HTA en situation particulière : je traite comment?

Le Sportif

Fabrice IVANES
Tours

Statement of Financial Interest

I currently have, or have had over the last two years, an affiliation or financial interests or interests of any order with a company or I receive compensation or fees or research grants with a commercial company :

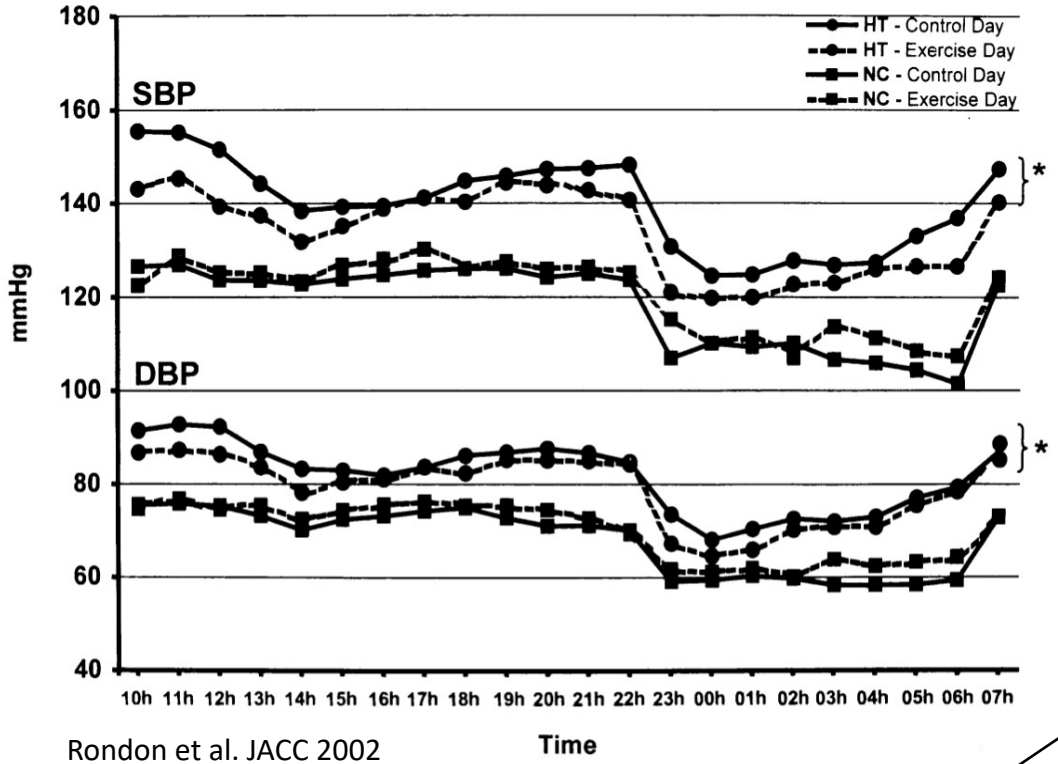
☑ I do not have any potential disclosure to report

JESFC

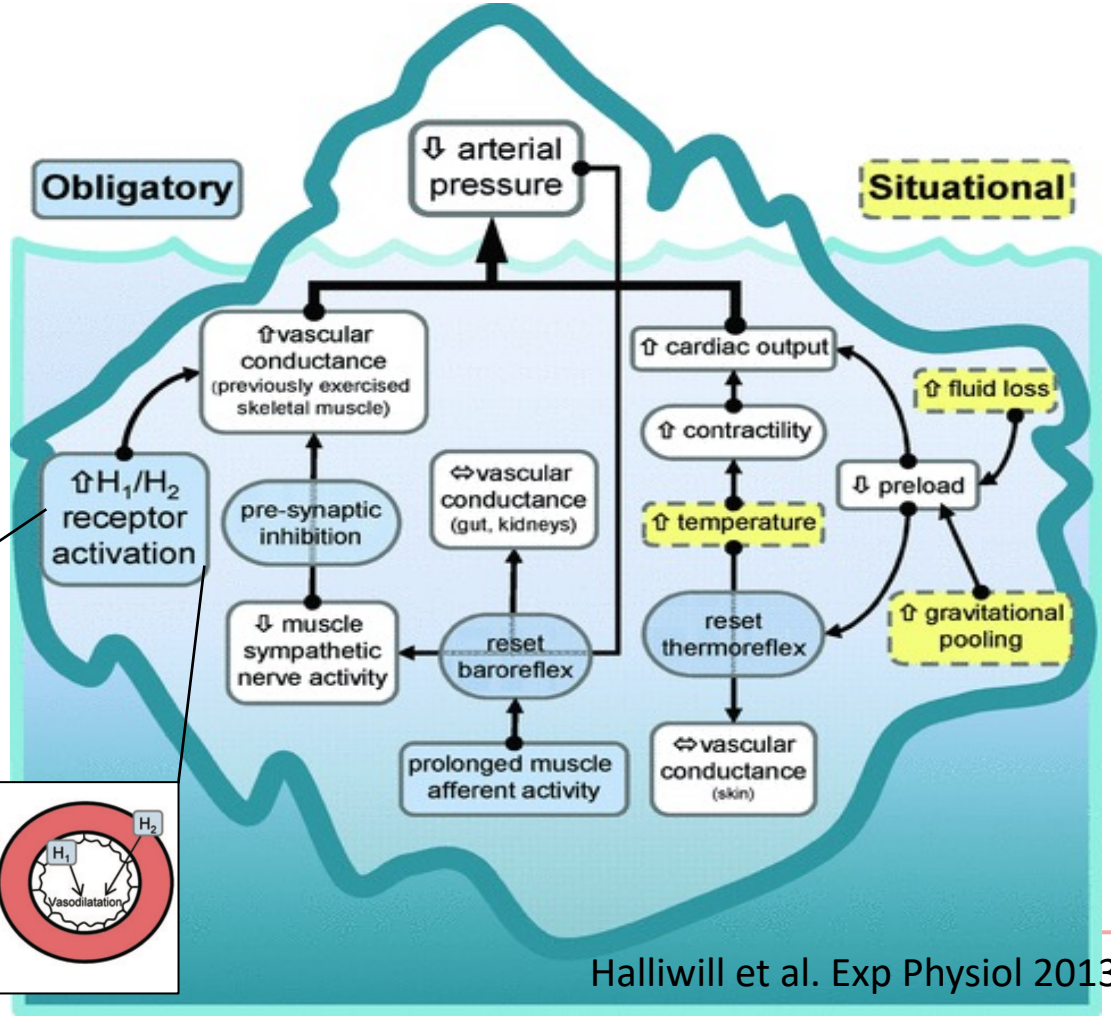
How do I treat arterial hypertension in athletes?

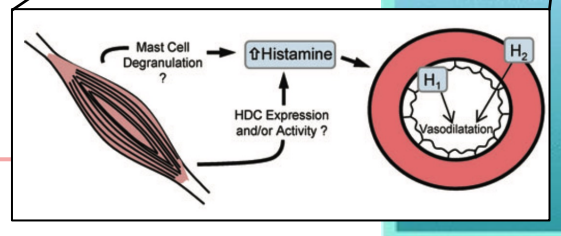
Hypertension in athletes is not common

Exercising is a real BP lowering therapy…



Rondon et al. JACC 2002





- In addition to a reduction in insulin levels

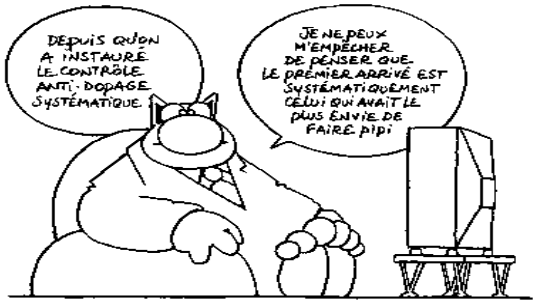
Halliwill et al. Exp Physiol 2013

Hypertension in athletes is not common

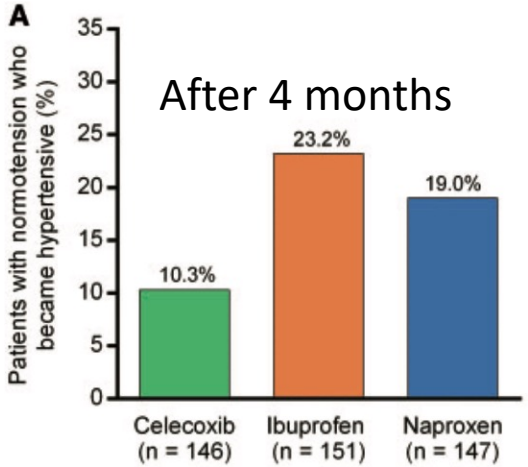
Hypertension in athlete? There's something fishy…

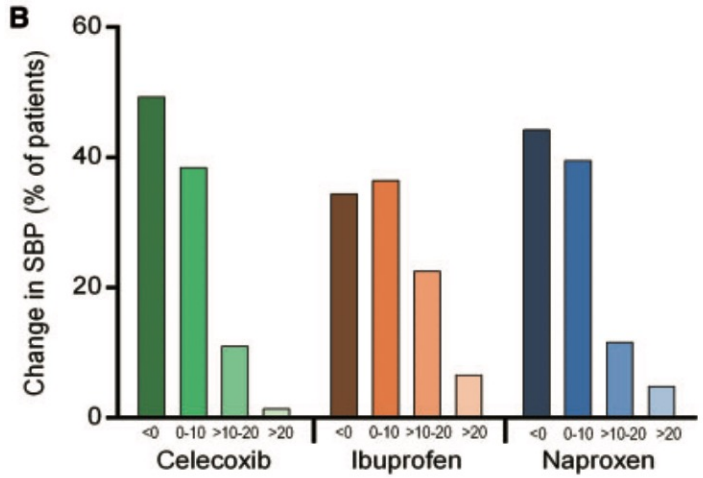
Common causes of hypertension in athletes:

- ✓ **Overtraining**
- ✓ Overweight
- ✓ Contraceptive pills
- ✓ **NSAID overconsumption**
- ✓ Excessive alcohol consumption
- ✓ Drug abuse
- ✓ **Doping…**



Beware of white coat hypertension





Ruschitzka et al, Eur Heart J 2017

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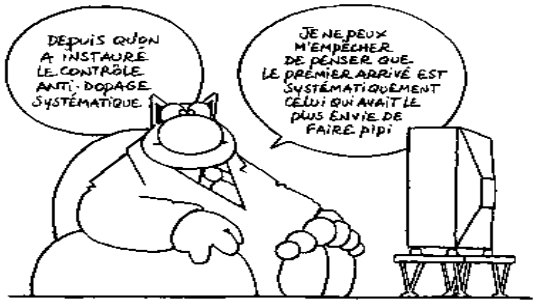
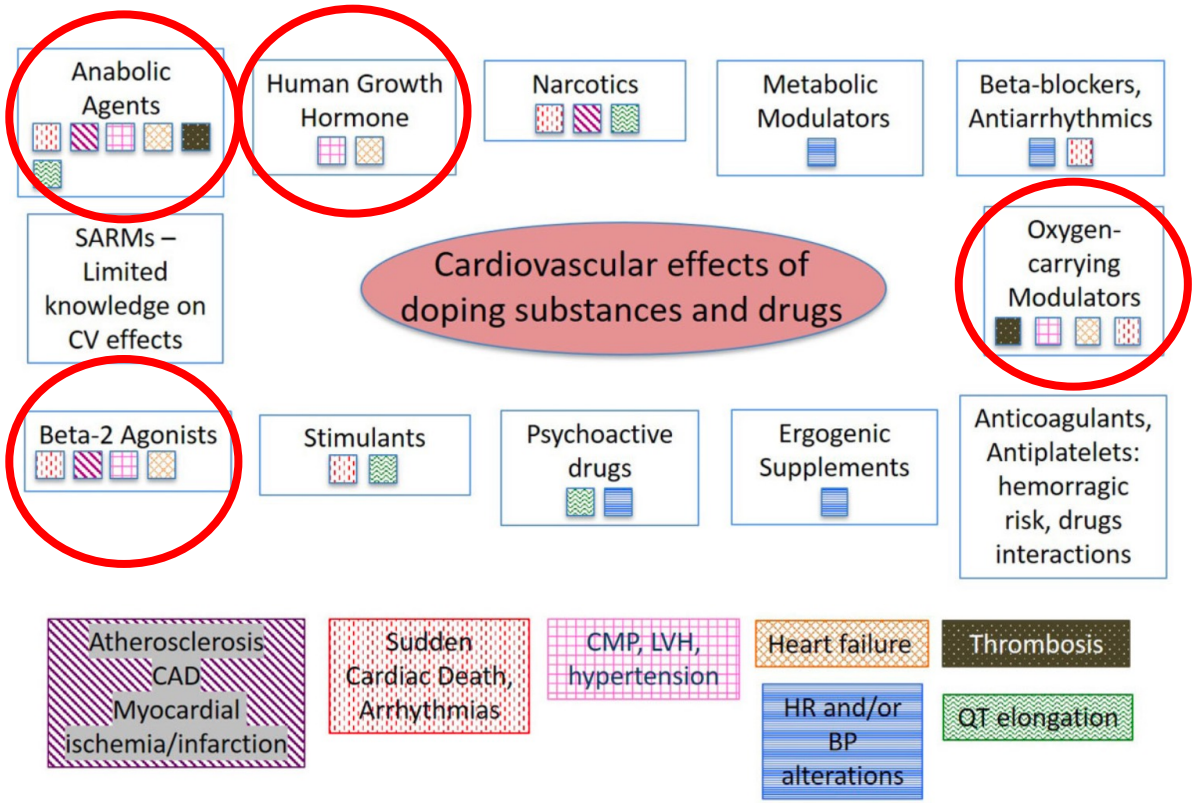


- ✓ **Doping…**

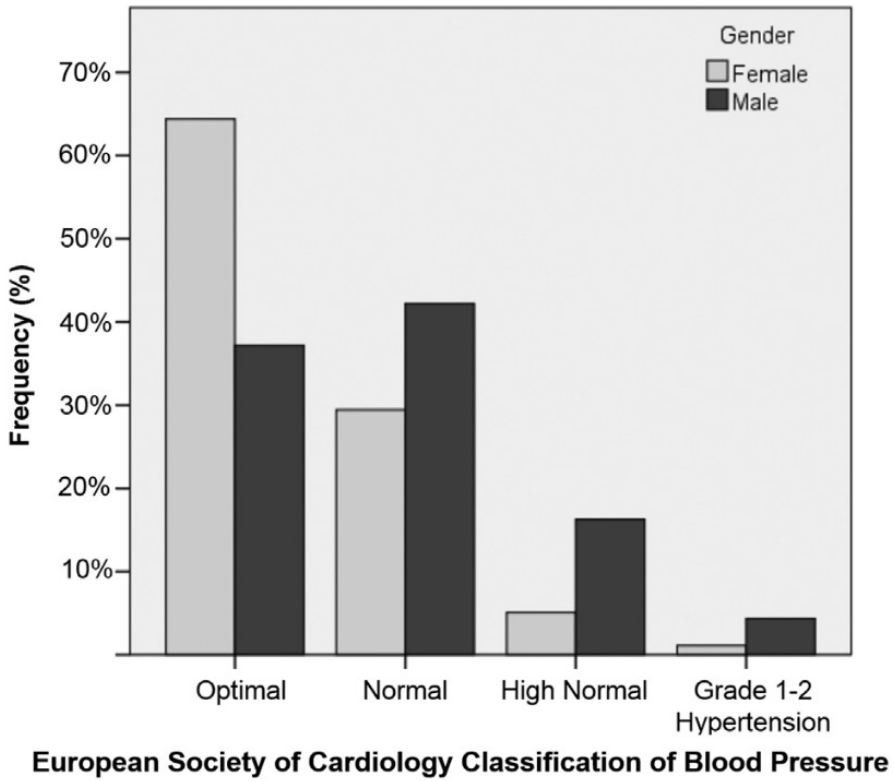
Beware of white coat hypertension



Adami et al, Eur J Prev Cardiol 2022

Hypertension in athletes is not common

Rare, but still often a problem of lifestyle…



European Society of Cardiology Classification of Blood Pressure

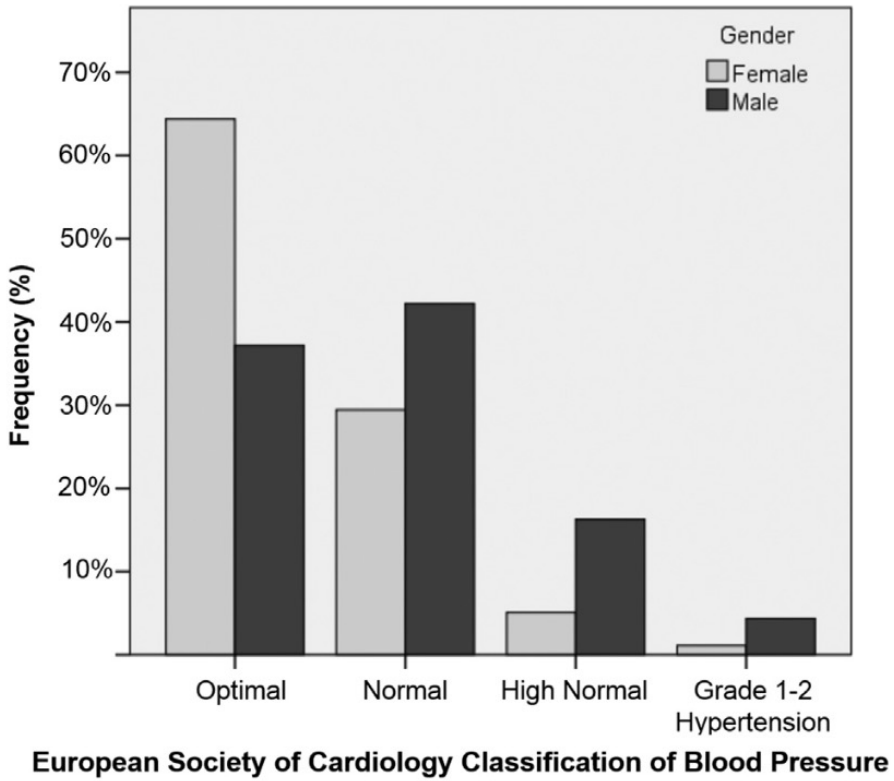
Italian cohort of 2040 athletes engaged in national/international competitions

Clinical, metabolic and echocardiographic characteristics of the study population according to European Society of Cardiology classification of office Blood Pressure

Variable	Optimal (n=957)	Normal (n=768)	High Normal (n=250)	Grade 1-2 (n=65)	p value
Age (years)	23±6	25±6	26±6	26±6 *	<0.001
Gender (male)	490 (50%)	550 (71%)	215 (85%)	55 (87%)	<0.001
Height (cm)	174±10	180±11	182±10	184±10 *	<0.001
Weight (Kg)	67±12	75±13	80±15	88±18 *,†,‡	<0.001
Body Surface Area (m^2)	1.81±0.21	1.95±0.21	2.01±0.23	2.10±0.24 *,†,‡	<0.001
Body Mass Index (Kg/ m^2)	22.0±2.4	23.1±2.6	24.2±3.3	26.2±4.8 *,†,‡	<0.001
Fat Mass (%)	18±7	17±7	17±6	22±9 *,†,‡	0.021
Positive Family History	220 (23%)	197 (26%)	69 (27%)	24 (38%) *,†,‡	0.030
Smoker	29 (3%)	16 (2%)	4 (2%)	0	0.246
Systolic Blood Pressure (mmHg)	105±8	118±5	128±5	136±11 *,†,‡	<0.001
Diastolic Blood Pressure (mmHg)	67±6	77±5	79±6	86±7 *,†,‡	<0.001

Hypertension in athletes is not common

Rare, but still often a problem of lifestyle…



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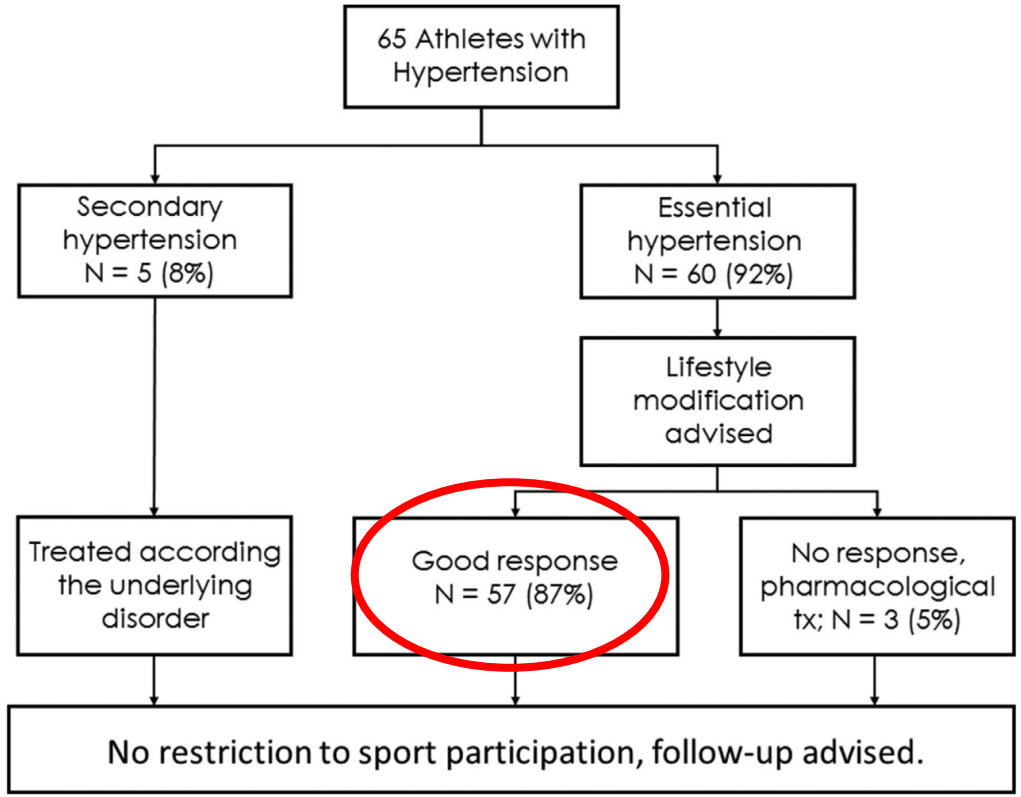
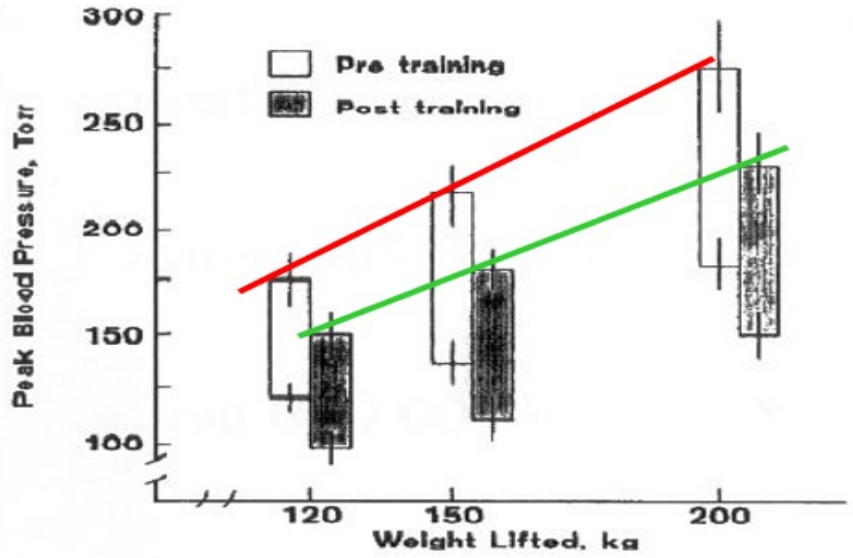


Lifestyle modification : training adaptations

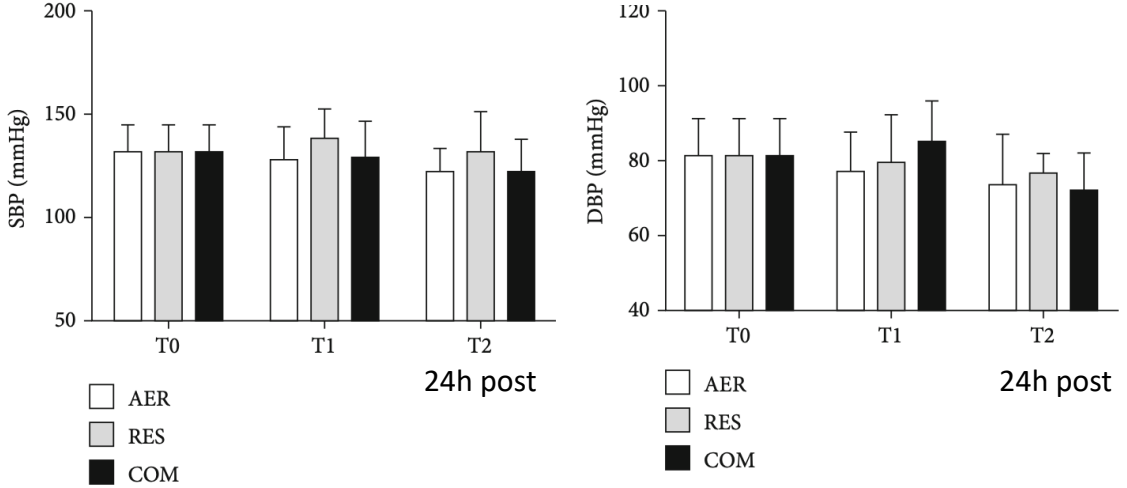
Adding dynamic training to resistance training helps in reducing blood pressure…

Historical data showing the benefit of adding submaximal endurance training for weigh lifters



Salle 1993

	RH ($n = 10$)	NON-RH ($n = 10$)	P value
Clinical data			
Age (years)	60 ± 9	54 ± 13	0.66
Female gender, n (%)	6 (60)	5 (50)	1
Diabetes mellitus, n (%)	10 (100)	5 (50)	0.03
BMI (kg/m^2)	31 ± 5	32 ± 7	0.18
Free-fat mass (kg)	54 ± 18.5	61 ± 10.6	0.40
Fat mass (kg)	25 ± 10	26 ± 14	0.32
Total body water (L)	75 ± 2	75 ± 3	0.17
Basal metabolic rate (cals/day)	1765 ± 482	1996 ± 540	0.39
Office SBP (mmHg)	147 ± 11	134 ± 8	0.02
Office DBP (mmHg)	85 ± 7	78 ± 6	0.08
Office MBP (mmHg)	56 ± 22	49 ± 10	0.12



AER : tapis 45 min, 50-60% FMT

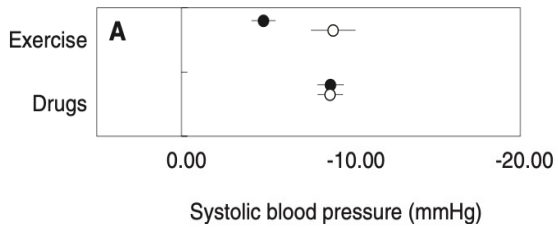
RES : 6 exercices (4x12 rep, Borg 3-5)

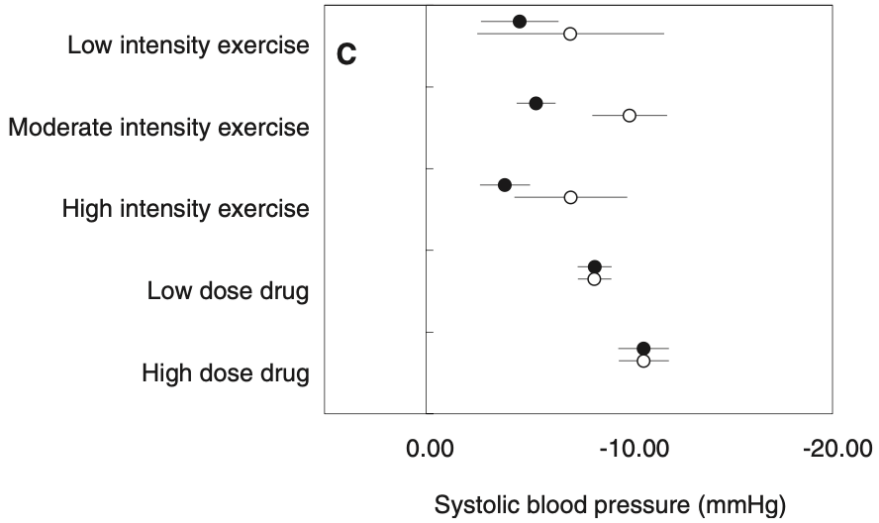
COM : AER 25 min + RES 6x2x12

Fraccara-Pires et al. Bio Med Res 2022

Lifestyle modification : training adaptations

391 studies, 39 742 patients including > 10 000 PA (3508 with HT)
Combining endurance and resistance training further reduces BP





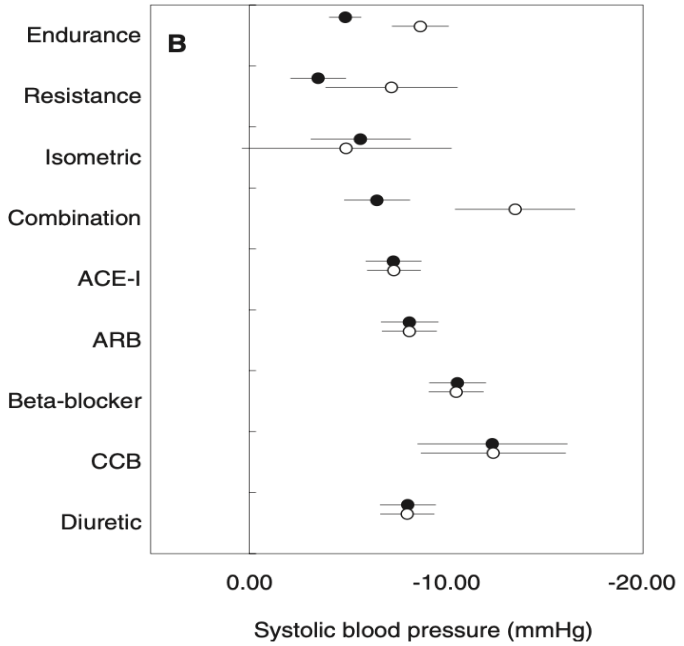


Table 2 Findings of network meta-analyses. Change from baseline systolic blood pressure (mmHg) achieved when comparing different types of exercise versus classes of drugs

–	Endurance	Resistance	Isometric	Combination*	ACE-I	ARB	β-blocker	CCB	Diuretic
Endurance	–	1.46 (–2.05 to 4.99)	3.77 (–1.73 to 9.21)	–4.81 (–7.99 to –1.61)	1.35 (–0.64 to 3.31)	0.55 (–1.45 to 2.55)	–1.81 (–3.82 to 0.186)	–3.70 (–7.64 to 0.27)	0.66 (–1.33 to 2.66)
Resistance	1.37 (–0.15 to 2.92)	–	2.32 (–4.02 to 8.61)	–6.26 (–10.67 to –1.90)	–0.11 (–3.73 to 3.50)	–0.90 (–4.52 to 2.71)	–3.27 (–6.91 to 0.33)	–5.15 (–10.16 to –0.20)	–0.78 (–4.41 to 2.83)
Isometric	–0.76 (–3.40 to 1.86)	–2.15 (–5.04 to 0.75)	–	–8.58 (–14.68 to –2.45)	–2.42 (–7.89 to 3.08)	–3.21 (–8.70 to 2.31)	–5.59 (–11.04 to –0.05)	–7.48 (–13.91 to –0.96)	–3.11 (–8.55 to 2.441)
Combination*	–1.61 (–3.34 to 0.12)	–2.98 (–5.04 to –0.93)	–0.84 (–3.85 to 2.13)	–	6.16 (2.81 to 9.48)	5.37 (2.03 to 8.70)	3.00 (–0.38 to 6.32)	1.11 (–3.66 to 5.86)	5.48 (2.13 to 8.82)
ACE-I	–2.45 (–4.07 to –0.82)	–3.83 (–5.83 to –1.83)	–1.67 (–4.57 to 1.20)	–0.83 (–3.03 to 1.35)	–	–0.78 (–2.60 to 1.02)	–3.16 (–5.12 to –1.21)	–5.04 (–8.98 to –1.13)	–0.67 (–2.50 to 1.14)
ARB	–3.26 (–4.96 to –1.60)	–4.64 (–6.65 to –2.61)	–2.49 (–5.42 to 0.43)	–1.64 (–3.89 to 0.57)	–0.81 (–2.72 to 1.07)	–	–2.37 (–4.34 to –0.41)	–4.25 (–8.18 to –0.33)	0.11 (–1.68 to 1.89)
β-blocker	–5.70 (–7.36 to –4.04)	–7.07 (–9.11 to –5.08)	–4.93 (–7.83 to –2.01)	–4.09 (–6.28 to –1.88)	–3.24 (–5.27 to –1.24)	–2.43 (–4.50 to –0.36)	–	–1.88 (–5.84 to 2.06)	2.48 (0.54 to 4.45)
CCB	–7.46 (–11.36 to –3.57)	–8.85 (–12.90 to –4.80)	–6.70 (–11.26 to –2.10)	–5.85 (–10.05 to –1.73)	–5.01 (–9.09 to –0.97)	–4.20 (–8.30 to –0.10)	–1.75 (–5.79 to 2.31)	–	4.36 (0.44 to 8.29)
Diuretic	–3.17 (–4.81 to –1.53)	–4.55 (–6.56 to –2.57)	–2.40 (–5.31 to 0.49)	–1.56 (–3.78 to 0.64)	–0.72 (–2.60 to 1.16)	0.09 (–1.77 to 1.92)	2.52 (0.50 to 4.54)	4.29 (0.27 to 8.32)	–

Once the diagnostic is established, and secondary causes ruled out, time for risk assessment

Not different in athletes compared to non athletes…

Hypertension disease staging	Other risk factors, HMOD, or disease	BP (mmHg) grading			
		High normal SBP 130-139 DBP 85-89	Grade 1 SBP 140-159 DBP 90-99	Grade 2 SBP 160-179 DBP 100-109	Grade 3 SBP ≥180 or DBP ≥110
Stage 1 (uncomplicated)	No other risk factors	Low risk	Low risk	Moderate risk	High risk
	1 or 2 risk factors	Low risk	Moderate risk	Moderate to high risk	High risk
	≥3 risk factors	Low to Moderate risk	Moderate to high risk	High Risk	High risk
Stage 2 (asymptomatic disease)	HMOD, CKD grade 3, or diabetes mellitus without organ damage	Moderate to high risk	High risk	High risk	High to very high risk
Stage 3 (established disease)	Established CVD, CKD grade ≥4, or diabetes mellitus with organ damage	Very high risk	Very high risk	Very high risk	Very high risk

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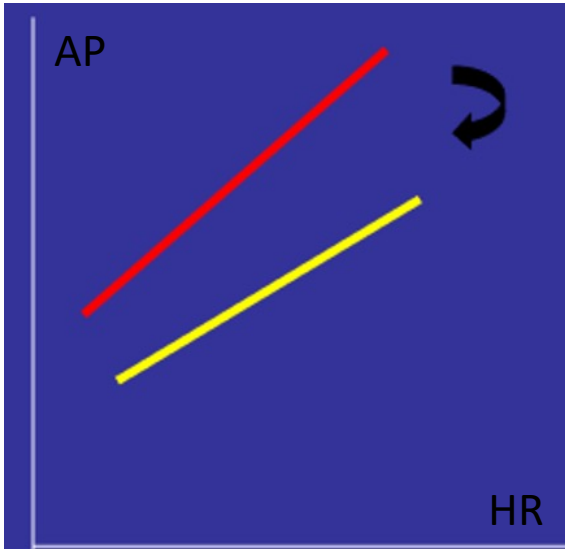
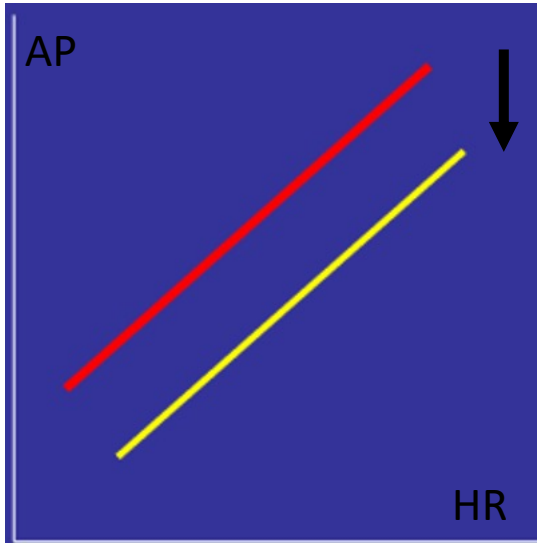
Anti-hypertensive drugs in sports

Impact of drugs on performance: none except for betablockers in endurance sports



Betablockers



All others therapeutic classes

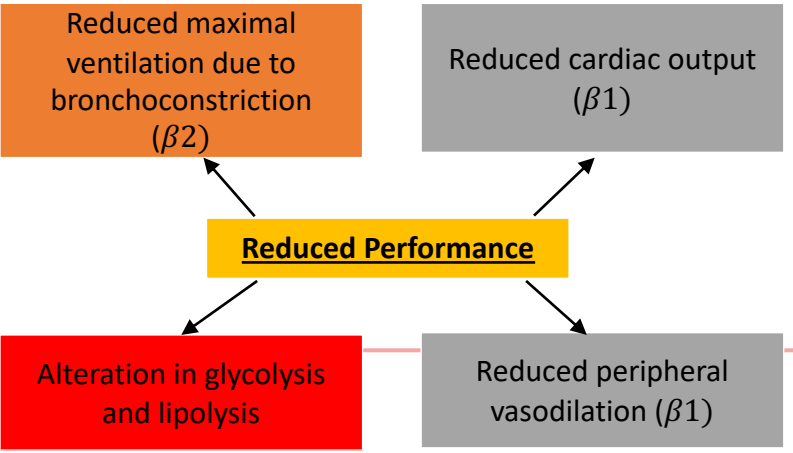
Therapeutic targets not different from the general population…

Age group	Office SBP treatment target ranges (mmHg)				
	Hypertension	+ DM	+ CKD	+ CAD	+ Stroke/TIA
18 – 69 years	120–130	120–130	<140–130	120–130	120–130
	Lower SBP acceptable if tolerated				
≥70 years	**<140 mmHg, down to 130 mmHg if tolerated**				
	Lower SBP acceptable if tolerated				
DBP treatment target (mmHg)	<80 for all treated patients				

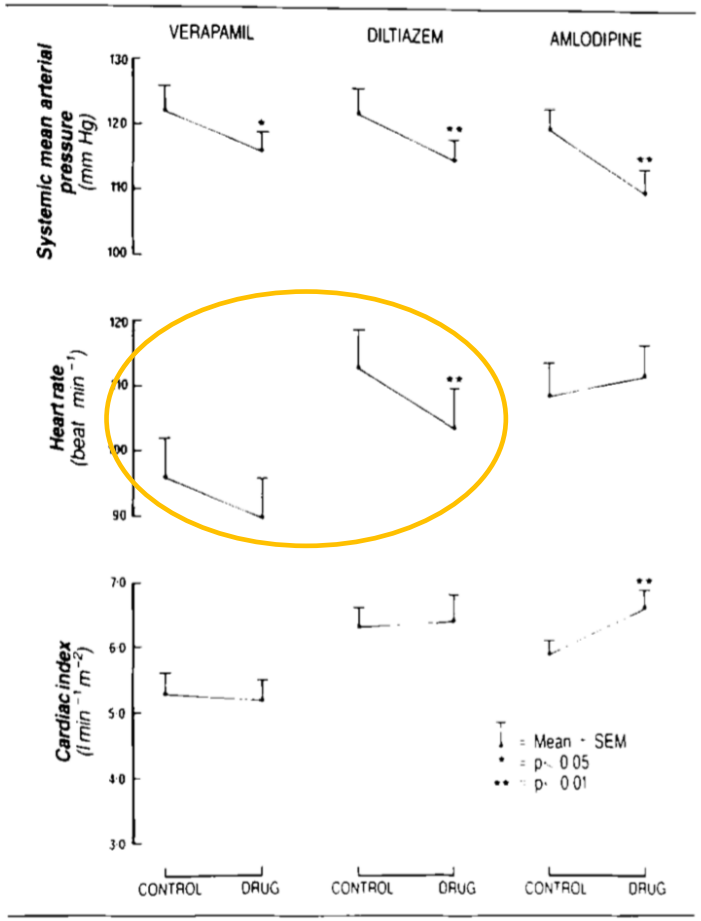
CAD = coronary artery disease; CKD = chronic kidney disease; DBP = diastolic blood pressure; DM = diabetes mellitus; SBP = systolic blood pressure; TIA = transient ischaemic attack.

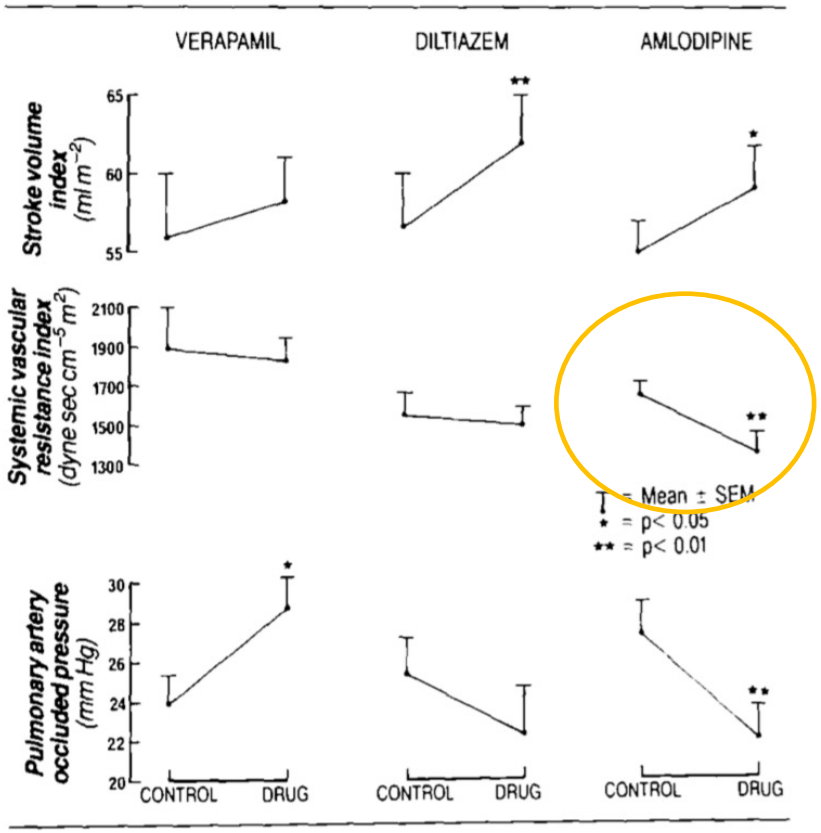
© ESC 2021

120-130/80 mmHg

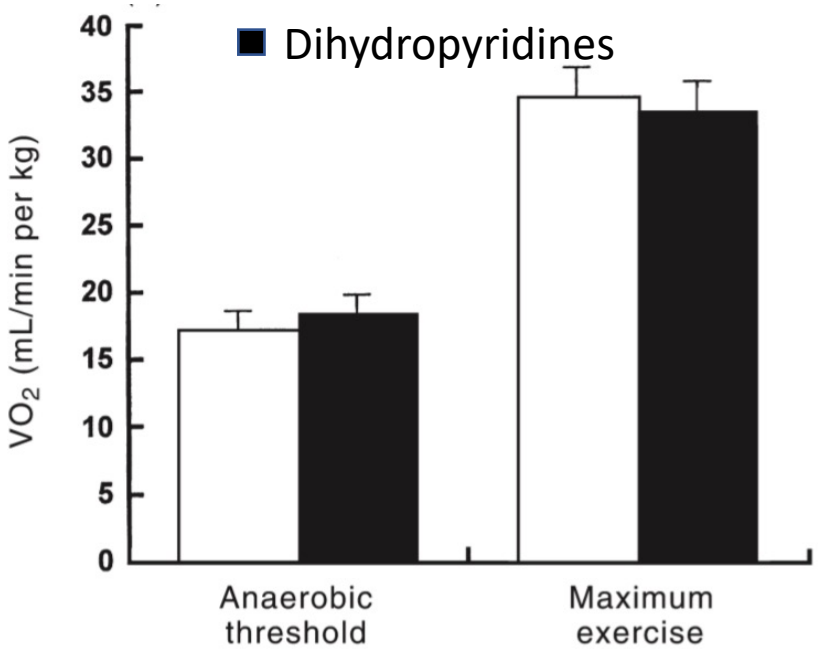


Focus on calcium channel blockers





No impact of dihydropyridines on performance



Vasodilator effect of dihydropyridines, negative chronotropic (and inotropic) effect of verapamil, mixed effect of diltiazem

Silke et al. Cardiovasc Drug Ther 1990

Lay et al., Clin Exp Pharmacol Physiol. 2001

But in athletes, some drugs are not allowed…

Tracking of doping is a permanent fight…

WORLD ANTI-DOPING AGENCY
play true

Except in case of an approved **Therapeutic Use Exemption** (TUE):

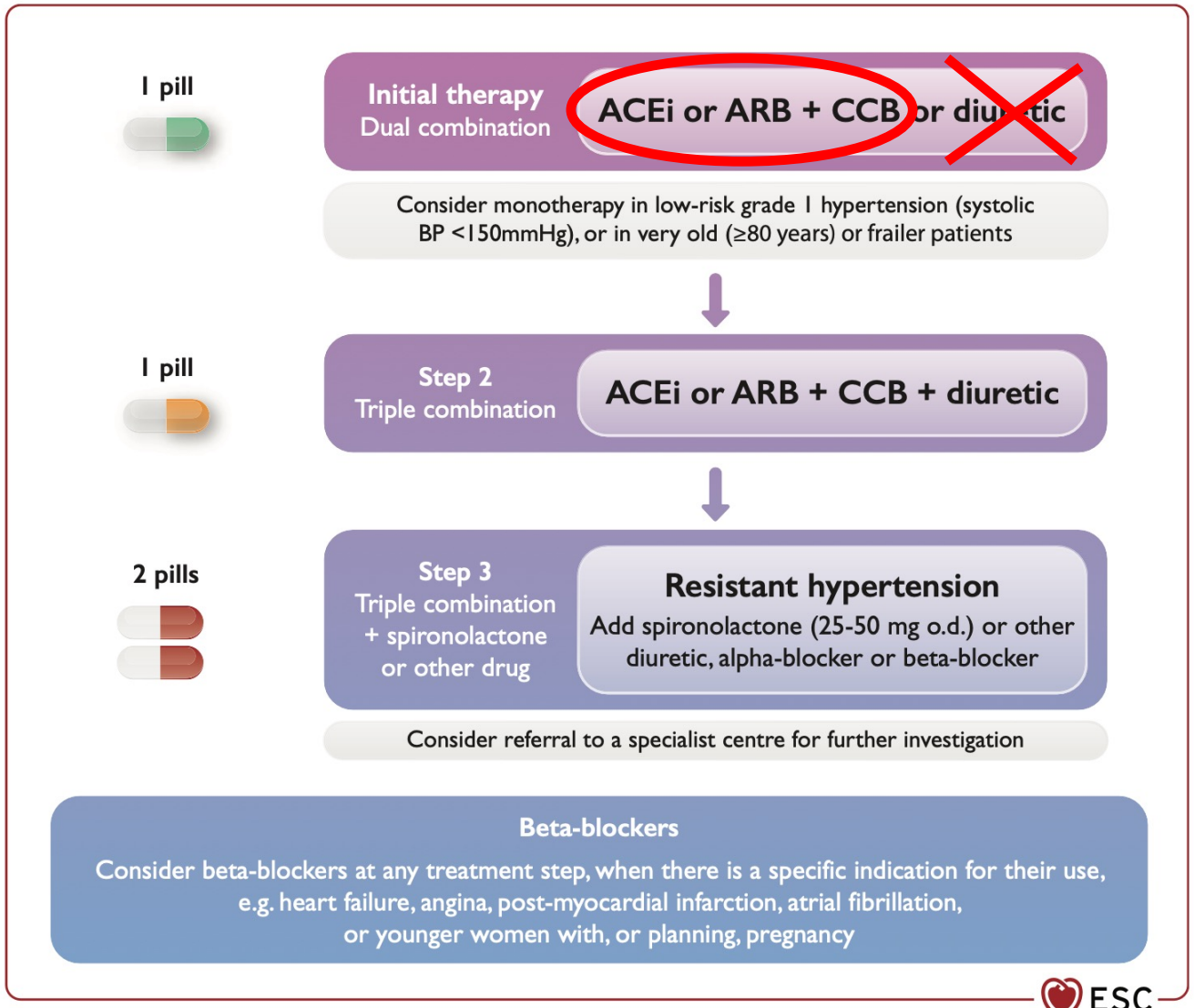
Diuretics are prohibited at all times as they are considered as masking agents

Betablockers are prohibited in competition for the following sports:

- Archery*
- Automobile
- Billiards
- Darts
- Golf
- Shooting*
- Skiing/snowboarding
- Underwater sports (apnoea)

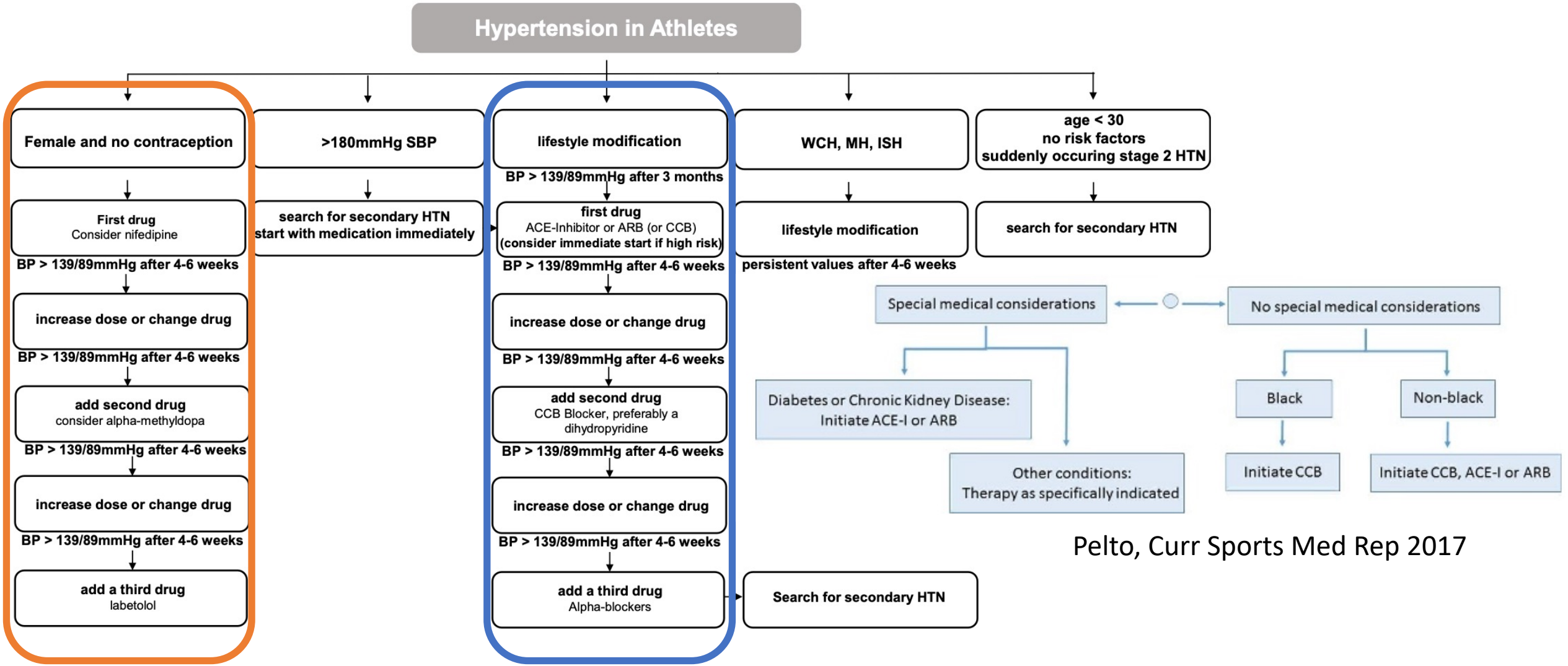
Olympic games 2008

Basis of pharmacological treatment



Hypertensive athletes are often low-risk grade I thus a monotherapy may be appropriated to start

Proposition of treatment strategy in hypertensive athletes



Pelto, Curr Sports Med Rep 2017

Schweiger et al, Curr Cardiol Rep 2021

Return to competitive sport practice

Only when BP is controlled… Beware of power sports that have greater impact on BP!

Sport Disciplines

Skill		Power		Mixed		Endurance	
Heart rate	+/++	Heart rate	++	Heart rate	++/+++	Heart rate	+++
Blood pressure	+	Blood pressure	+++	Blood Pressure	++	Blood Pressure	++
Cardiac output	+	Cardiac output	++	Cardiac Output	++/+++	Cardiac output	+++
Volume of training	-	Volume of training	+	Volume of training	++	Volume of training	+++
Cardiac remodeling	-	Cardiac remodeling	+	Cardiac remodeling	++	Cardiac remodeling	+++
• Archery • Car/ motor racing • Curling • Equestrian • Golf • Sailing • Shooting • Table Tennis		• Alpine skiing • Bobsleigh • Discus / javelin • Shot-putting • Snowboarding • Sprinting • Water skiing • Weightlifting • Wrestling		• Basketball • Cricket • Fencing • Football • Handball • Ice / field hockey • Rugby • Soccer • Tennis • Waterpolo • Volleyball		• Canoeing • Cross-country skiing • Cycling • Mid-long distance swimming • Mid-long distance running • Mid-long distance skating • Pentathlon • Rowing • Triathlon	

Others restrictions may apply if there are associated pathological conditions

In conclusion

Hypertensive athlete should be considered as a regular patient… with some specificities

- ✓ Rare condition, it should always lead to research secondary and/or toxic cause
- ✓ Importance of lifestyle modifications (yes, athletes are not always perfect people!)
- ✓ Treat when needed, but avoid prohibited drugs (diuretics ++, betablockers)
- ✓ Follow regularly
- ✓ Allow return to competition only when BP is controlled

Thank you for your attention