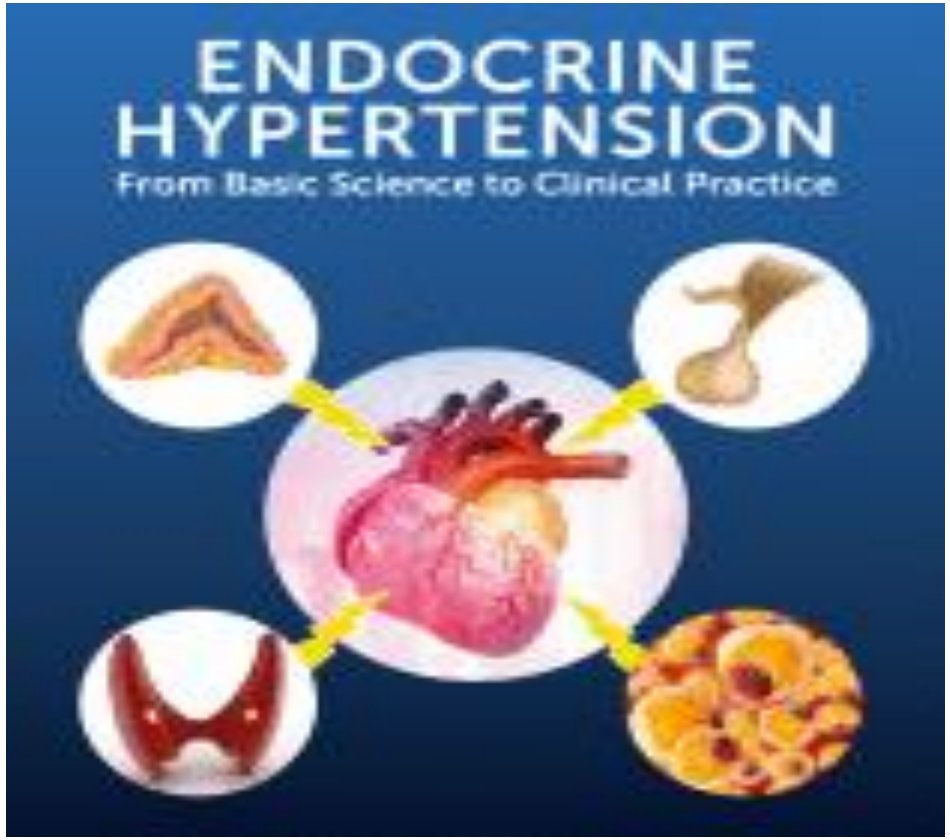

In the name of
God
NODY.IR



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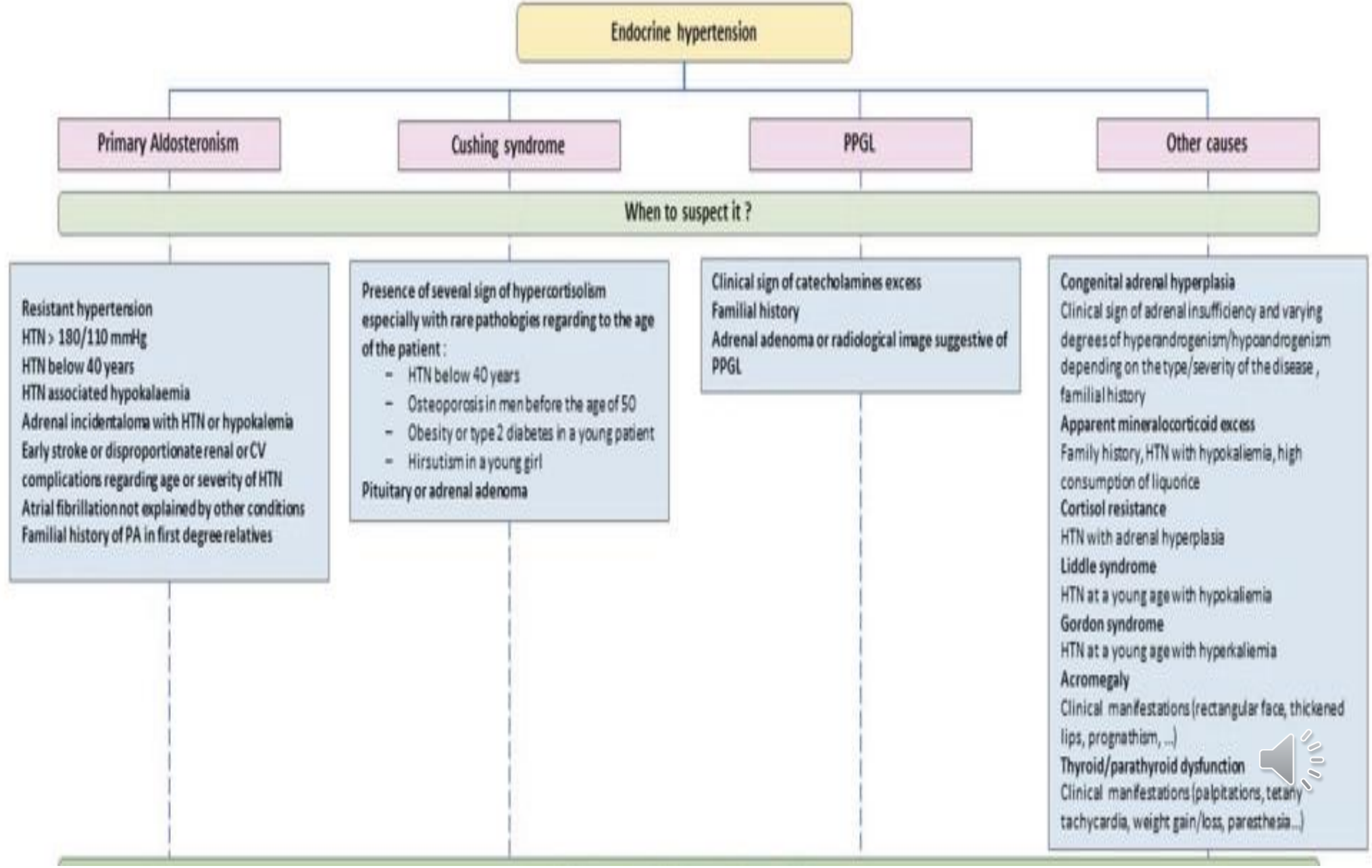
Outline:

- **Importance of Secondary Hypertension**
- **Incidence and Screening Criteria**
- **Recommendations for Screening**
- **Importance of Timely Screening**


Endocrine hypertension
Primary Aldosteronism
Cushing syndrome
PPGL
Other causes
When to suspect it ?
Resistant hypertension
HTN > 180/110 mmHg
HTN below 40 years
HTN associated hypokalaemia
Adrenal incidentaloma with HTN or hypokalemia
Early stroke or disproportionate renal or CV complications regarding age or severity of HTN
Atrial fibrillation not explained by other conditions
Familial history of PA in first degree relatives
Presence of several sign of hypercortisolism especially with rare pathologies regarding to the age of the patient :
- HTN below 40 years
- Osteoporosis in men before the age of 50
- Obesity or type 2 diabetes in a young patient
- Hirsutism in a young girl
Pituitary or adrenal adenoma
Clinical sign of catecholamines excess
Familial history
Adrenal adenoma or radiological image suggestive of PPGL
Congenital adrenal hyperplasia
Clinical sign of adrenal insufficiency and varying degrees of hyperandrogenism/hypoandrogenism depending on the type/severity of the disease , familial history
Apparent mineralocorticoid excess
Family history, HTN with hypokaliemia, high consumption of liquorice
Cortisol resistance
HTN with adrenal hyperplasia
Liddle syndrome
HTN at a young age with hypokaliemia
Gordon syndrome
HTN at a young age with hyperkaliemia
Acromegaly
Clinical manifestations (rectangular face, thickened lips, prognathism, ...)
Thyroid/parathyroid dysfunction
Clinical manifestations (palpitations, tetany tachycardia, weight gain/loss, paresthesia...)

Hypertension

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Check for updates

Clinical Management of Primary Aldosteronism: An Update

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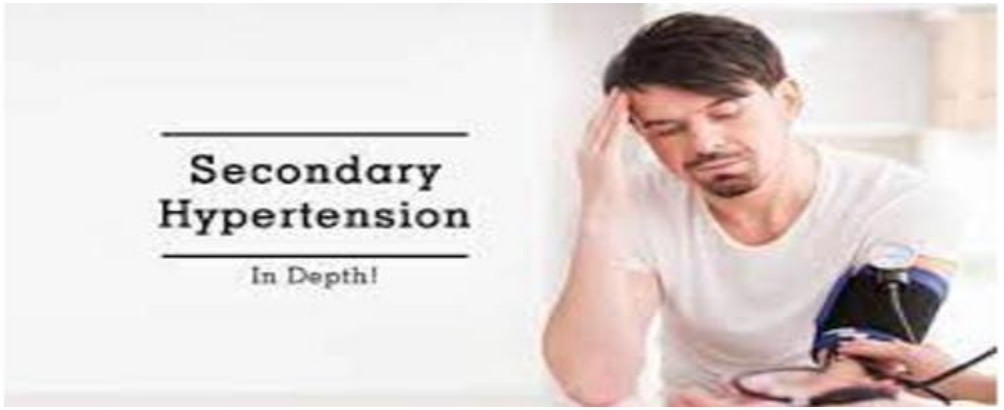


Textbooks from the 10th edition of Harrison's and guidelines report that 95% to 99% of patients with high blood pressure (BP) would have primary (essential) hypertension as recently reviewed. Hence, secondary hypertension is regarded as exceptional and thus neglected in clinical practice.

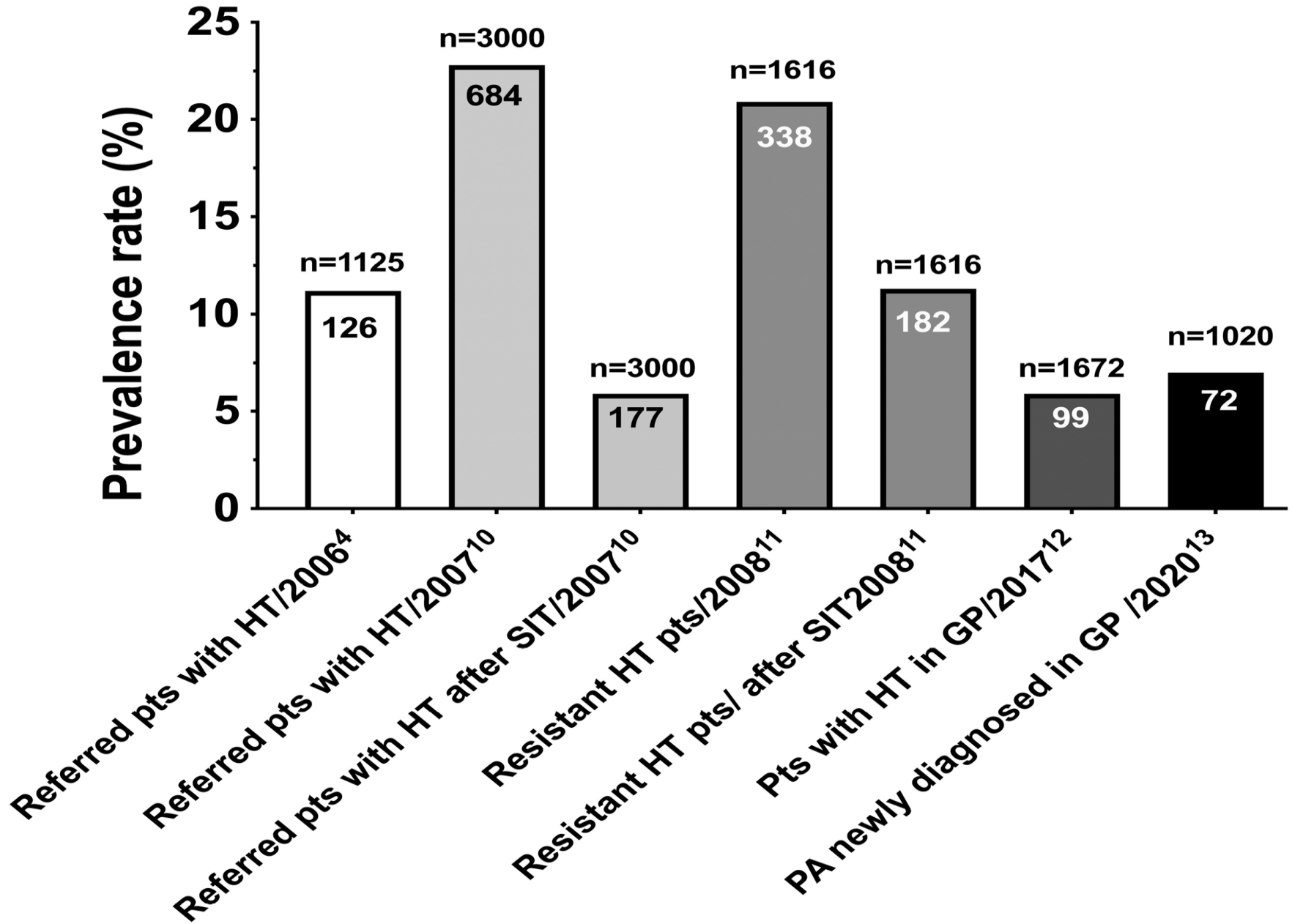
Compelling accumulating evidences indicate instead that, when thoroughly investigated, secondary hypertension is highly prevalent. This applies particularly to primary aldosteronism (PA), which is rarely diagnosed, despite being surgically curable in many cases.

This *is tragic* because PA detrimentally affects the heart, arterial wall, and kidneys, causing cardiovascular events that can be prevented with early diagnosis and targeted treatment.

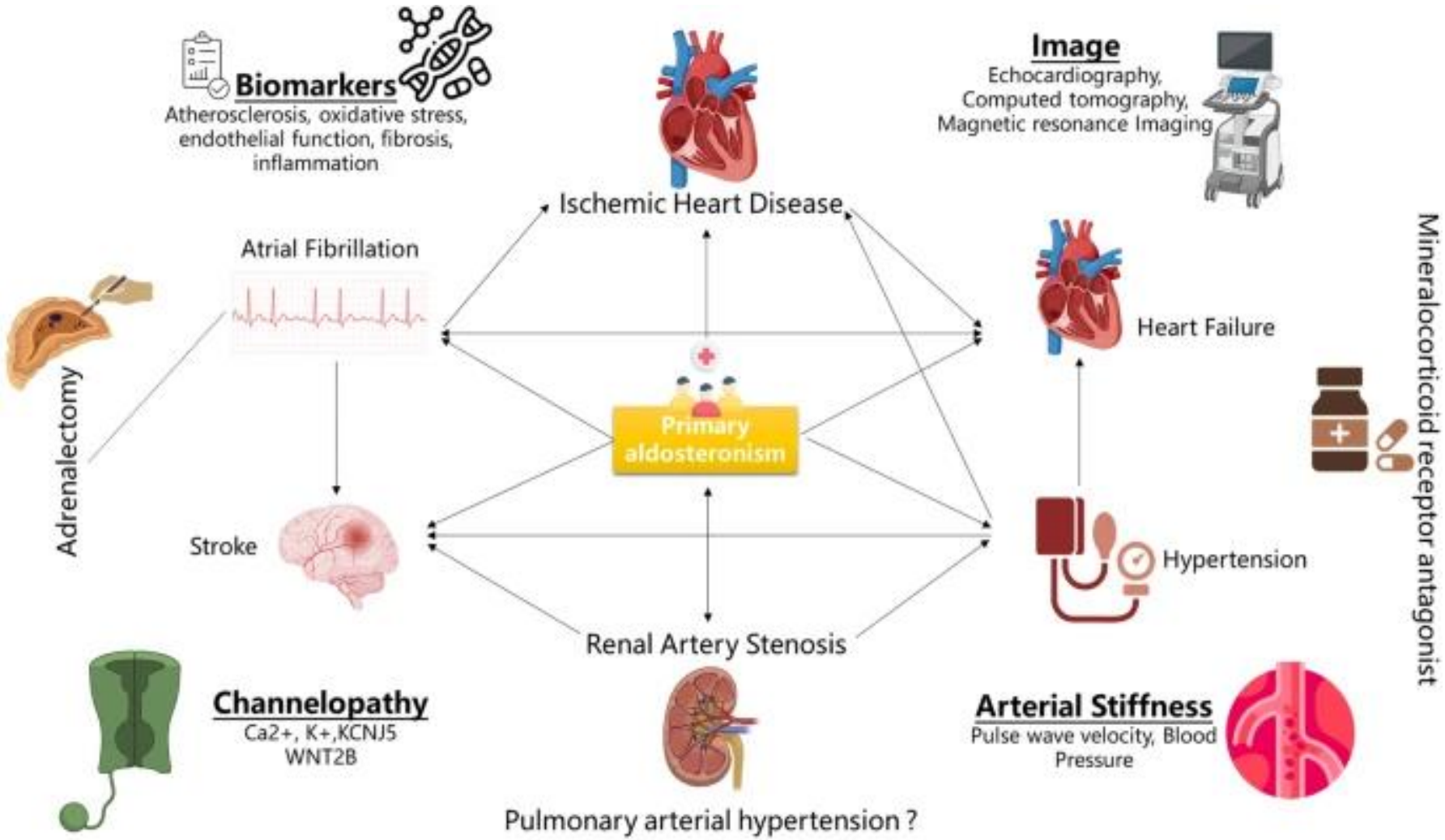
PREVALENCE OF PA

A wide range of estimates of PA prevalence exists, which are mainly explained by differences in patient populations, screening protocols, and diagnostic criteria.

PA Prevalence in studies that recruited > 1,000 Pts with HT



CARDIOVASCULAR DAMAGE IN PA


Biomarkers
Atherosclerosis, oxidative stress, endothelial function, fibrosis, inflammation
Image
Echocardiography, Computed tomography, Magnetic resonance Imaging
Ischemic Heart Disease
Atrial Fibrillation
Heart Failure
Adrenalectomy
Primary aldosteronism
Mineralocorticoid receptor antagonist
Stroke
Hypertension
Renal Artery Stenosis
Channelopathy
Ca2+, K+,KCNJ5 WNT2B
Arterial Stiffness
Pulse wave velocity, Blood Pressure
Pulmonary arterial hypertension ?

WHY IS PA SO MARKEDLY UNDERDETECTED DESPITE ITS DETRIMENTAL CONSEQUENCES?

1-Misconceptions about the rarity of this disease

2-Misconception about the absolute existence of hypokalemia

٣ -Errors in the interpretation of plasma aldosterone levels

4- variable secretion of aldosterone

Patients With HT That Must Be Screened Because of High Prior Probability of Primary Aldosteronism

1-Drug-resistant HT by current definitions Systolic-diastolic HT (BP >150/100)

2-Spontaneous or diuretic-induced hypokalemia

3-Incidentally discovered adrenal mass (incidentaloma)

4-Sleep apnea

5-Family history of PA and early-onset HT or CA at a young age

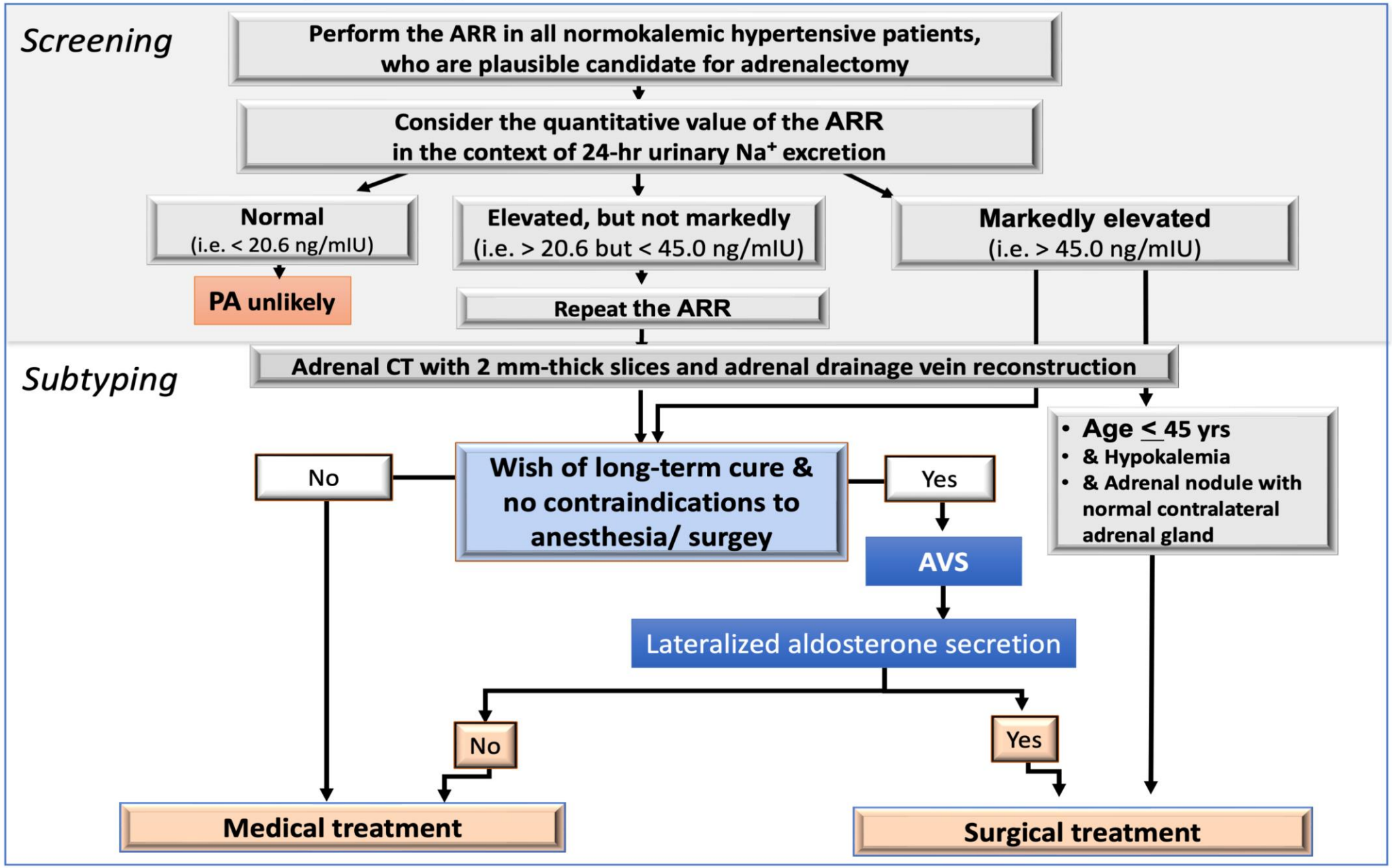
6-Unexplained atrial fibrillation

7-LVH, diastolic dysfunction, microalbuminuria, chronic kidney disease in excess of what expected based on BP values.

8-Women with HT planning a pregnancy


Hypertension and sleep apnea? You
may have primary aldosteronism.

Simplified Algorithm for PA Screening and Work-up



Serum levels of potassium:

Marked hypokalemia lowers aldosterone secretion and should be corrected before performing the test to avoid FN ARR values

Estimation of salt intake by measuring 24-h urinary sodium excretion allows to identify FP cases due to a low salt intake and diuretics that increase PAC.

6 wk before testing withdraw:

1-diuretics as they raise renin and, if they caused hypokalemia, PAC can be factitiously low

2-RAS blockers (ACE inhibitors and ARBs) as they raise renin and lower PAC thus causing FN results.

Given the 15 min half-life of plasma renin and aldosterone, after 1 h their values are back to baseline (clinostatic) values.

Hence, keep the patient resting, supine, or sitting for 60 min before sampling.

Long-acting calcium channel blockers (verapamil), α1-receptor blocker (doxazosin) should be used.

MRAs are advised, if necessary to control BP or to ensure normokalemia

Calculate the ARR in the correct unit of measure using ARR-App.

Pheochromocytomas and paragangliomas

Paragangliomas and pheochromocytomas (PGL) are tumours that can develop in the thoracic-abdominal-pelvic sympathetic ganglia located along the spine or in the parasympathetic ganglia located at the cervical level and at the base of the skull. More specifically, PGL arising in the adrenal medulla is called pheochromocytoma.

HTN is the most frequent clinical sign, present in more than 80% of patients .It can be permanent or paroxysmal in the form of hypertensive attacks. However, orthostatic hypotension can sometimes be associated. Due to the rarity of the disease, the average time to diagnosis is about 3 years.

Biological diagnosis is based on the determination of metanephrines (MN) (including metanephrine and normetanephrine) which are the degradation products of CTN.

These assays can be performed in plasma or on a 24 h urine collection (and associated with a 24 h urine creatinine assay to ensure correct collection)

A normal MN value excludes the presence of a secreting PGL. Conversely, a result greater than 4 times the upper limit is in favour of tumour secretion.

Screening for secretory PGL is indicated in patients

1- HTN diagnosed before 40 years old

2- blood pressure lability on ambulatory blood pressure monitoring

3-a history of Takotsubo heart disease

4- any adrenal incidentaloma associated or not with HTN

5-resistant HTN

6-any genetic disease predisposing toPGL

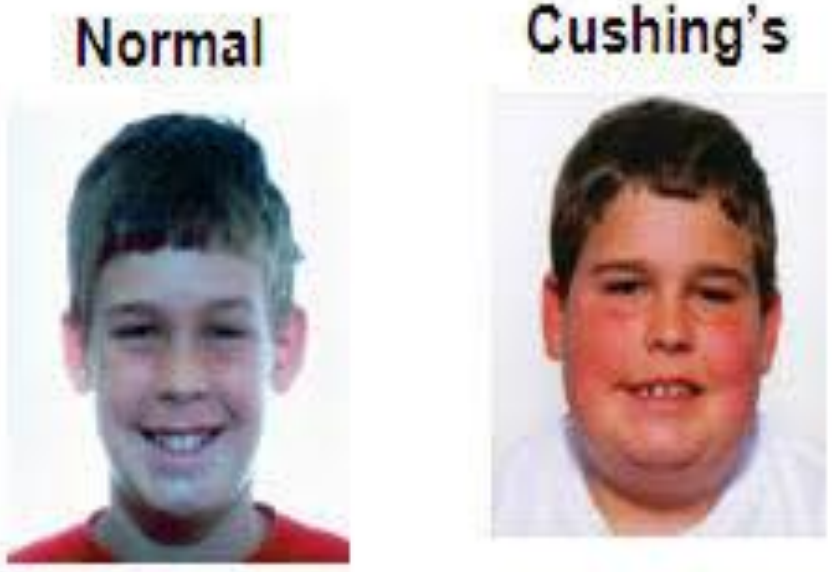
7-a history of hypertensive crisis or haemodynamic instability during general anaesthesia or after taking drugs that induce catecholamine release

8- HTN associated with diabetes (not type 1), with a body mass index < 25 kg/m^2 in a patient under 50 years of age

Magnetic resonance imaging (MRI) is only preferred when looking for a cervical paraganglioma. In certain specific indications, functional imaging using positron emission tomography (PET) may complete the initial imaging work-up.

Cushing syndrome

Cushing's syndrome (CS) is the result of prolonged exposure to glucocorticoids. Except for exogenous administration of supra-physiological doses of glucocorticoids, this is a rare disease with an incidence estimated between 1 and 5 million person-years .Its prevalence is estimated to be about 0.5% in hypertensive patients



Recommended to screen:

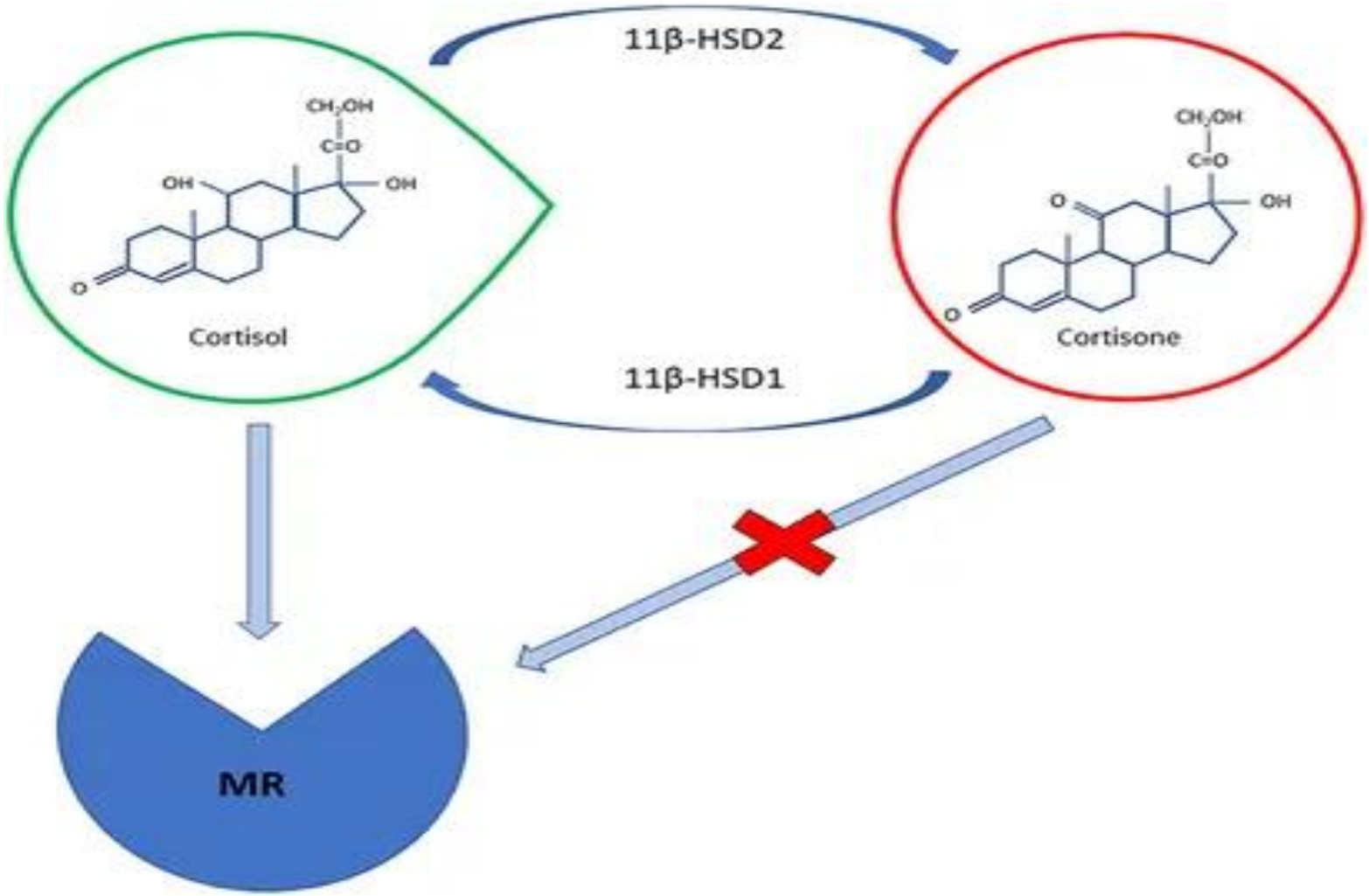
1- patients presenting several signs related to CS, especially if the patients present rare pathologies regarding to their age (HTN before the age of 40).

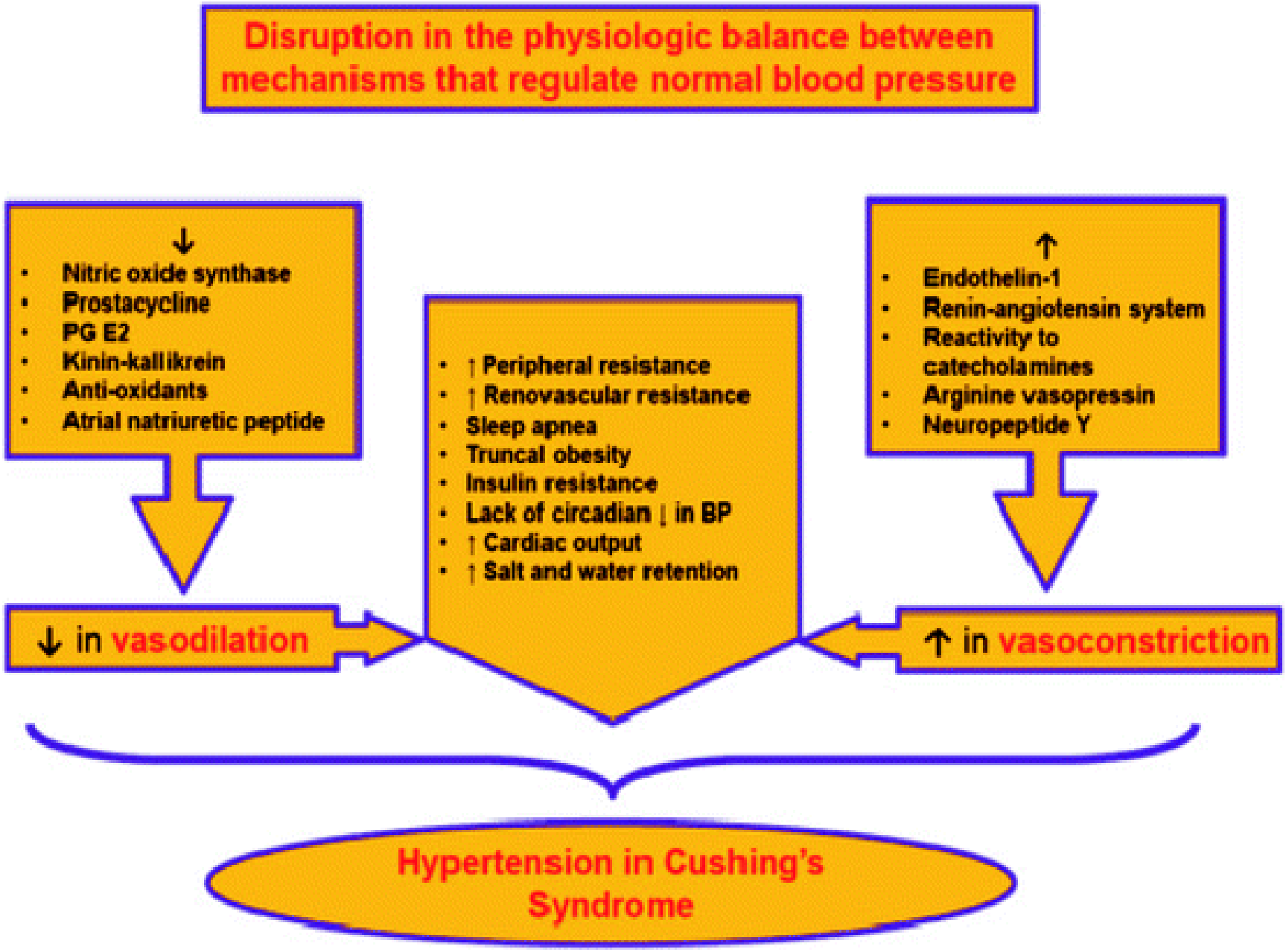
2-osteoporosis in men before the age of 50.

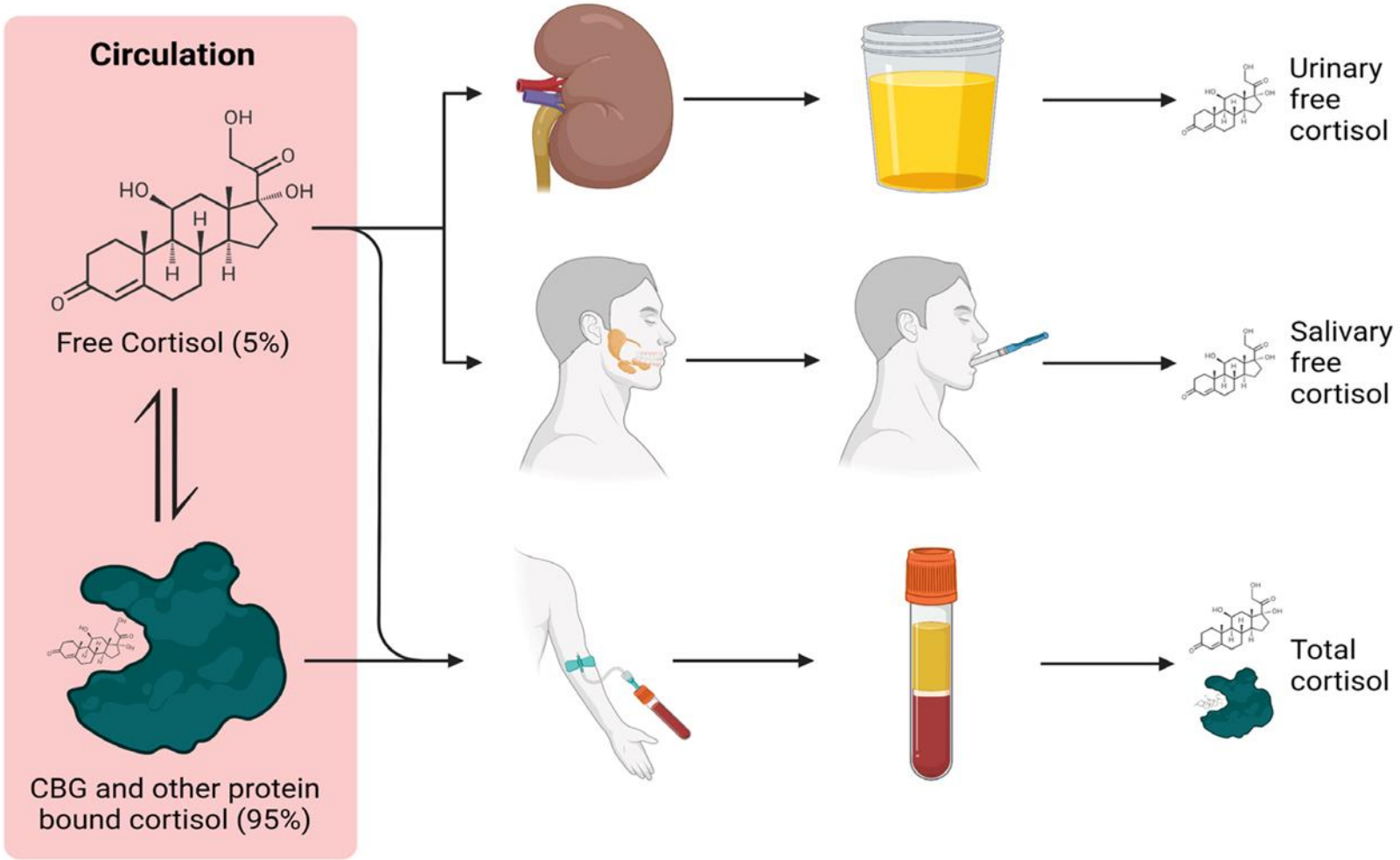
3- obesity or type 2 diabetes in a young patient.

4-hirsutism in a young girl) and patients presenting a pituitary or adrenal adenoma.

It is not recommended to screen patients if they present general signs alone as obesity or type 2 diabetes because of the rarity of the disease and the cost of the diagnosis.


11β-HSD2
CH2OH
C=O
OH
OH
O
Cortisol
CH2OH
C=O
O
OH
O
Cortisone
11β-HSD1
MR


Disruption in the physiologic balance between mechanisms that regulate normal blood pressure
↓
Nitric oxide synthase
Prostacycline
PG E2
Kinin-kallikrein
Anti-oxidants
Atrial natriuretic peptide
↑ Peripheral resistance
↑ Renovascular resistance
Sleep apnea
Truncal obesity
Insulin resistance
Lack of circadian ↓ in BP
↑ Cardiac output
↑ Salt and water retention
↑
Endothelin-1
Renin-angiotensin system
Reactivity to catecholamines
Arginine vasopressin
Neuropeptide Y
↓ in vasodilation
↑ in vasoconstriction
Hypertension in Cushing's Syndrome


Circulation
Free Cortisol (5%)
CBG and other protein bound cortisol (95%)
Urinary free cortisol
Salivary free cortisol
Total cortisol

PRESS RELEASE Meetings & Events

Endocrine Society guideline calls for increased screening for common cause of high blood pressure

Washington, DC | July 14, 2025

فشار خون ثانویه شایع‌تر از تصور است.

اشتباهات رایج در تشخیص آلدسترونیسم اولیه شامل تصور نادرست از نادر بودن بیماری، تأکید بیش از حد بر هیپوکالمی و تفسیر اشتباه آزمایش‌هاست.

آلدسترونیسم اولیه، فئوکروموسیتوما و کوشینگ از علل مهم و قابل درمان هستند.

غربالگری به موقع و آگاهی از شرایط بالینی، کلید تشخیص صحیح است