

BLOOD PRESSURE

- **Blood pressure – the most important parameter in cardiovascular system – „high-profile“ parameter**

- **Blood pressure (BP) – pressure of the blood to the wall of the vessels**
- **Systolic BP, diastolic BP, pulse pressure, mean arterial pressure (MAP)**

$BP = CO \times R$ CO – cardiac output, R – resistance

$CO = SV \times HR$ SV – stroke volume, HR – heart rate

ESH AND ESC GUIDELINES

**2013 ESH/ESC Guidelines for the management of
arterial hypertension**

**The Task Force for the management of arterial hypertension of
the European Society of Hypertension (ESH) and of the
European Society of Cardiology (ESC)**

Authors/Task Force Members: Giuseppe Mancia (Chairperson) (Italy) * , Robert Fagard (Chairperson)

Classification BP values

category	Systolic BP	Diastolic BP
	(mmHg)	(mmHg)
optimal	< 120	< 80
normal	120 – 129	80 – 84
high normal pressure	130 – 139	85 – 89
Hypertension - mild	140 – 159	90 – 99
Hypertension - moderate	160 – 179	100 – 109
Hypertension - severe	≥ 180	≥ 110
Izolated systolic hypertension	≥ 140	< 90

According the Guidelines of European Society of Cardiology 2013

2018 ESC/ESH Guidelines for the management of arterial hypertension

The Task Force for the management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH)

Authors/Task Force Members: **Bryan Williams*** (ESC Chairperson) (UK), **Giuseppe Mancia*** (ESH Chairperson) (Italy), Wilko Spiering (The Netherlands), Enrico Agabiti Rosei (Italy), Michel Azizi (France), Michel Burnier (Switzerland), Denis L. Clement (Belgium), Antonio Coca (Spain), Giovanni de Simone (Italy), Anna Dominiczak (UK), Thomas Kahan (Sweden), Felix Mahfoud (Germany), Josep Redon (Spain), Luis Ruilope (Spain), Alberto Zanchetti† (Italy), Mary Kerins (Ireland), Sverre E. Kjeldsen (Norway), Reinhold Kreutz (Germany), Stephane Laurent (France), Gregory Y. H. Lip (UK), Richard McManus (UK), Krzysztof Narkiewicz (Poland), Frank Ruschitzka (Switzerland), Roland E. Schmieder (Germany), Evgeny Shlyakhto (Russia), Costas Tsioufis (Greece), Victor Aboyans (France), and Ileana Desormais (France)

European Heart Journal (2018) 39, 3021–3104

Classification of BP

- **It is recommended that BP be classified as optimal, normal, high-normal, or grades 1–3 hypertension, according to office BP.**

Classification BP values: „officer BP“

category	Systolic BP	Diastolic BP
	(mmHg)	(mmHg)
optimal	< 120	< 80
normal	120 – 129	80 – 84
high normal pressure	130 – 139	85 – 89
Hypertension – mild: grade 1	140 – 159	90 – 99
Hypertension – moderate: grade 2	160 – 179	100 – 109
Hypertension – severe: grade 3	≥ 180	≥ 110
Isolated systolic hypertension	≥ 140	< 90

According the Guidelines of European Society of Cardiology 2018

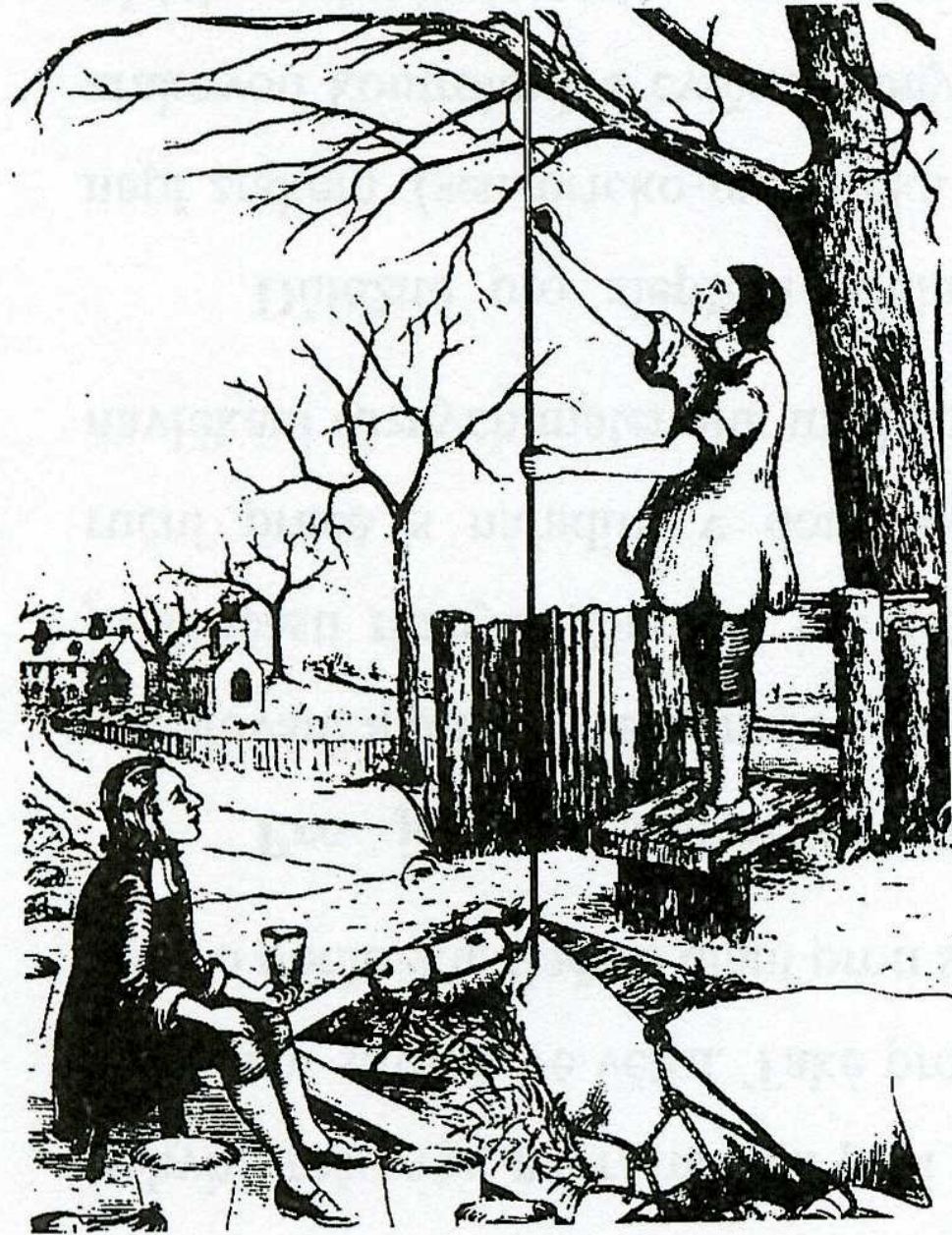
BLOOD PRESSURE MEASUREMENT

- **Direct invasive method**

- 1726 Stephan Hales – horse
- Today – during catetrisation

- **Indirect non-invasive measurement**

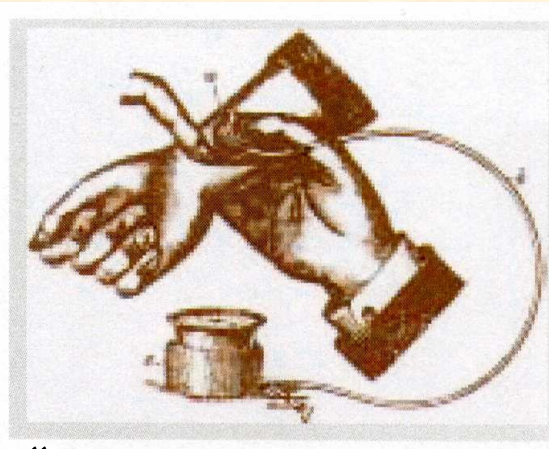
- palpation method
- Auscultation method
- Oscilometric method



Palpatory methods

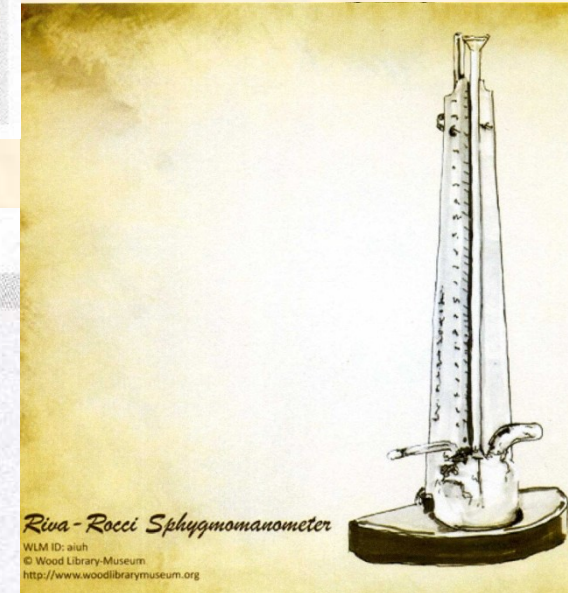
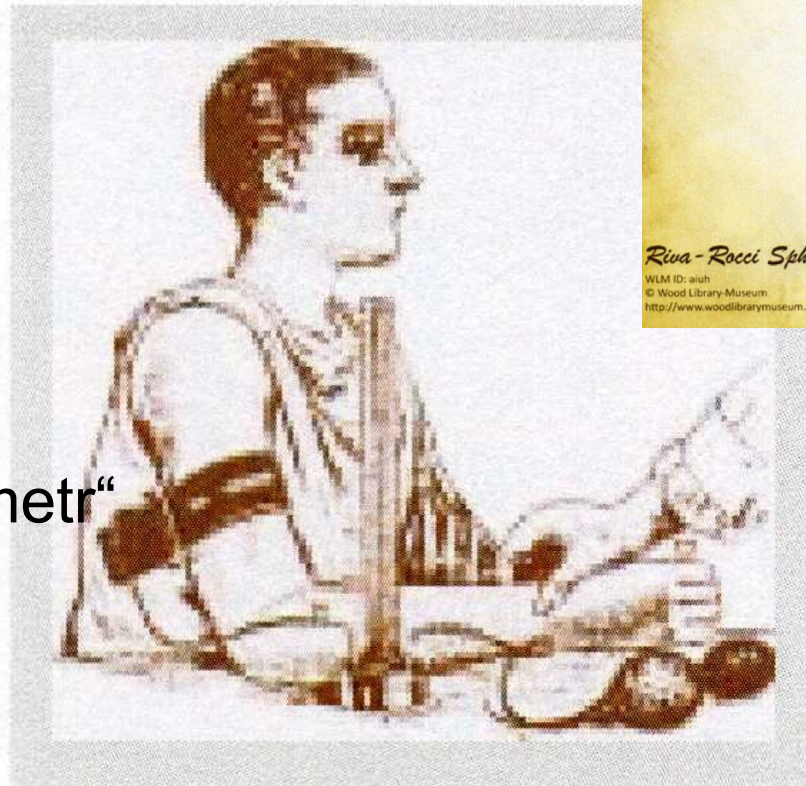
An Austrian physician
Von Basch

„aneroid sphygmomanometer“
Balloon in the wrist
1876



Italian physician
Riva Rocci

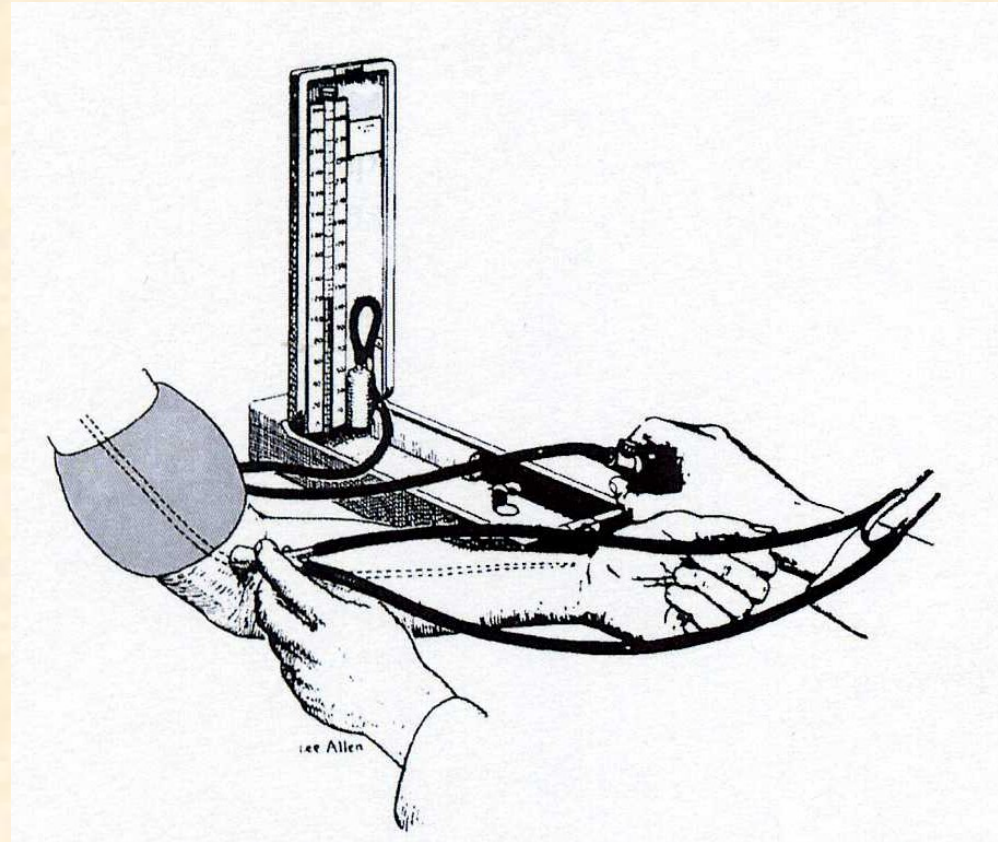
„mercury sphygmomanometer“
The cuff on the arm
1896



Auskultatory method

A Russian army surgeon
Nikolai Korotkoff
1904

„mercury sphygmomanometer“
The cuff on the arm
Stethoscope at the elbow



The size of the cuff in adults

Tab. 7.2 Doporučená šířka manžety tlakoměru u dospělých podle obvodu paže vyšetřovaného

kategorie manžety	obvod končetiny (cm)	šířka × délka gumového vaku (cm)
malá dospělá	22–26	10 × 24
dospělá	27–34	13 × 30
velká dospělá	35–44	16 × 38
stehenní dospělá	45–52	20 × 42

Small adult

Adult

Large

Tight cuff

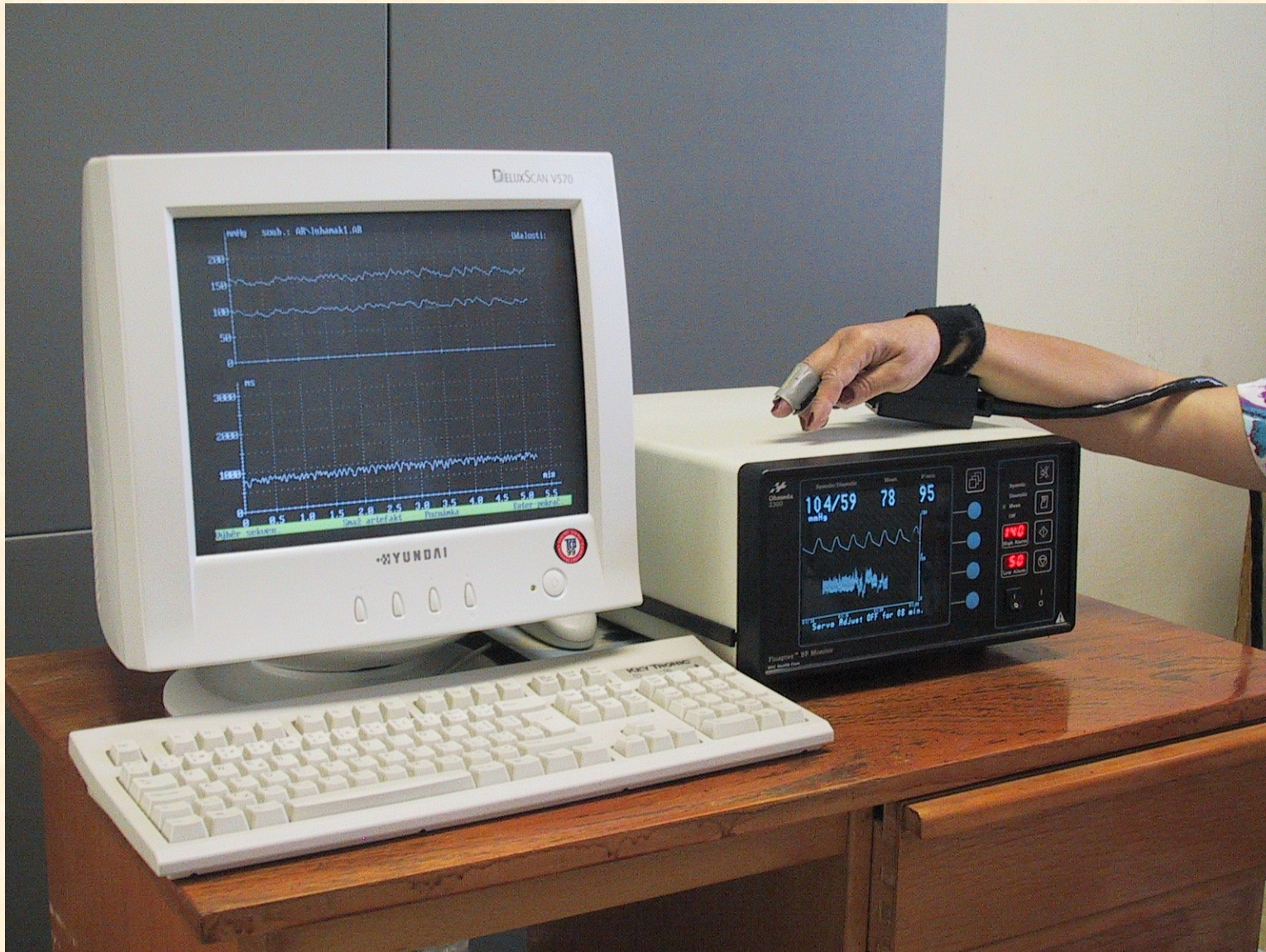
Špinar, J. a kol. Propedeutika a vyšetřovací metody vnitřních nemocí, 2008

Noninvasive continuously beat-to-beat measurement of finger arterial pressure

- Prof. Jan Peňáz, MD, PhD
- Teacher and researcher on the Department of Physiology, Masaryk university, Brno
- Patent 1969



Finapres (Ohmeda, USA)



Finometr (FMS, Nizozemí)



- We need that **pressure in the cuff corresponded to the pressure of the digital artery**
- **Method: photoplethysmography**
- Recorded photoelectric plethysmogram
- The new term: **Transmural pressure** – P_t (the pressure across the wall of the artery)
- BP , P_c (pressure in cuff), P_t
- We estimated: **$BP = P_c - - - P_t = 0$** - - - photoplethysmogram registered the highest amplitude of oscillation --- **we measure the MAP**
- **Step by step** increase of P_c , in the moment of the highest amplitude – **feed-back loop** started for obtained(keeping) the constant volume of the finger

Records of circulatory parameters

