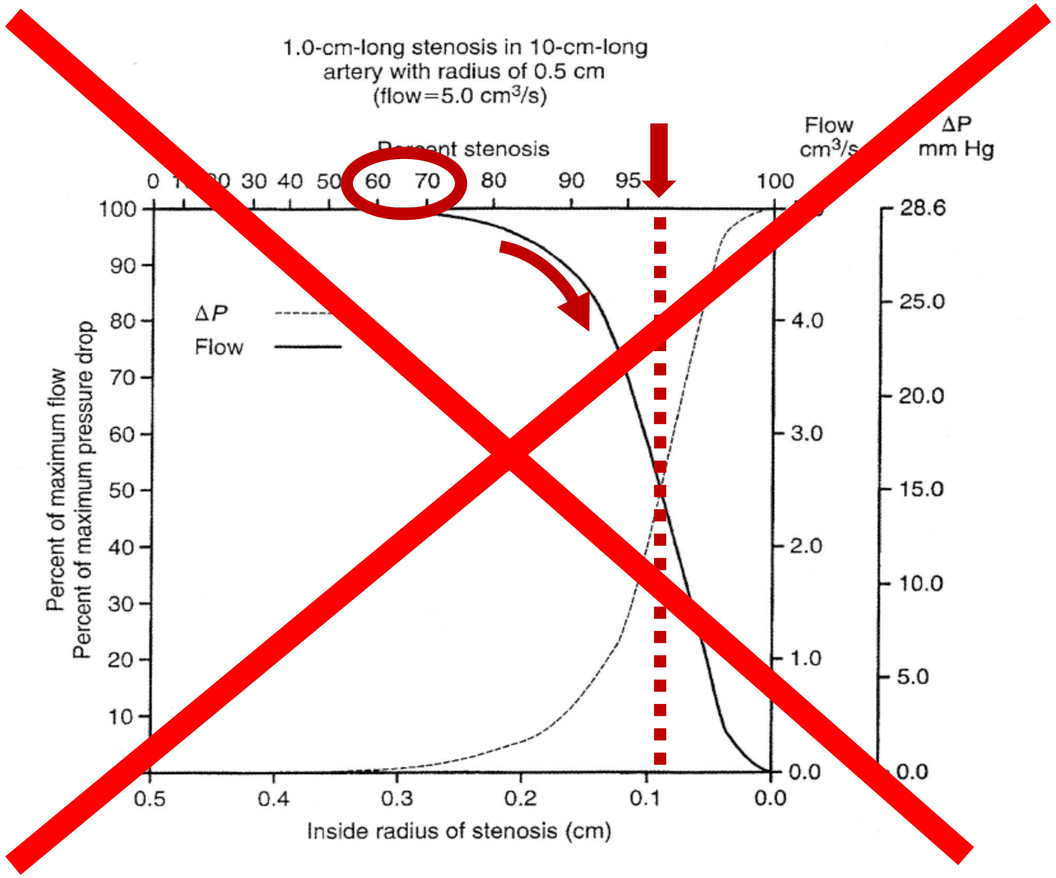
Flow **Q** = $\dfrac{\Delta P}{R\ (resistance)}$

P *const* **Rs** *const*



Hemodynamics of stenosis: Physiological effects of stenosis

Venous



Flow rate

$$\text{Flow } \mathbf{Q} = \frac{\Delta P}{R\ (resistance)}$$

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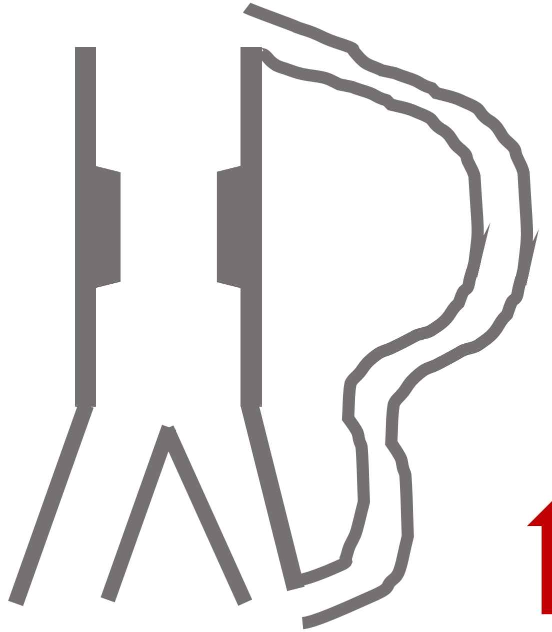


Collaterals

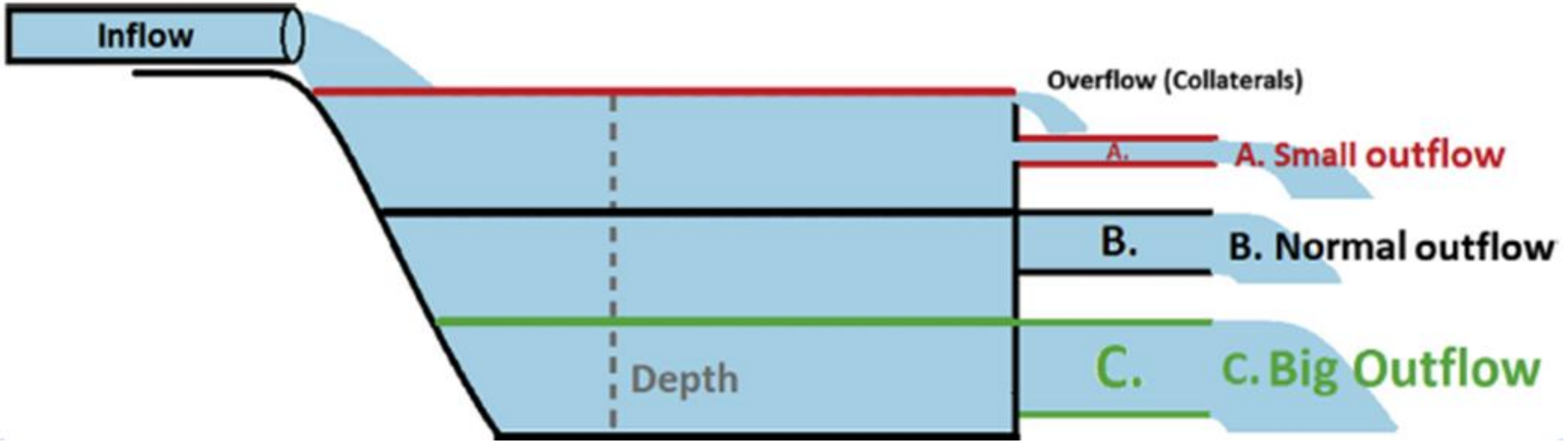
↑ **P**

Optimal Caliber of Iliac-Femoral Vein Segments

IVUS is key, venogram has no measurement scale

	Diameter (mm)	Area (mm^2)
CFV	12	125
EIV	14	150
CIV	16	200
IVC	18-24	300-450

“optimal venous caliber” concept



Factors influencing peripheral venous pressure in an experimental model

Seshadri Raju, MD, FACS, William Crim, BA, MS, *and* William Buck, BBA, MS, *Jackson, Miss*

J Vasc Surg: Venous and Lym Dis 2017;5:864-74

Posture commonly and considerably modifies stenosis of left common iliac and left renal veins in women diagnosed with pelvic venous disorder

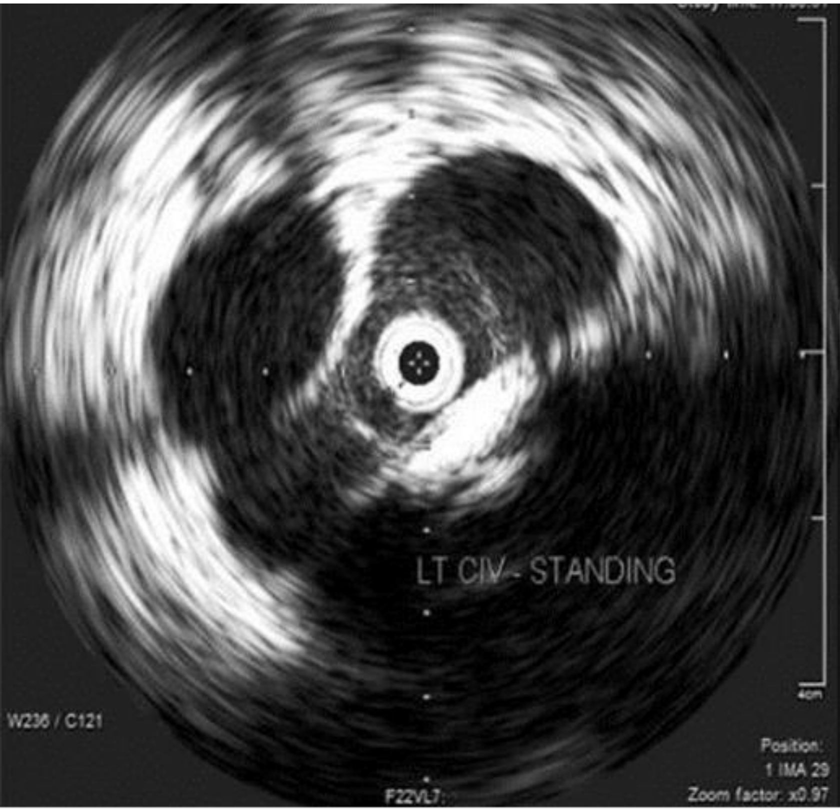
Marek Krzanowski, MD, PhD,[a] Lukasz Partyka, MD, PhD,[a,b] Lukasz Drelicharz, MD, PhD,[a,b] Malgorzata Mielnik, MD,[a] Marzena Frolow, MD, PhD,[b] Krzysztof Piotr Malinowski, MSc,[c] Agnieszka Sliwka, PhD,[d,e] Karolina Marciniak, MR,[d,e] *and* Tomasz Aleksiejew-Kleszczynski, MD,[f]
Krakow, Poland

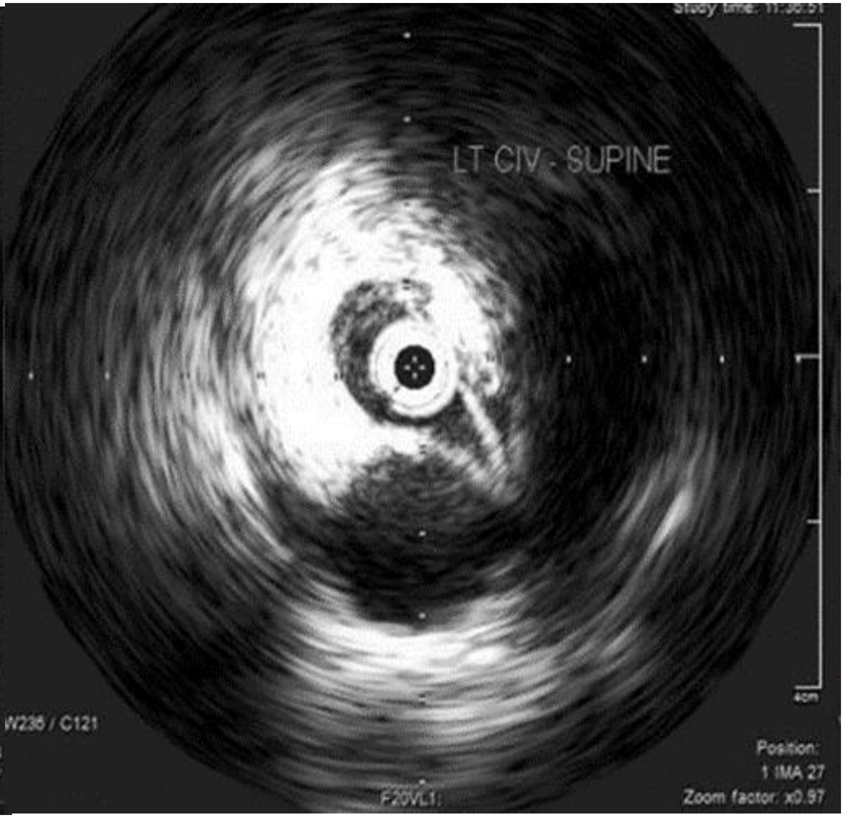
J Vasc Surg: Venous and Lym Dis 2019;7:845-52

Standing 281 mm^2

Lying on the left side 400 mm^2

Supine 61 mm^2

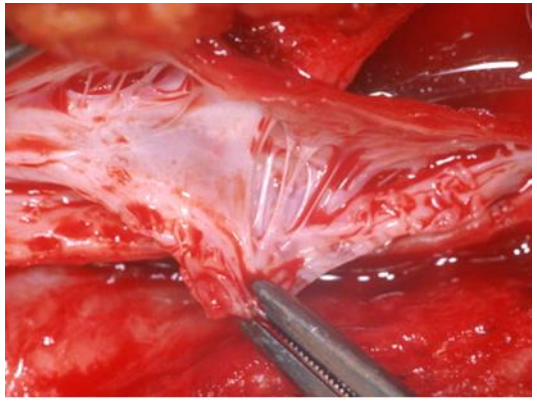


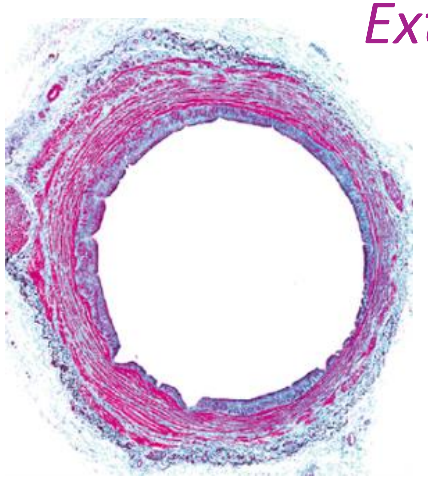


Conductance

S. Raju et al. J Vasc Surg: Venous and Lym Dis 2017;5:864-74

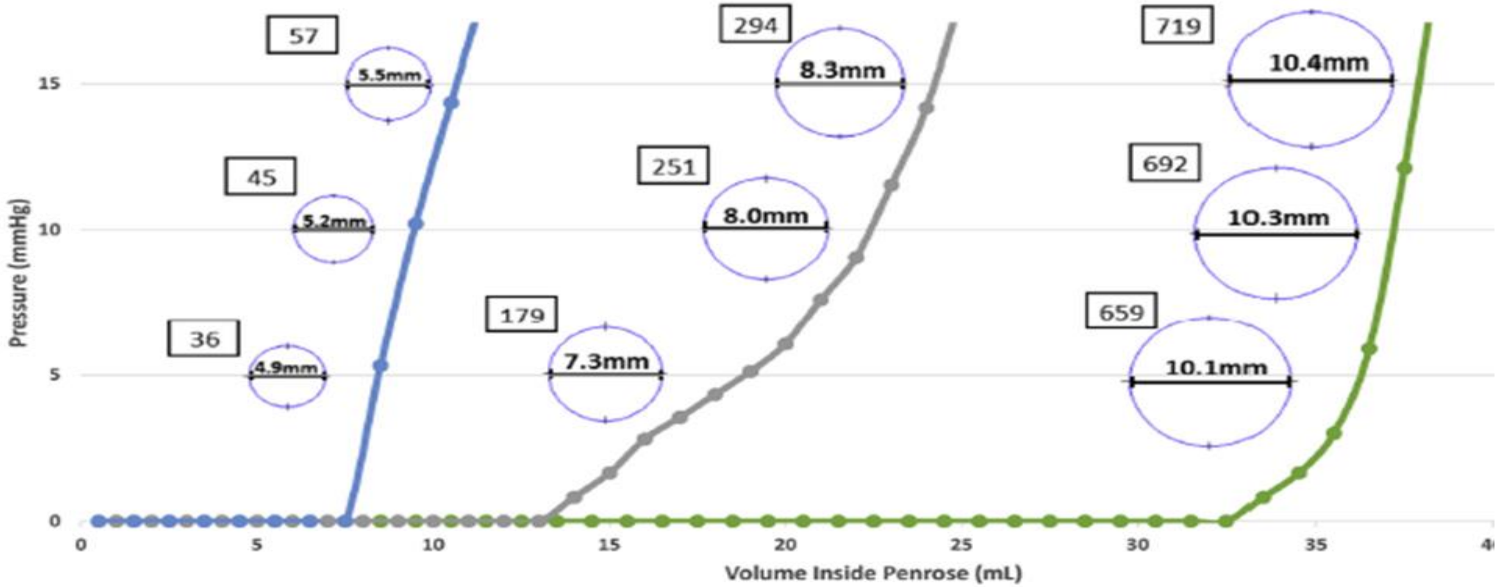
Intra-venous synechia





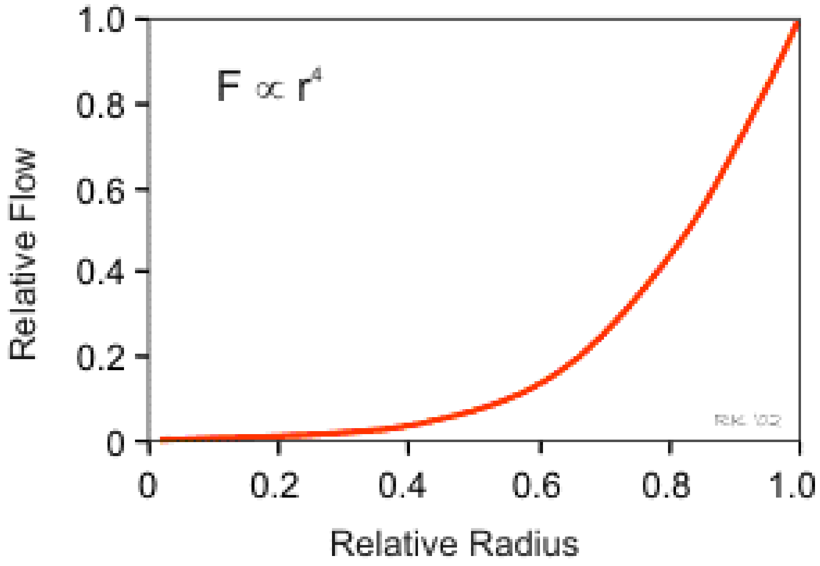
Extra-venous fibrosis

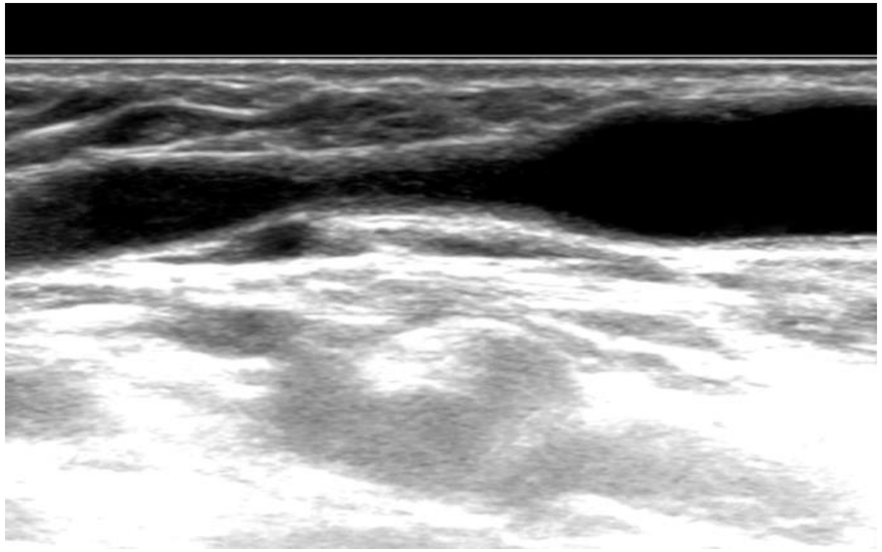
Normal vein



Venous function

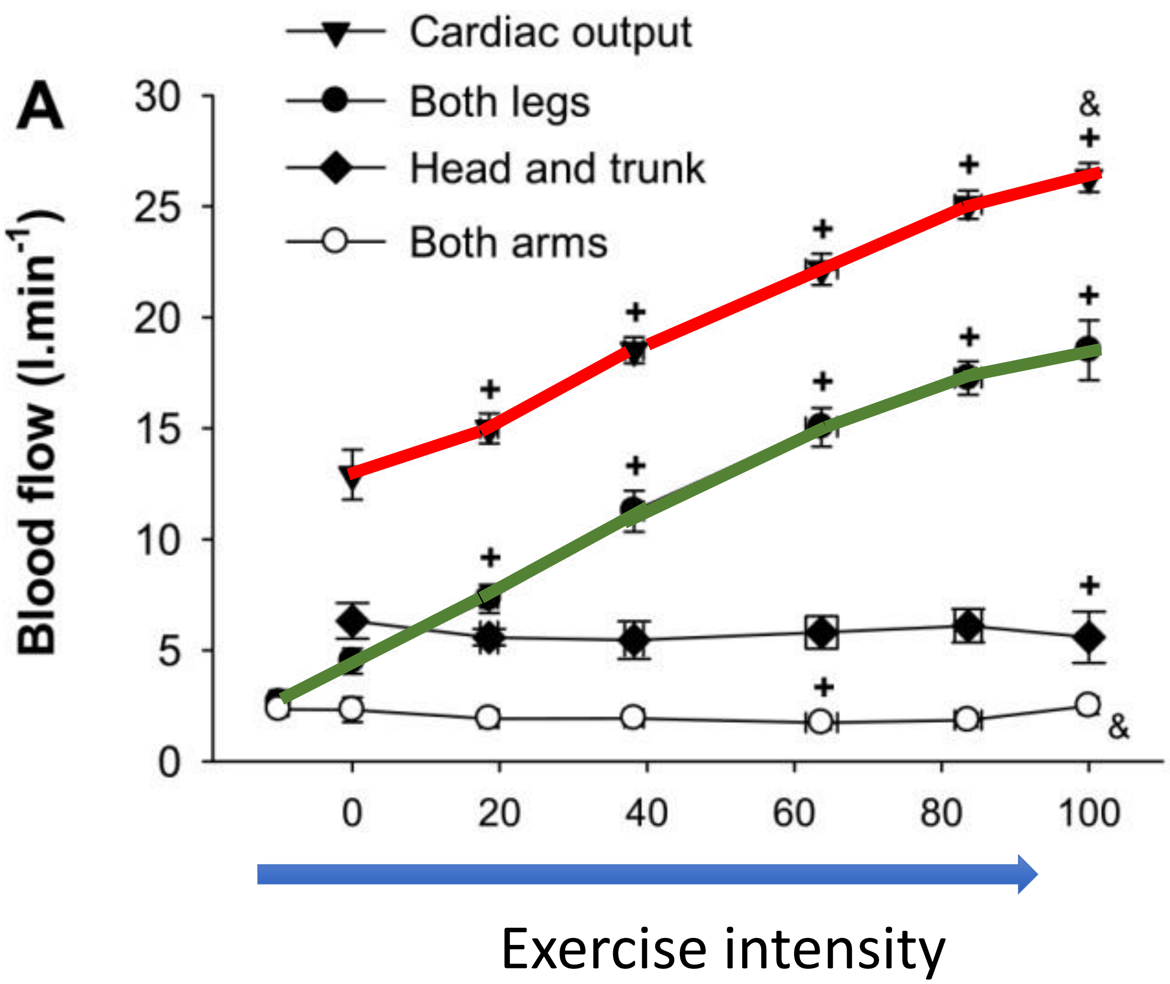
1. Conduction
2. Adaptation





Blood volumes distribution

Exercise



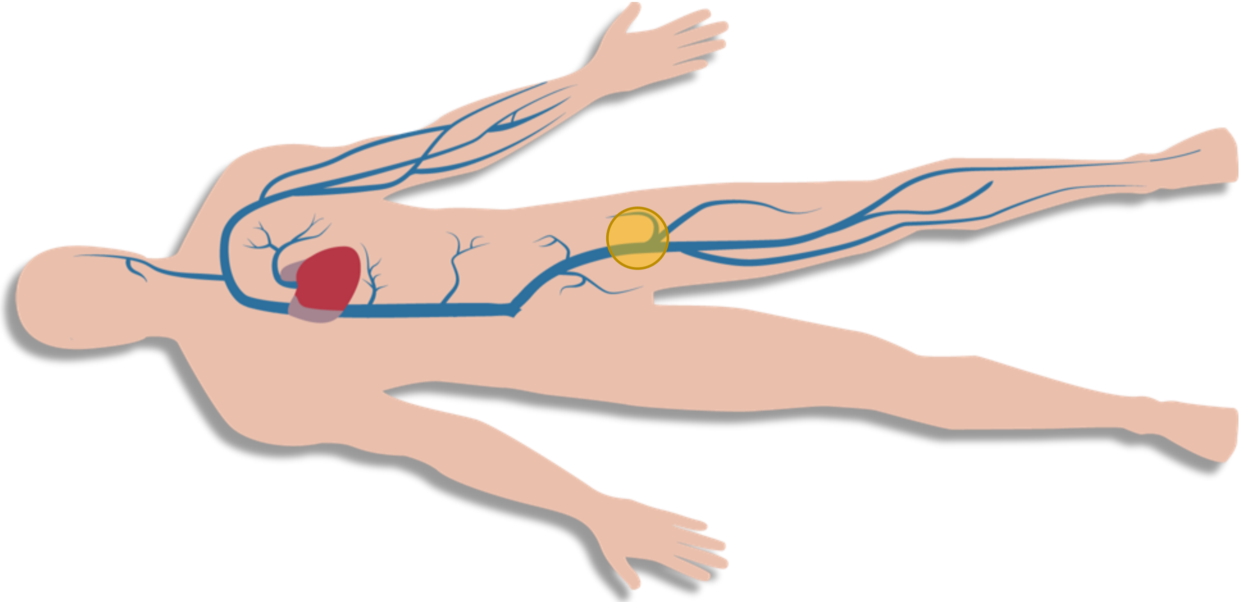
Jose A. L. Calbet et al. J Appl Physiol 2007;103:969-978

Journal of Thrombosis and Haemostasis, 14: 1163–1170 DOI: 10.1111/jth.13333

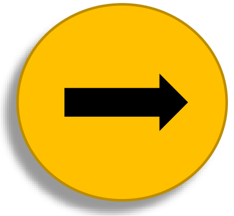
ORIGINAL ARTICLE

Intravenous pressure changes in patients with postthrombotic deep venous obstruction: results using a treadmill stress test

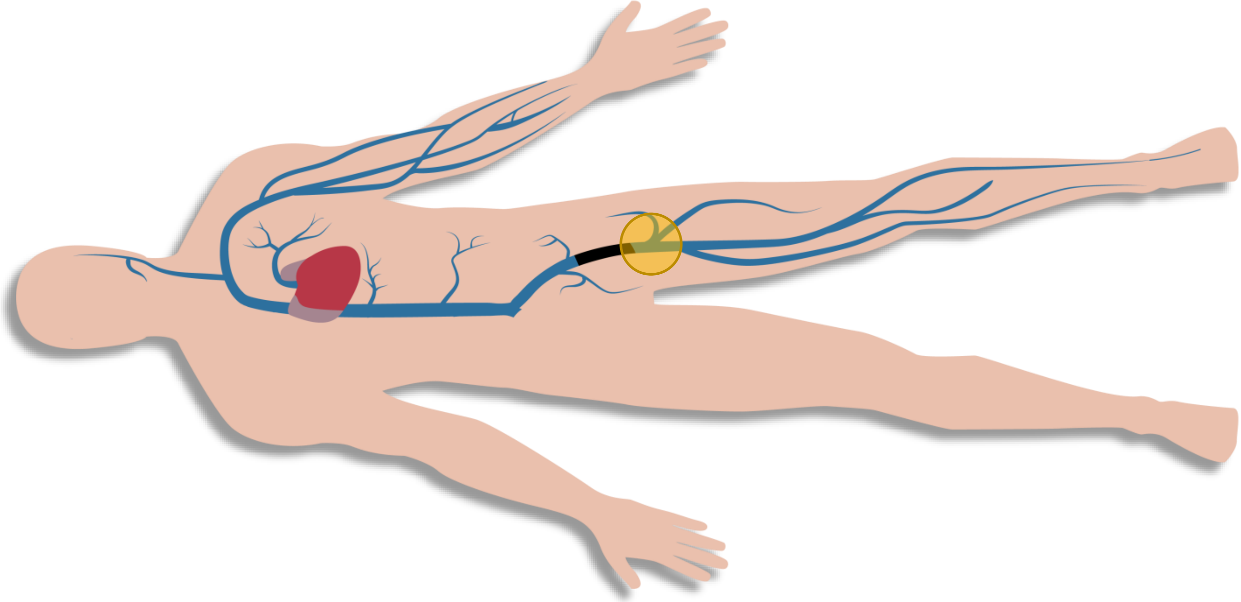
R. L. M. KURSTJENS,*† M. A. F. DE WOLF,*† H. W. KONIJN,* I. M. TOONDER,* P. J. NELEMANS,‡ R. DE GRAAF§ and C. H. A. WITTENS*†¶



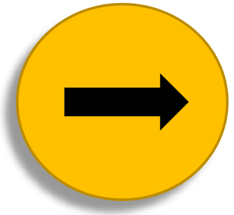
21.4 mm Hg



NS



24.2 mm Hg



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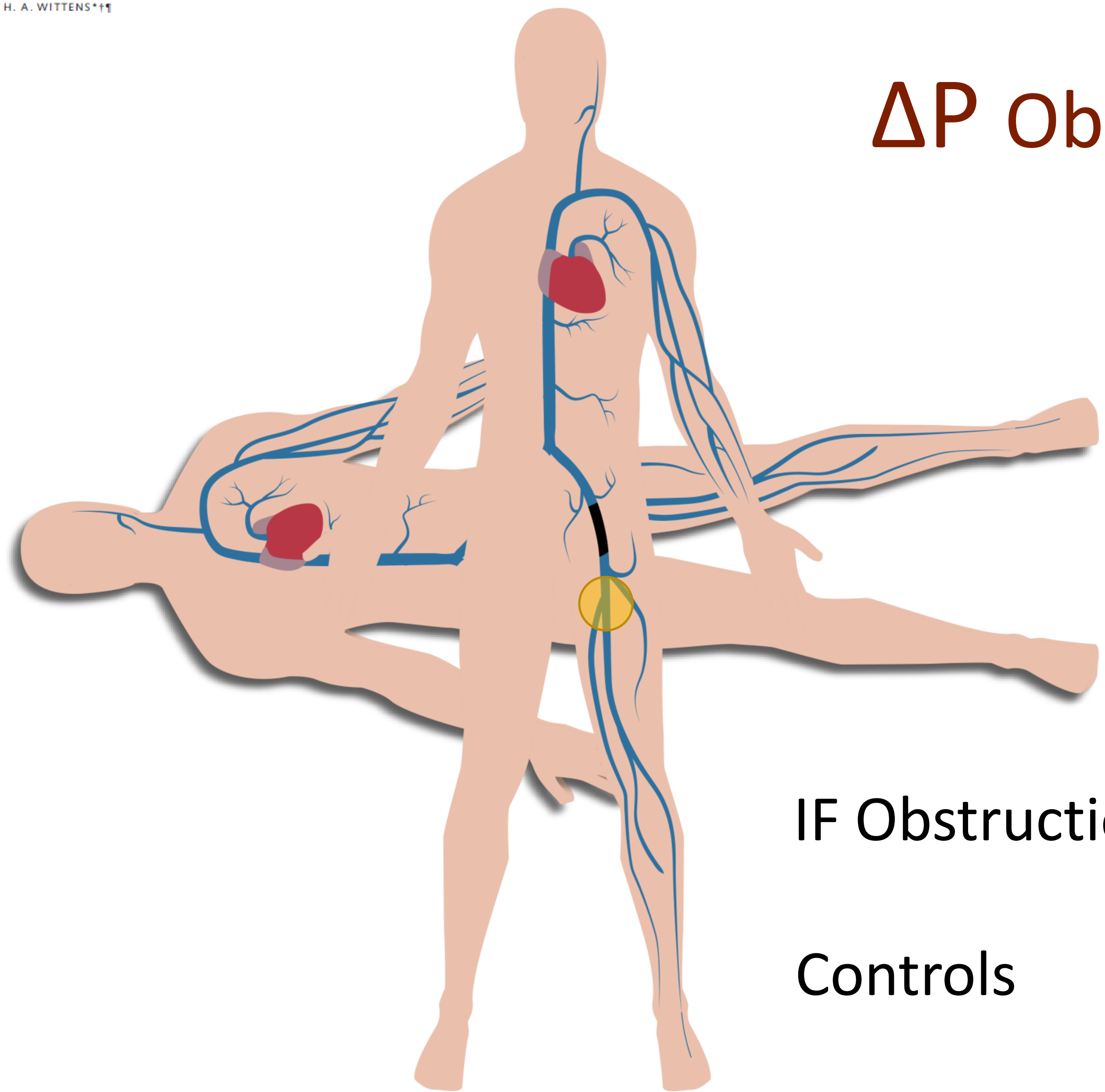
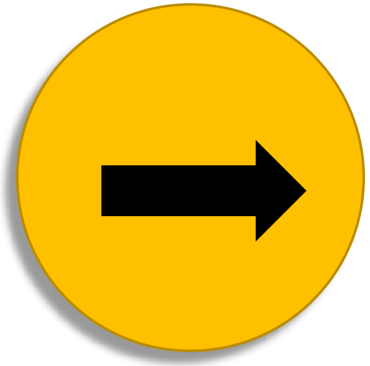


ΔP Obstruction ≈ ΔP Controls



IF Obstruction	24 mm Hg	➡	60 mm Hg
Controls	21 Mm Hg	➡	45 Mm Hg

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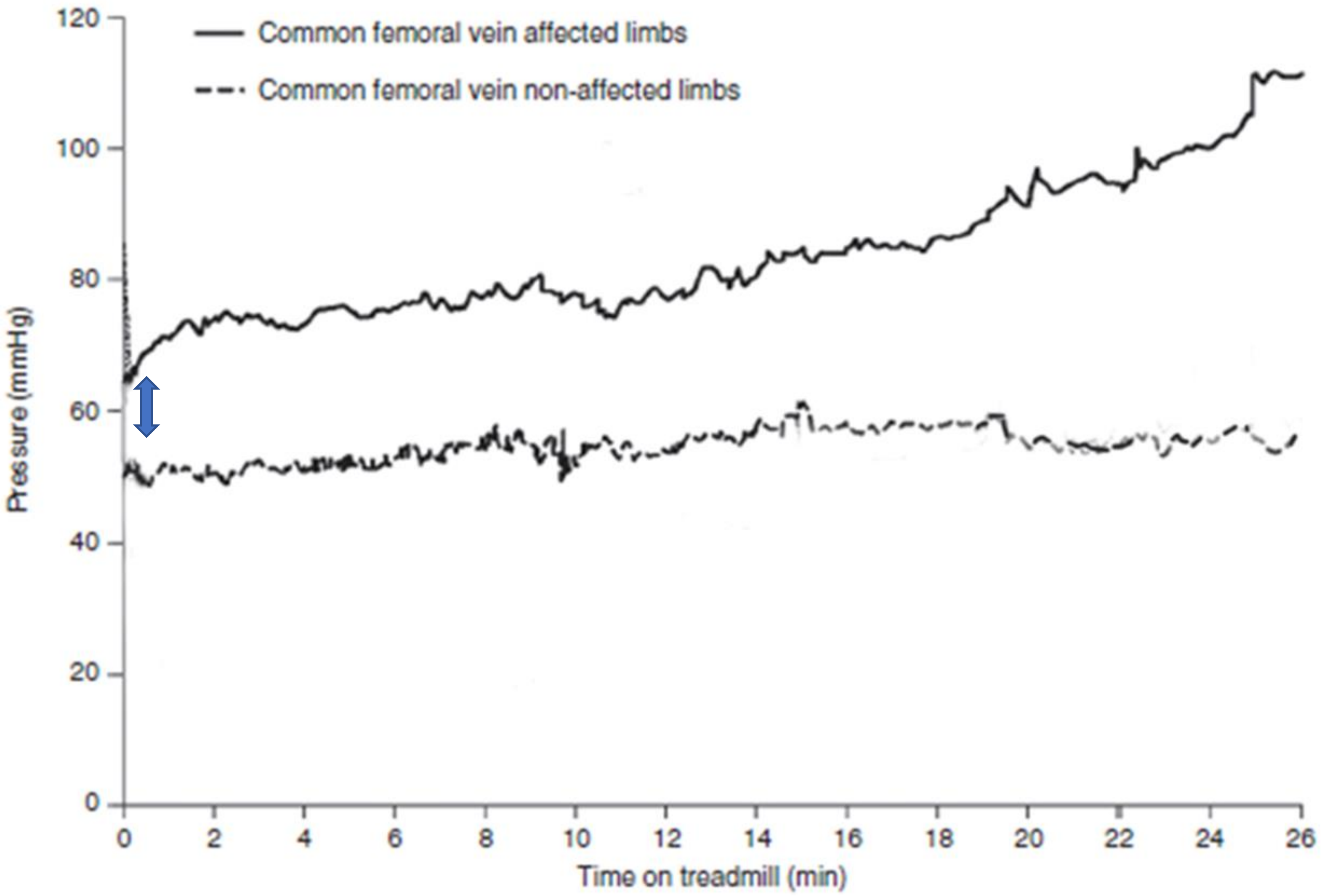
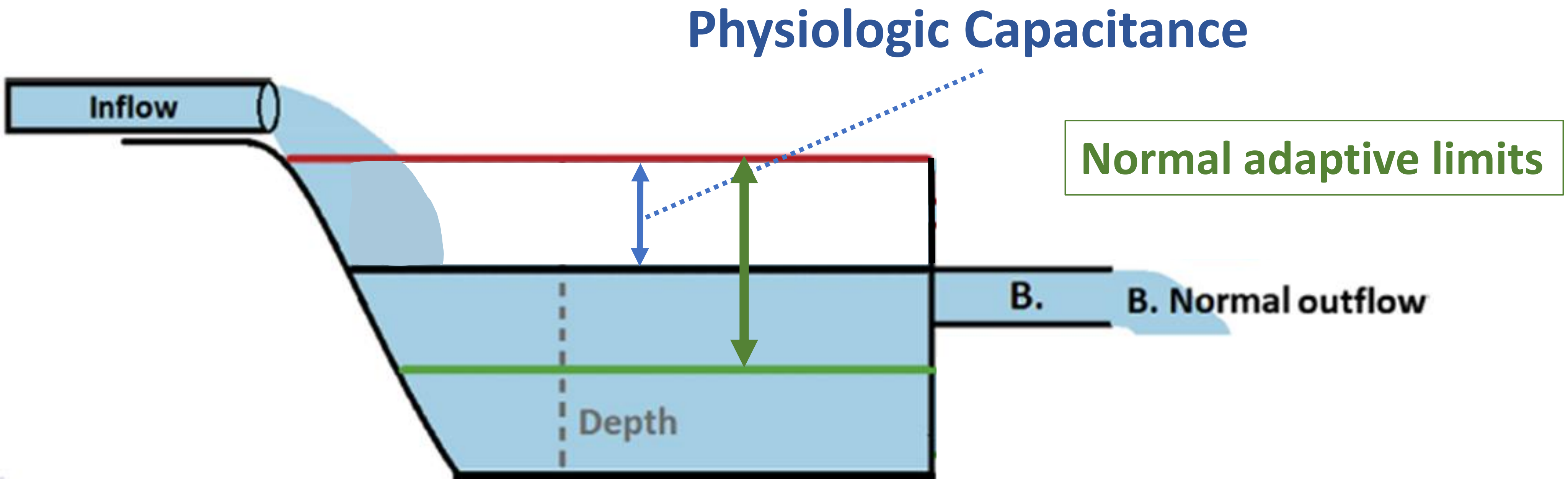


“optimal venous caliber” concept



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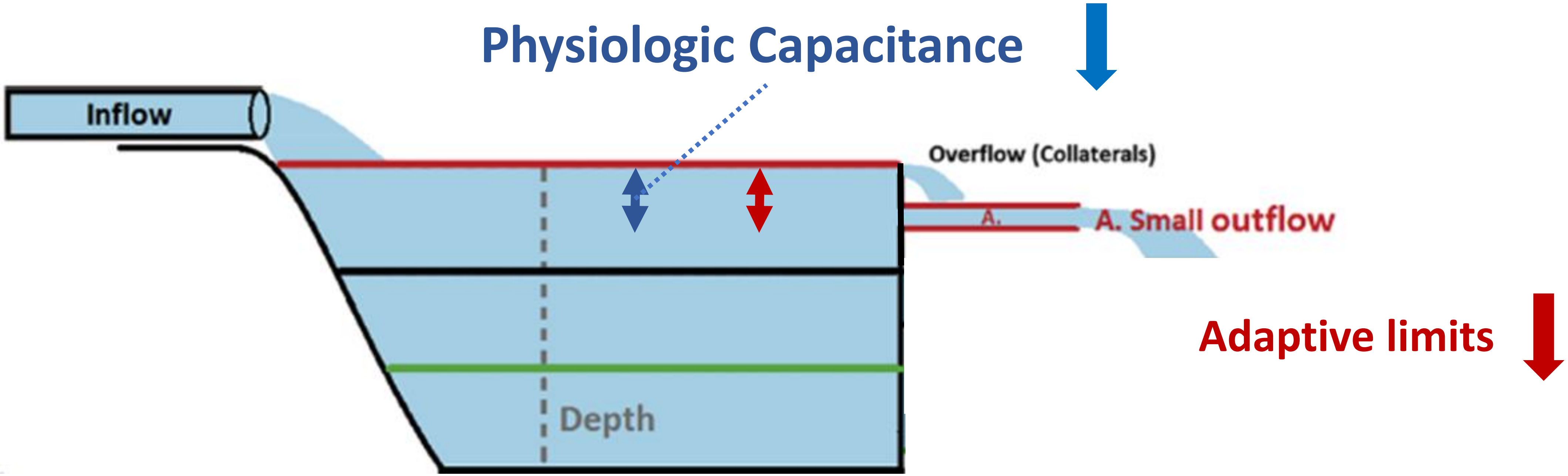

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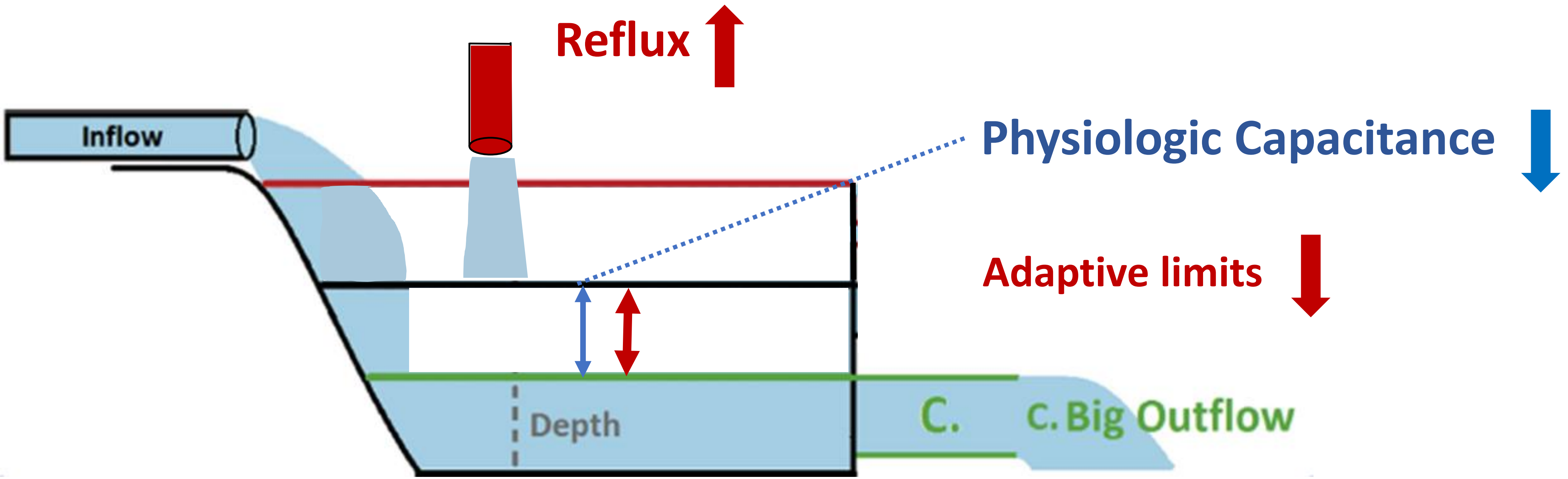
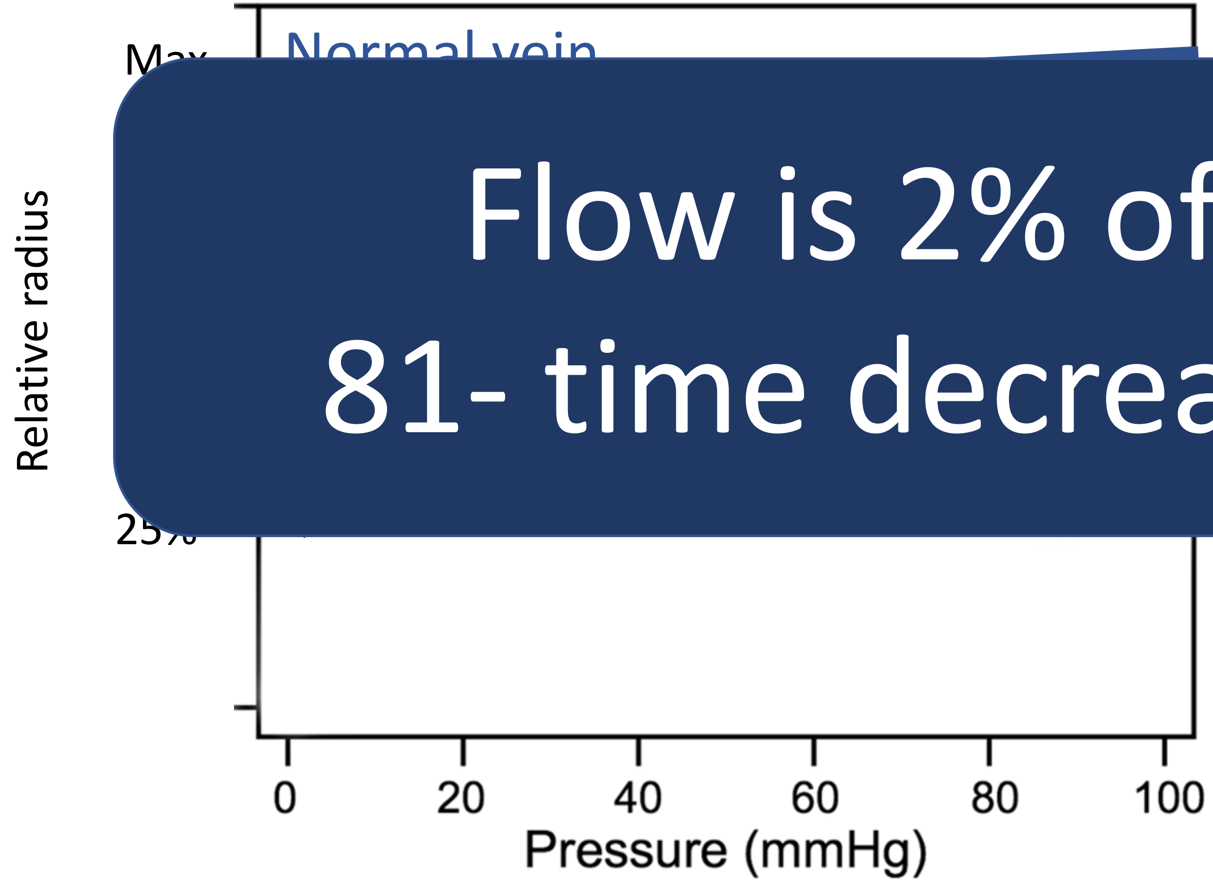
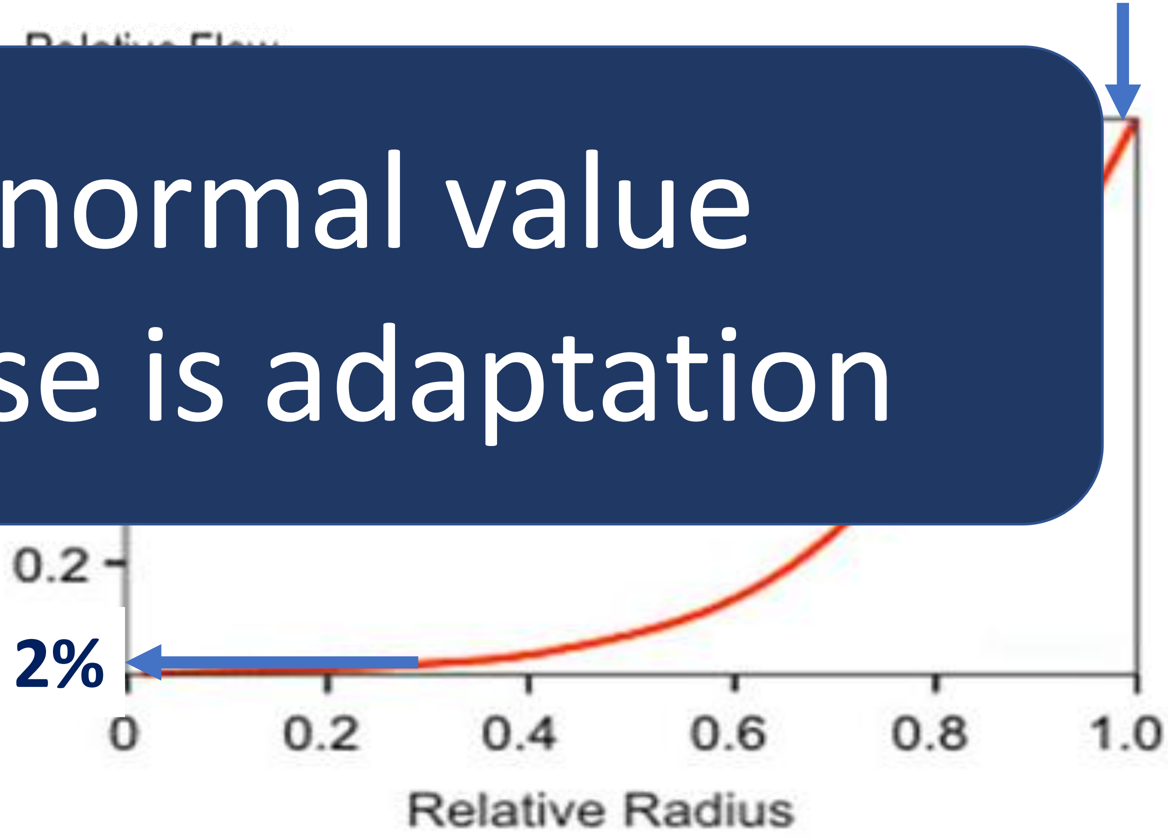


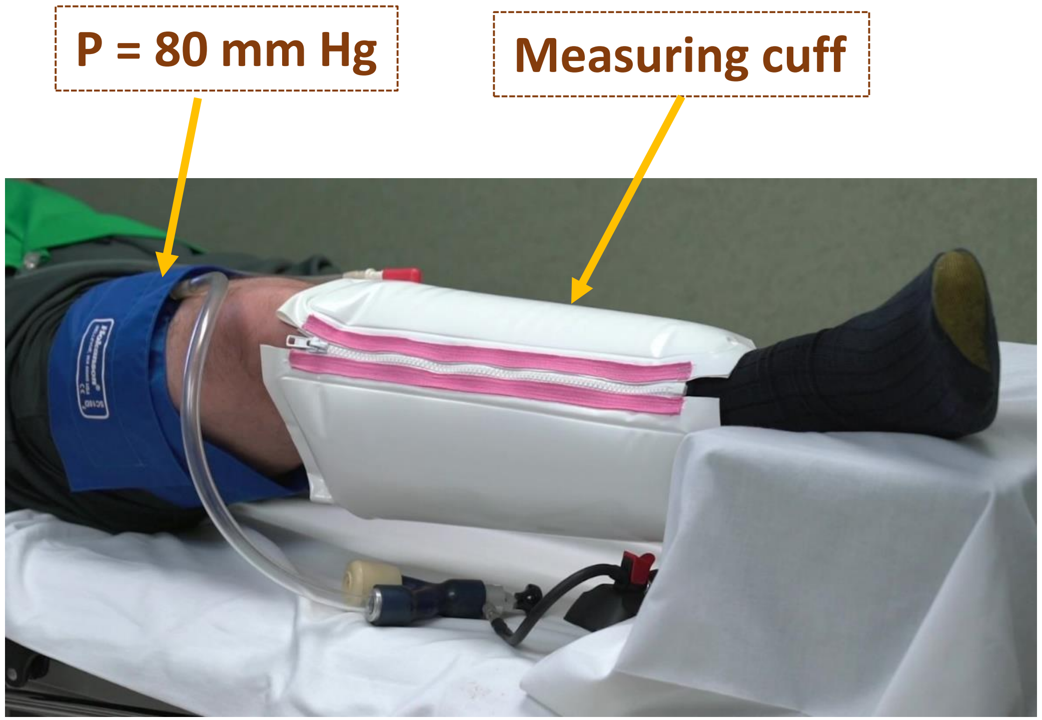
ADPTATION
during ambulation

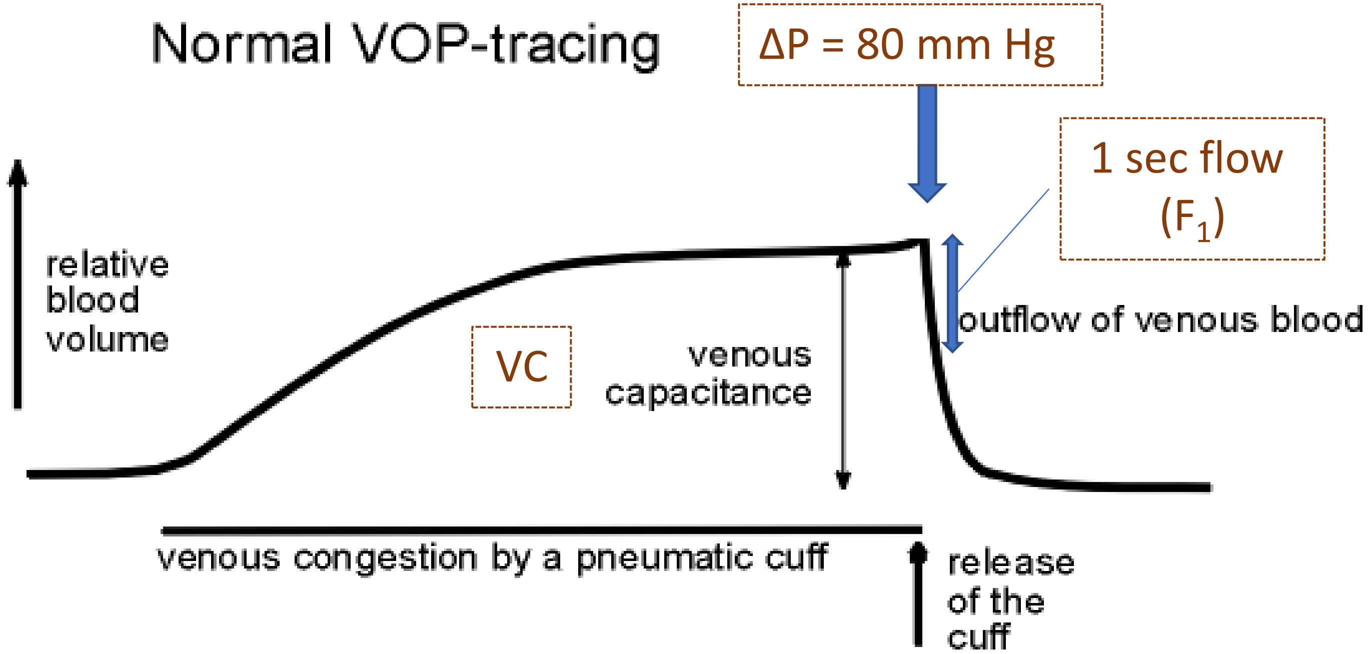




Flow is 2% of normal value
81- time decrease is adaptation

Outflow Fraction vs. Resistance





Resistance (R): $R \approx \Delta P/F = 80_{\text{mm Hg}}/\ F_1$

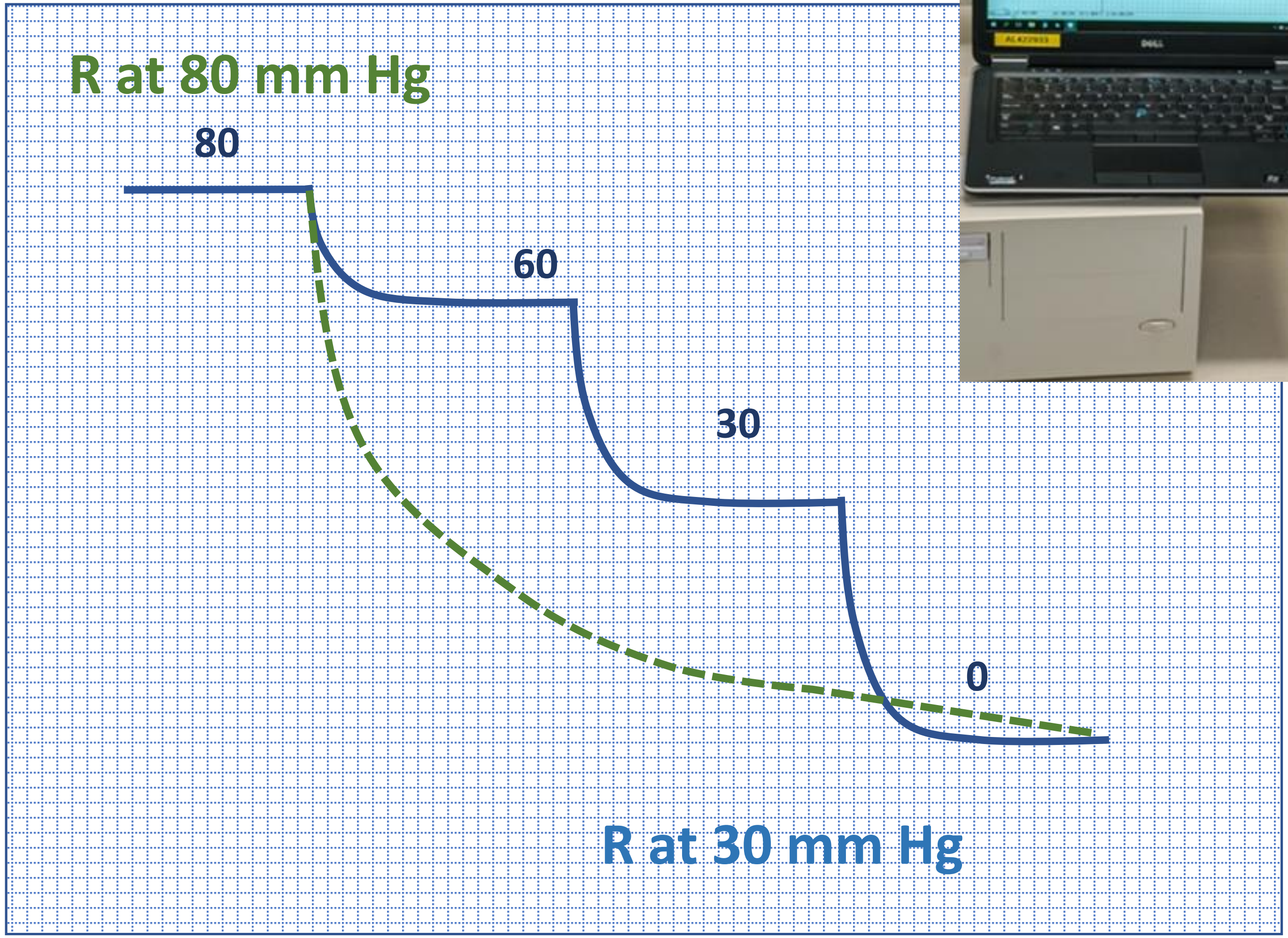
Eur J Vasc Endovasc Surg (2018) 56, 247—254

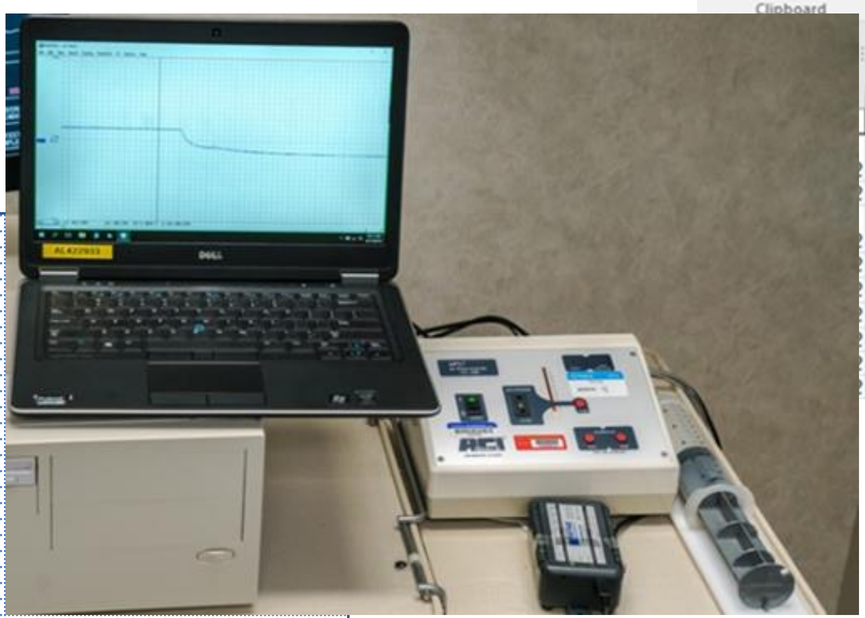
The Effect of Stenting on Venous Hypertension: Results Using a Treadmill Stress Test with Invasive Pressure Measurements in Patients with Iliofemoral Venous Obstruction

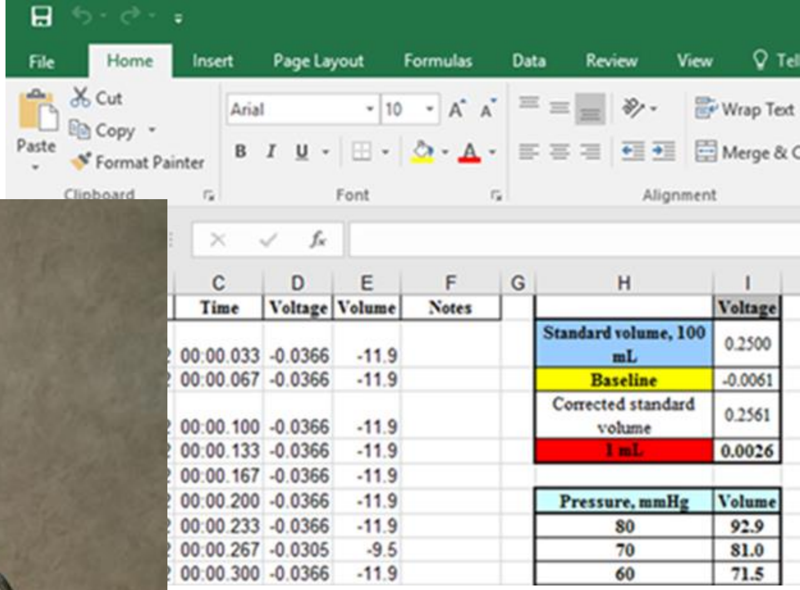
Ralph L.M. Kurstjens [a,b,c,*], Mark A.F. de Wolf [a,b], Helena W. Konijn [a], Irwin M. Toonder [a], Patricia J. Nelemans [d], Jorinde H.H. van Laanen [a], Rick de Graaf [e], Cees H.A. Wittens [a,b,f]

During the intervention, pressure in the CFV was 18.0 ± 7.8 mmHg in affected and 11.7 ± 5.9 mmHg in non-affected limbs

Digital APG



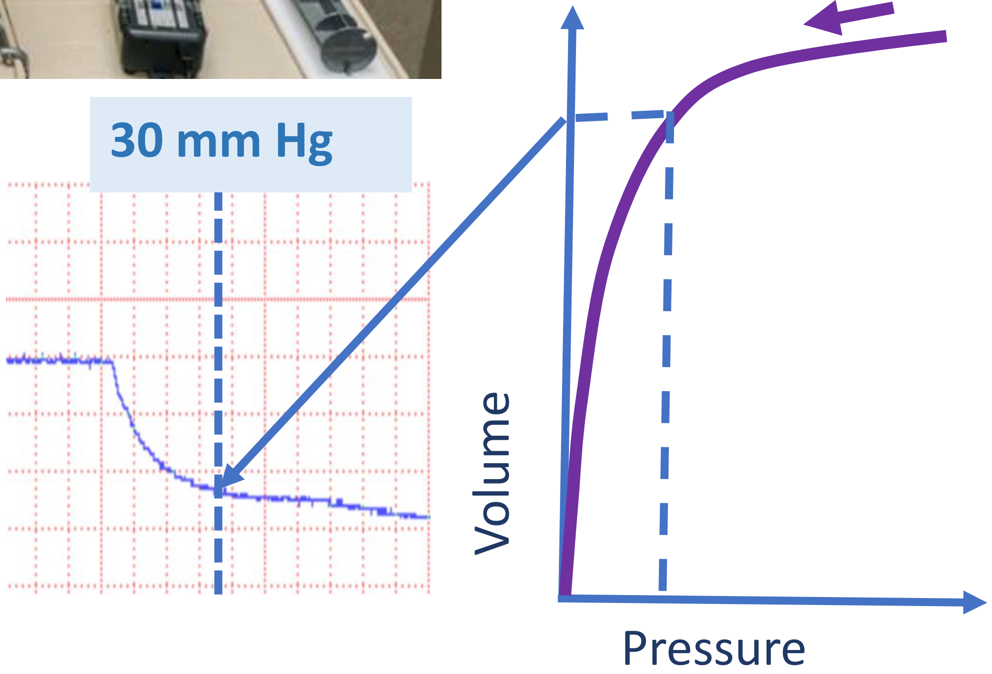




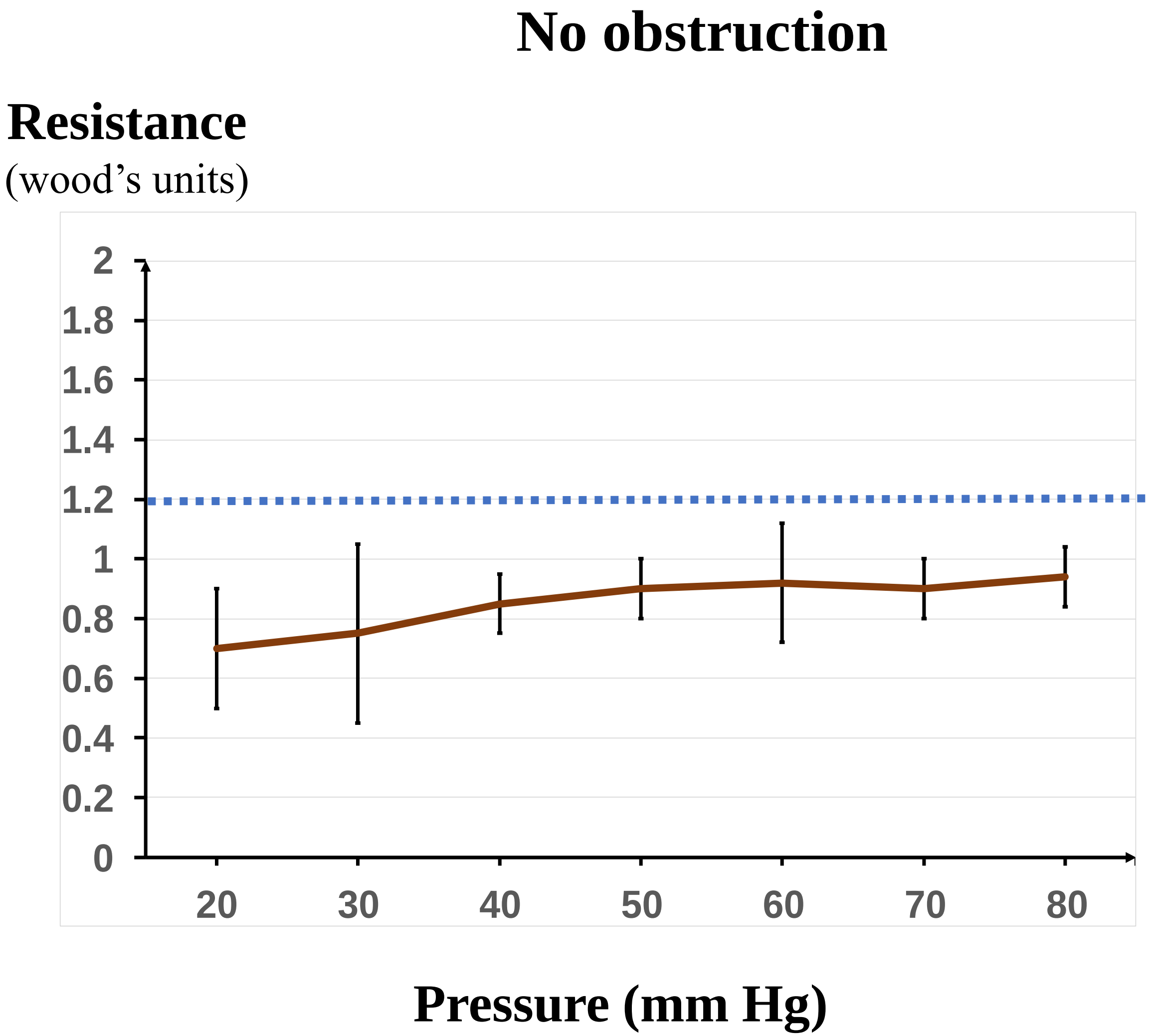
Time	Voltage	Volume	Notes
00:00.033	-0.0366	-11.9	
00:00.067	-0.0366	-11.9	
00:00.100	-0.0366	-11.9	
00:00.133	-0.0366	-11.9	
00:00.167	-0.0366	-11.9	
00:00.200	-0.0366	-11.9	
00:00.233	-0.0366	-11.9	
00:00.267	-0.0305	-9.5	
00:00.300	-0.0366	-11.9	

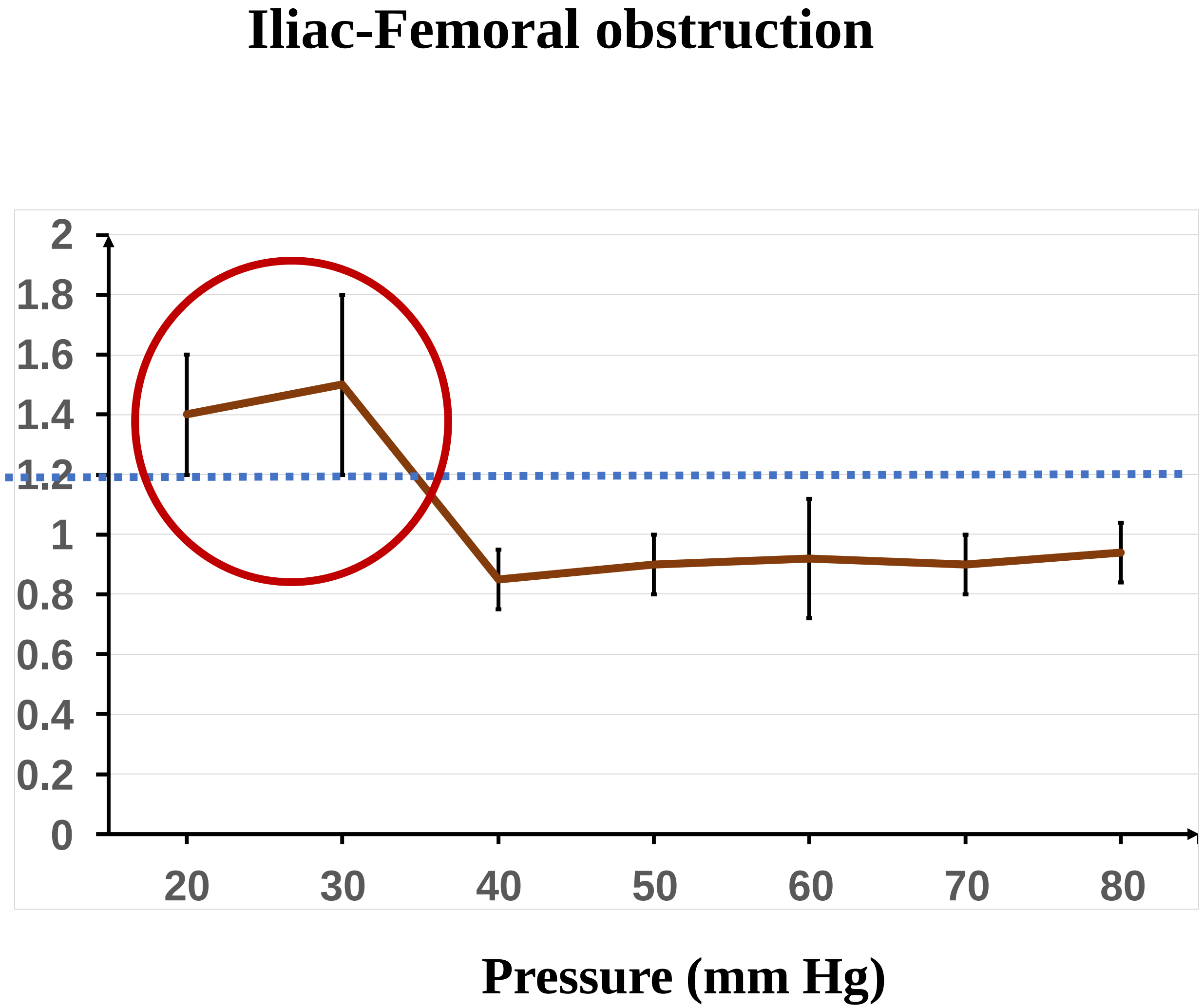
	Voltage
Standard volume, 100 mL	0.2500
Baseline	-0.0061
Corrected standard volume	0.2561
1 mL	0.0026

Pressure, mmHg	Volume
80	92.9
70	81.0
60	71.5



Resistance at lower pressures is higher in IFO





CONCLUSIONS

- Concept of “critical stenosis” is not applicable to veins
- Clinically useful physiological test assessing Iliac vein stenosis does not exist
- Measuring venous resistance at low pressures is promising
- Clinical indications **>** anatomical criteria

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