CẬP NHẬT KHUYẾN CÁO ESC 2022
CHẨN ĐOÁN VÀ ĐIỀU TRỊ TĂNG ÁP MẠCH MÁU PHỔI

BS. Nguyễn Văn Hiếu

NỘI DUNG

- 114 trang khuyến cáo, lần thứ 4 (2004 – 2009 – 2015 - 2022), bởi Hội Tim mạch châu Âu ESC và Hội Hô hấp châu Âu (ERS).
- Cập nhật về chẩn đoán và phân loại PH, nhấn mạnh PAH và CTEPH
- Cập nhật về điều trị

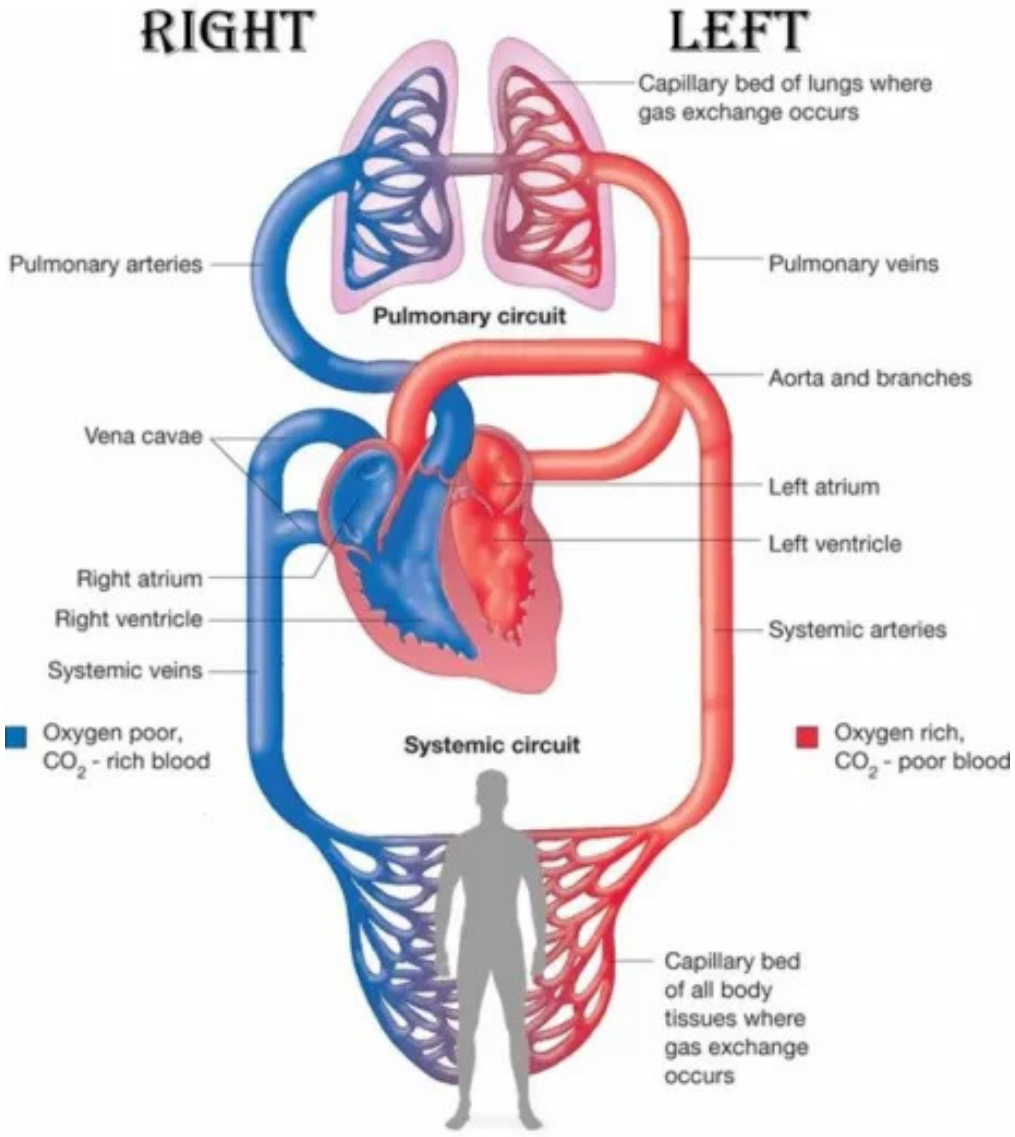
HIỂU CƠ BẢN VỀ TĂNG ÁP PHỔI

Tuần hoàn hệ thống:

- Tăng huyết áp: Tăng áp lực và sức cản Động mạch hệ thống.
- Chẩn đoán xác định dựa vào đo huyết áp ĐM cánh tay.
- Gánh nặng: Tim trái, não, thận, mắt, ĐMC…

Tuần hoàn phổi:

- Tăng áp phổi (tăng áp mạch máu phổi/ tang áp lực mạch phổi - PH): Tăng áp lực và sức cản mạch máu phổi, gồm Động mạch phổi và Tĩnh mạch phổi.
- Chẩn đoán dựa vào các thông số Thông tim phải.
- Gánh nặng: Tim phải, phổi.



TĂNG ÁP PHỔI

- Tăng áp phổi hay Tăng áp mạch máu phổi (Pulmonary hypertension)
- Chẩn đoán xác định: Dựa trên thông tim phải, áp lực ĐMP trung bình > 20 mmHg.
- Phân nhóm: 5 nhóm
- Đánh giá mức độ nặng: Dựa vào đánh giá lâm sàng (Suy tim, WHO –FC, Test 6 phút đi bộ), cận lâm sàng (siêu âm tim, ProBNP…), thông tim phải.
- Điều trị: Bệnh được mô tả lần đầu vào năm 1891, tuy nhiên đến năm 1995 mới lần đầu tiên có thuốc điều trị (epoprostenol). Hiện tại việc điều trị còn nhiều thách thức. Các thuốc điều trị chủ yếu tập trung vào PAH nhóm 1 và nhóm 4.

PHÂN BIỆT TĂNG ÁP PHỔI (PH) VÀ TĂNG ÁP ĐỘNG MẠCH PHỔI (PAH)

- Tăng áp phổi (Pulmonary hypertension): Còn gọi là Tăng áp mạch máu phổi. Được định nghĩa khi áp lực **ĐMP trung bình (mPAP) > 20 mmHg** (trên thông tim phải).

- Tăng áp động mạch phổi (Pulmonary aterial hypertension): Còn gọi là Tăng áp phổi tiền mao mạch (pre-capillary pulmonary hypertension), là PH nhóm 1. Được định nghĩa khi:

  - Áp lực ĐMP trung bình (mPAP) > 20 mmHg
  - Sức cản phổi tăng (RVR) > 2 WU
  - Áp lực mao mạch phổi bít bình thường (PAWP) ≤ 15 mmHg

CẬP NHẬT CHẨN ĐOÁN và PHÂN LOẠI TĂNG ÁP PHỔI (PH)

Haemodynamic definitions of pulmonary hypertension

Definition	Haemodynamic characteristics
PH	mPAP >20 mmHg
Pre-capillary PH	mPAP >20 mmHg PAWP ≤15 mmHg PVR >2 WU
Isolated post-capillary PH	mPAP >20 mmHg PAWP >15 mmHg PVR ≤2 WU
Combined post- and pre-capillary PH	mPAP >20 mmHg PAWP >15 mmHg PVR >2 WU
Exercise PH	mPAP/CO slope between rest and exercise >3 mmHg/L/min

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Clinical classification of pulmonary hypertension (1)

GROUP 1 Pulmonary arterial hypertension (PAH)
1.1 Idiopathic
1.1.1 Non-responders at vasoreactivity testing
1.1.2 Acute responders at vasoreactivity testing
1.2 Heritable
1.3 Associated with drugs and toxins
1.4 Associated with:
1.4.1 Connective tissue disease
1.4.2 HIV infection
1.4.3 Portal hypertension
1.4.4 Congenital heart disease
1.4.5 Schistosomiasis
1.5 PAH with features of venous/capillary (PVOD/PCH) involvement
1.6 Persistent PH of the newborn

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Clinical classification of pulmonary hypertension (2)

GROUP 2 PH associated with left heart disease
2.1 Heart failure:
2.1.1 with preserved ejection fraction
2.1.2 with reduced or mildly reduced ejection fraction
2.2 Valvular heart disease
2.3 Congenital/acquired cardiovascular conditions leading to post-capillary PH
GROUP 3 PH associated with lung diseases and/or hypoxia
3.1 Obstructive lung disease or emphysema
3.2 Restrictive lung disease
3.3 Lung disease with mixed restrictive/obstructive pattern
3.4 Hypoventilation syndromes
3.5 Hypoxia without lung disease (e.g. high altitude)
3.6 Developmental lung disorders

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Clinical classification of pulmonary hypertension (3)

GROUP 4 PH associated with pulmonary artery obstructions
4.1 Chronic thrombo-embolic PH
4.2 Other pulmonary artery obstructions
GROUP 5 PH with unclear and/or multi-factorial mechanisms
5.1 Haematological disorders
5.2 Systemic disorders
5.3 Metabolic disorders
5.4 Chronic renal failure with or without haemodialysis
5.5 Pulmonary tumour thrombotic microangiopathy
5.6 Fibrosing mediastinitis

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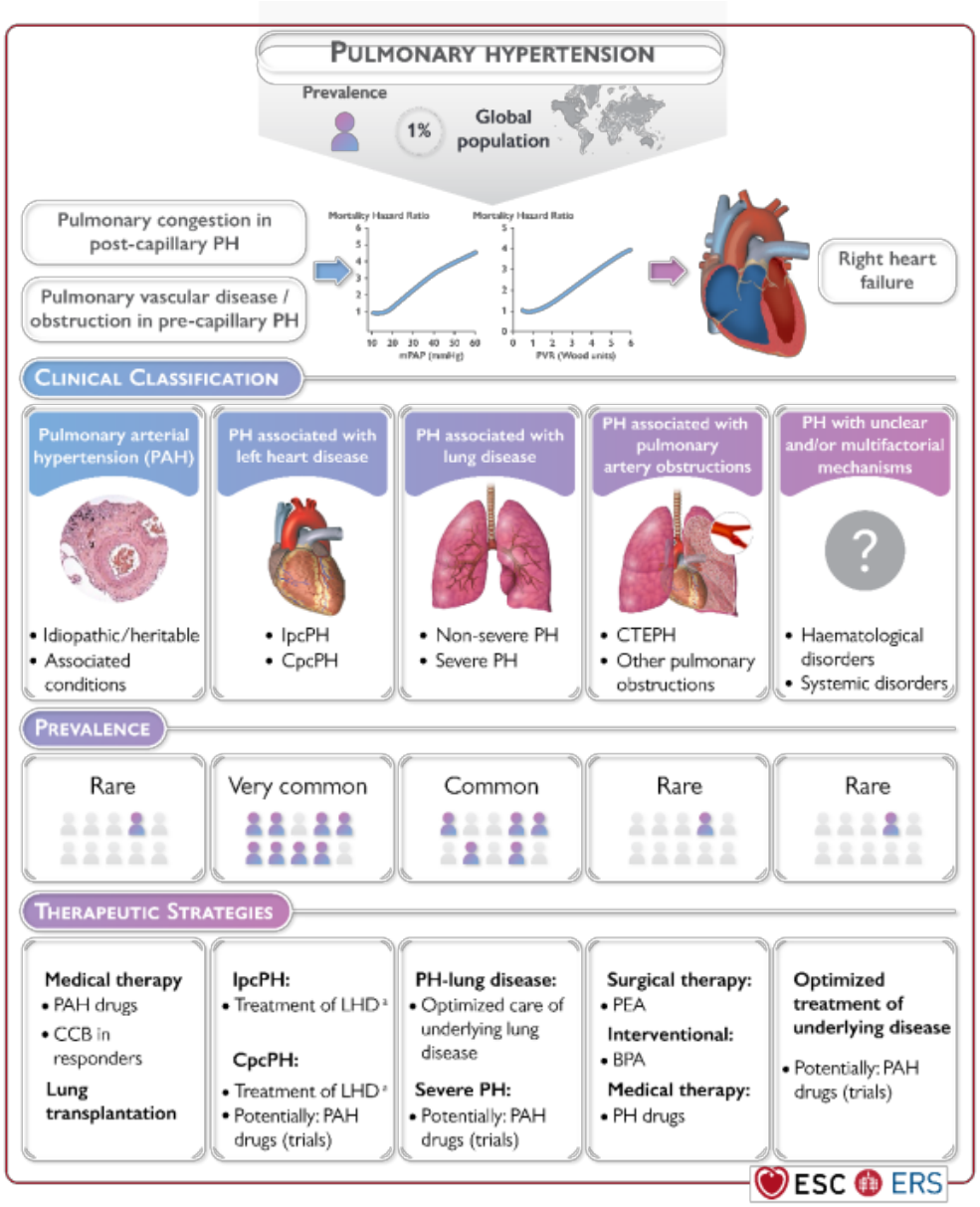
Figure 1

Central illustration



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ĐÁNH GIÁ LÂM SÀNG, CẬN LÂM SÀNG

Figure 2

Symptoms in patients with pulmonary hypertension

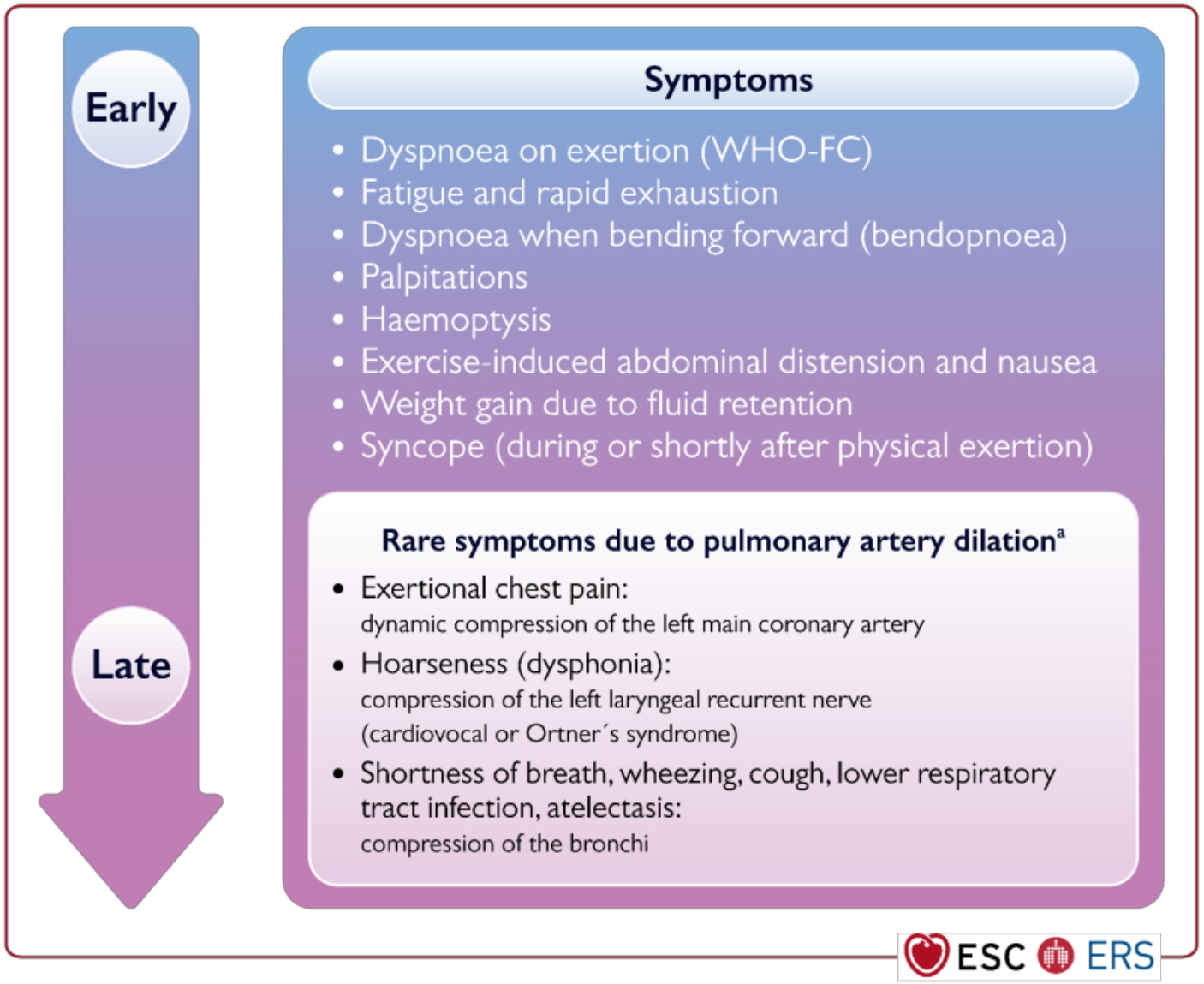

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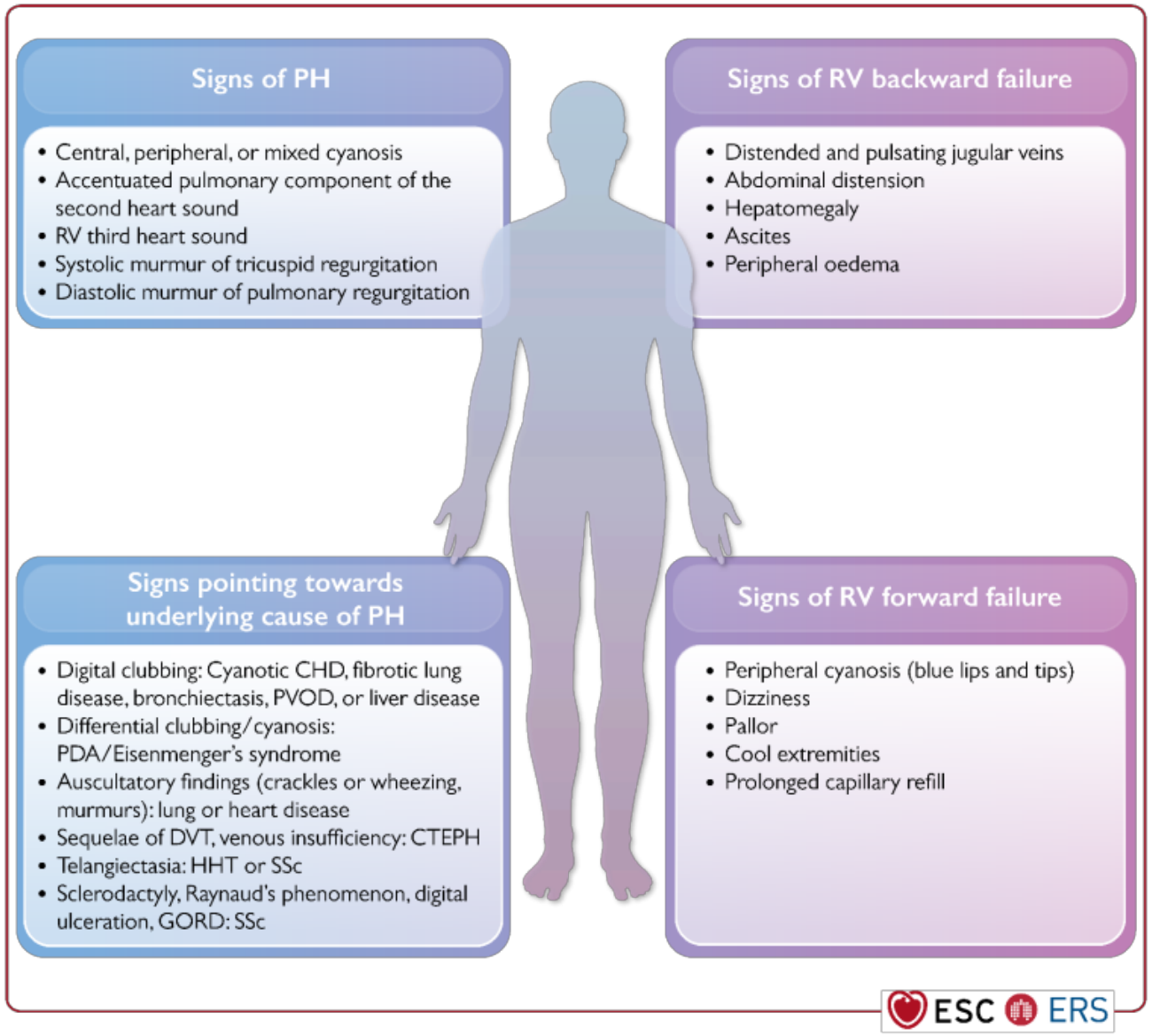
Figure 3

Clinical signs in patients with pulmonary hypertension



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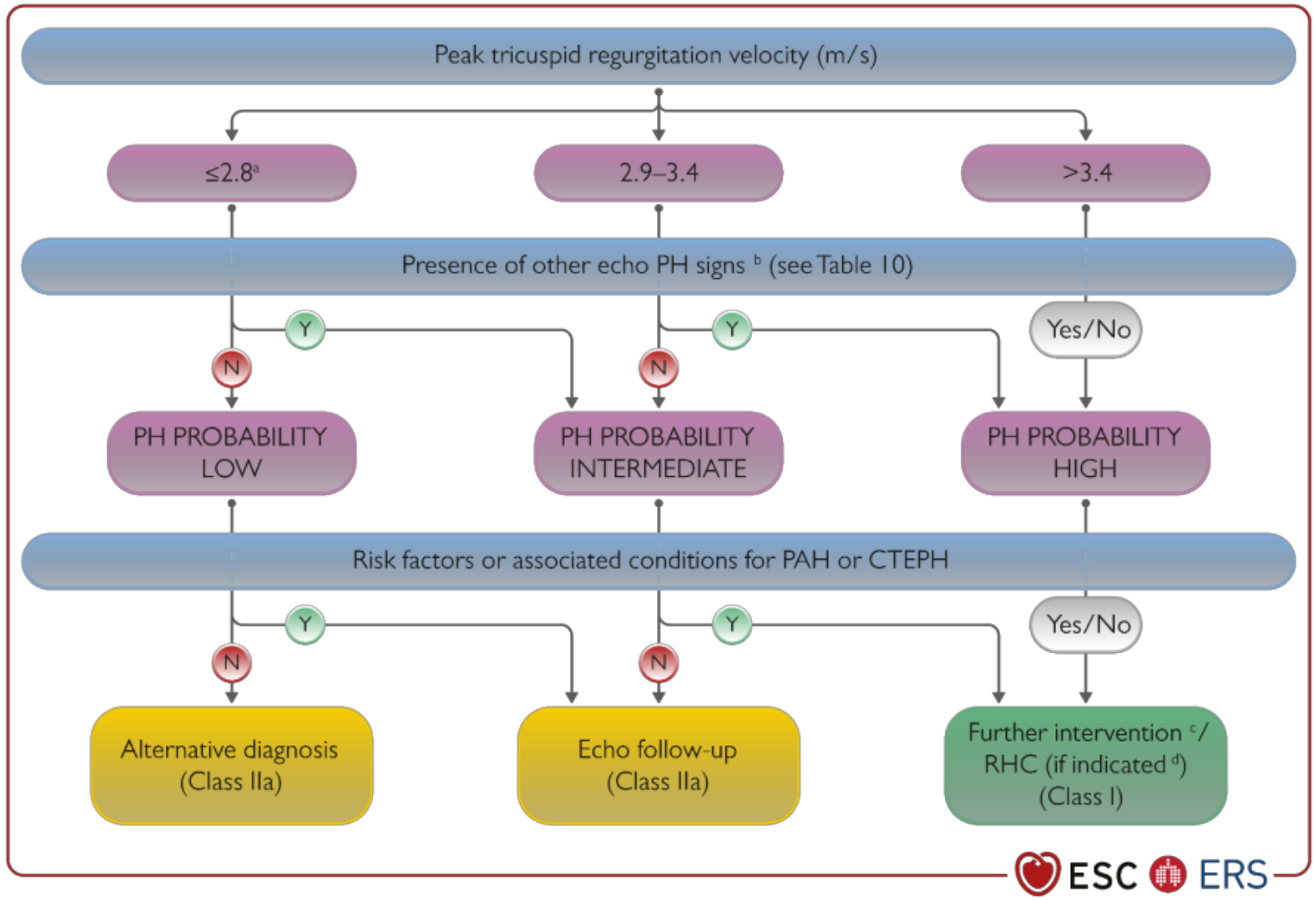
Phân loại của Tổ chức Y tế Thế giới về tình trạng chức năng của bệnh nhân tăng áp phổi (WHO-FC)

Loại	Mô tả [a]
WHO-FC I	Bệnh nhân có PH nhưng không dẫn đến hạn chế hoạt động thể chất. Hoạt động thể chất bình thường không gây khó thở quá mức hoặc mệt mỏi, đau ngực hoặc gần ngất
WHO-FC II	Bệnh nhân có PH dẫn đến hạn chế nhẹ hoạt động thể chất. BN thoải mái khi nghỉ ngơi. Hoạt động thể chất thông thường gây khó thở hoặc mệt mỏi quá mức, đau ngực hoặc gần ngất
WHO-FC III	Bệnh nhân có PH dẫn đến hạn chế rõ rệt các hoạt động thể chất. BN thoải mái khi nghỉ ngơi. Ít hoạt động hơn bình thường do khó thở hoặc mệt mỏi quá mức, đau ngực hoặc gần như ngất xỉu
WHO-FC IV	Bệnh nhân PH không có khả năng thực hiện bất kỳ hoạt động thể chất nào mà không có triệu chứng. Những bệnh nhân này có dấu hiệu của HF bên phải. Khó thở và / hoặc mệt mỏi thậm chí có thể xuất hiện khi nghỉ ngơi. Sự khó chịu tăng lên bởi bất kỳ hoạt động thể chất nào

Figure 5

Echocardiographic probability of pulmonary hypertension and recommendations for further assessment



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Additional echocardiographic signs suggestive of pulmonary hypertension

A: The ventricles	B: Pulmonary artery	C: Inferior vena cava and RA
RV/LV basal diameter/area ratio >1.0	RVOT AT <105 ms and/or mid-systolic notching	IVC diameter >21 mm with decreased inspiratory collapse (<50% with a sniff or <20% with quiet inspiration)
Flattening of the interventricular septum (LVEI >1.1 in systole and/or diastole)	Early diastolic pulmonary regurgitation velocity >2.2 m/s	RA area (end-systole) >18 cm^2
TAPSE/sPAP ratio <0.55 mm/mmHg	PA diameter > AR diameter PA diameter >25 mm	

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Route of administration, half-life, dosages, and duration of administration of the recommended test compounds for vasoreactivity testing in pulmonary arterial hypertension

Compound	Route	Half-life	Dosage	Duration
Nitric oxide	inh	15–30 s	10–20 p.p.m.	5–10 min
Iloprost	inh	30 min	5–10 µg	10–15 min
Epoprostenol	i.v.	3 min	2–12 ng/kg/min	10 mind

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ĐIỀU TRỊ CÁC NHÓM TĂNG ÁP PHỔI

Các nhóm thuốc điều trị

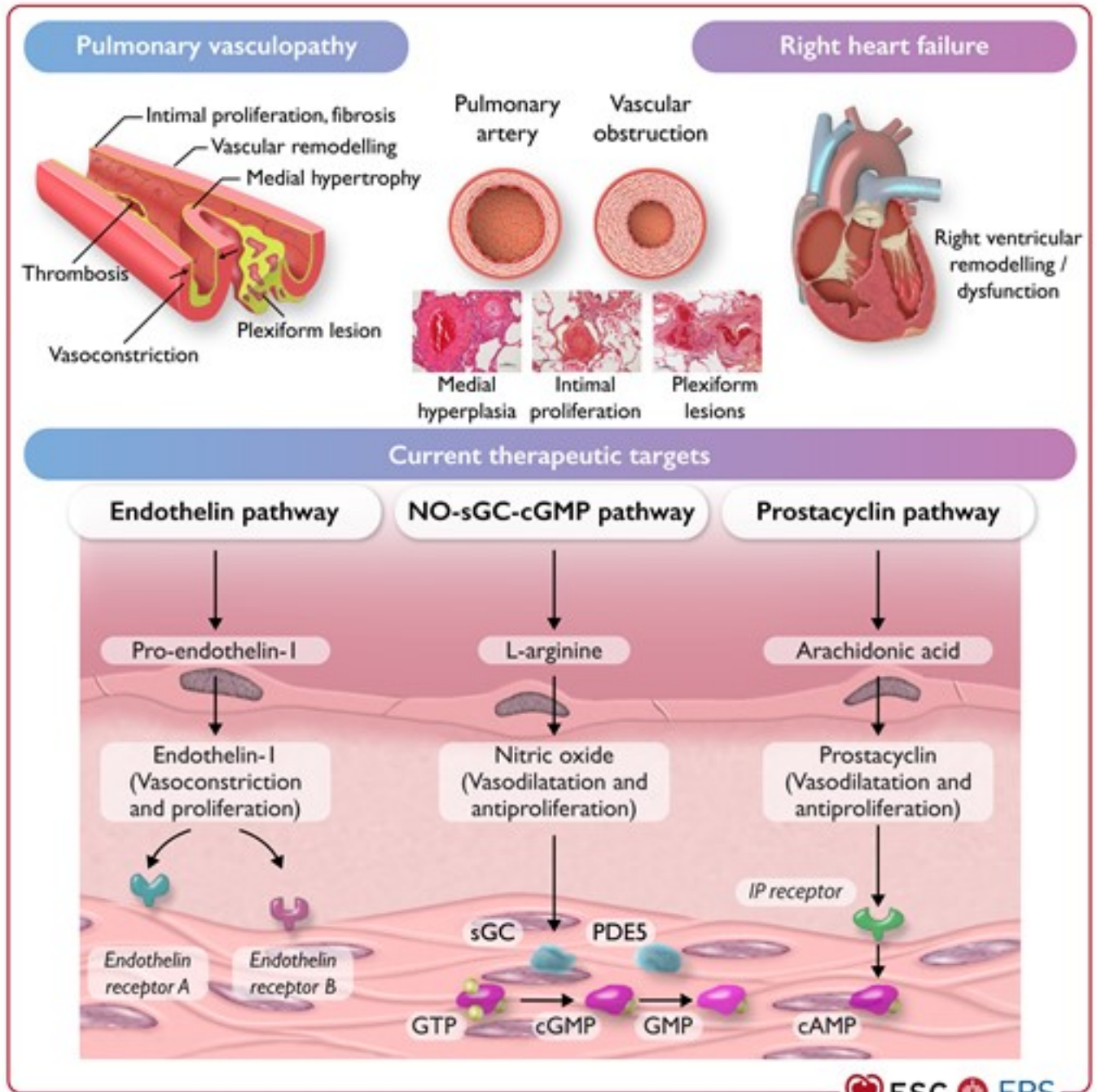
Trước năm 1995 không có thuốc điều trị đặc hiệu cho tăng áp động mạch phổi (PAH).

Hiện tại đã có bốn nhóm thuốc được chấp nhận trong điều trị PAH **(PH nhóm 1)** bao gồm:

(1) Các thuốc giống prostacyclin: Epoprostenol iv; Treprostinil các dạng tiêm và uống; Iloprost dạng khí dung.
(2) Thuốc đối kháng thụ thể endothelin: Bosentan, Macitentan, Ambrisentan.
(3)Thuốc ức chế phosphodiesterase – 5: Sildenafil, Tadalafil.
(4) Thuốc kích thích trực tiếp guanin cyclase hòa tan: Riociguat.

Các nhóm PH 2,3,4: Hiệu quả các thuốc điều trị còn hạn chế. Riociguat có chỉ định sử dụng ở bệnh nhân CTEPH (PH nhóm 4) không có chỉ định phẫu thuật.

Cơ chế thuốc điều trị



Comprehensive risk assessment in pulmonary arterial hypertension (three-strata model) (1)

Determinants of prognosis (estimated 1-year mortality)	Low risk <5%	Intermediate risk 5–20%	High risk >20%
Signs of right heart failure	Absent	Absent	Present
Progression of symptoms and clinical manifestations	No	Slow	Rapid
Syncope	No	Occasional syncope	Repeated syncope
WHO-FC	I, II	III	IV
6MWD	>440 m	165–440 m	<165 m

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Comprehensive risk assessment in pulmonary arterial hypertension (three-strata model) (2)

Determinants of prognosis (estimated 1-year mortality)	Low risk <5%	Intermediate risk 5–20%	High risk >20%
CPET	Peak VO_2 >15 mL/min/kg (>65% pred.) VE/VCO_2 slope <36	Peak VO_2 11–15 mL/min/kg (35–65% pred.) VE/VCO_2 slope 36–44	Peak VO_2 <11 mL/min/kg (<35% pred.) VE/VCO_2 slope >44
Biomarkers: BNP or NT-proBNP	BNP <50 ng/L NT-proBNP <300 ng/L	BNP 50–800 ng/L NT-proBNP 300–1100 ng/L	BNP >800 ng/L NT-proBNP >1100 ng/L

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Comprehensive risk assessment in pulmonary arterial hypertension (three-strata model) (3)

Determinants of prognosis (estimated 1-year mortality)	Low risk <5%	Intermediate risk 5–20%	High risk >20%
Echocardiography	RA area <18 cm^2 TAPSE/sPAP >0.32 mm/mmHg No pericardial effusion	RA area 18–26 cm^2 TAPSE/sPAP 0.19–0.32 mm/mmHg Minimal pericardial effusion	RA area >26 cm^2 TAPSE/sPAP <0.19 mm/mmHg Moderate or large pericardial effusion
cMRI	RVEF >54% SVI >40 mL/m^2 RVESVI <42 mL/m^2	RVEF 37–54% SVI 26–40 mL/m^2 RVESVI 42–54 mL/m^2	RVEF <37% SVI <26 mL/m^2 RVESVI >54 mL/m^2

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Comprehensive risk assessment in pulmonary arterial hypertension (three-strata model) (4)

Determinants of prognosis (estimated 1-year mortality)	Low risk <5%	Intermediate risk 5–20%	High risk >20%
Haemodynamics	RAP <8 mmHg CI ≥2.5 L/min/m^2 SVI >38 mL/m^2 SvO_2 >65%	RAP 8–14 mmHg CI 2.0–2.4 L/min/m^2 SVI 31–38 mL/m^2 SvO_2 60–65%	RAP >14 mmHg CI <2.0 L/min/m^2 SVI <31 mL/m^2 SvO_2 <60%

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Variables used to calculate the simplified four-strata risk-assessment tool

Determinants of prognosis	Low risk	Intermediate -low risk	Intermediate -high risk	High risk
Points assigned	1	2	3	4
WHO-FC	I or II	-	III	IV
6MWD, m	>440	320–440	165–319	<165
BNP or NT-proBNP, ng/L	<50 <300	50–199 300–649	200–800 650–1100	>800 >1100

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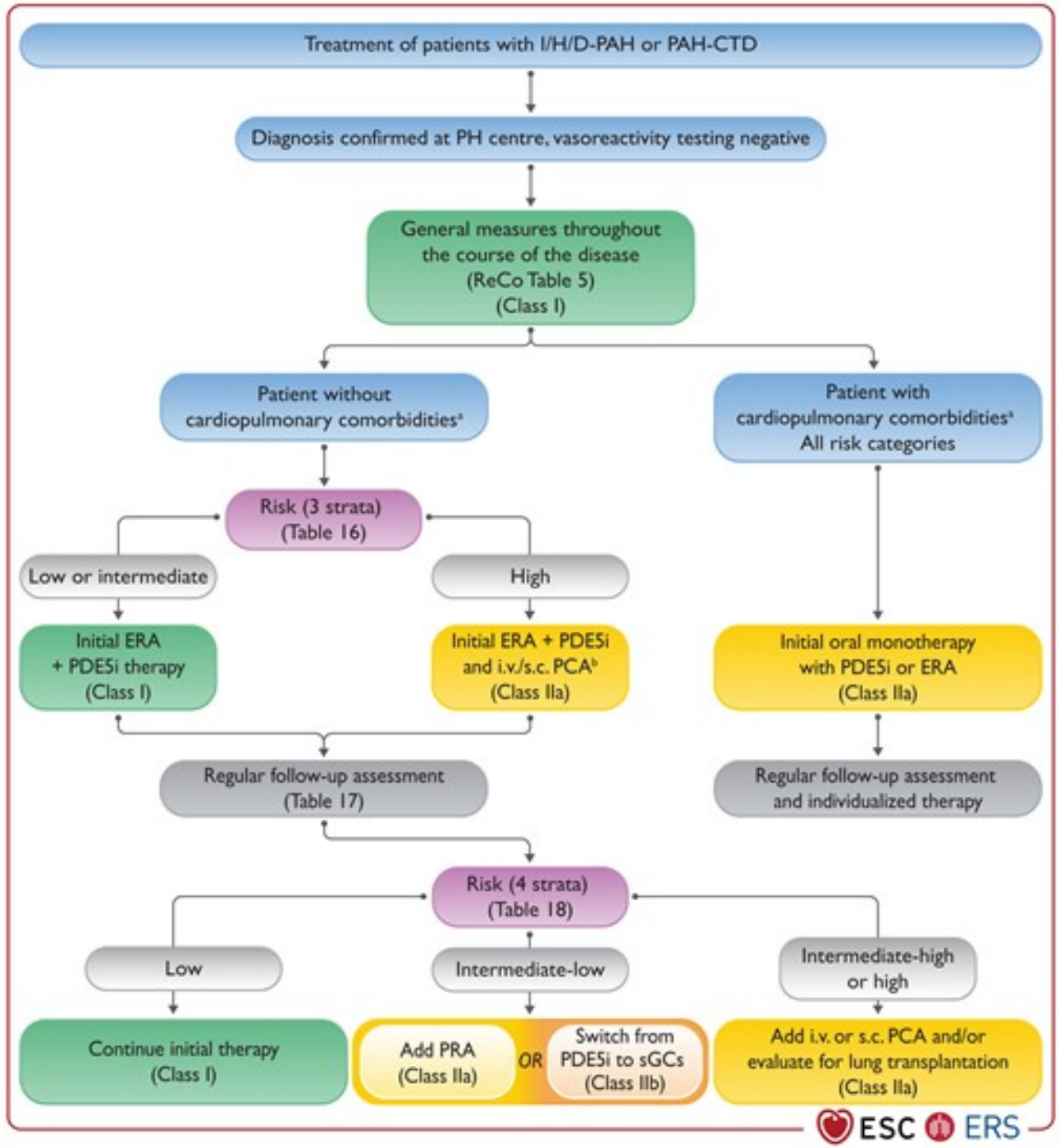
Chiến lược điều trị Tăng áp động mạch phổi (PAH)



Dosing of pulmonary arterial hypertension medications in adults (1)

	Starting dose	Target dose
Calcium channel blockers		
Amlodipine	5 mg o.d.	15–30 mg o.d.
Diltiazem	60 mg b.i.d.	120–360 mg b.i.d.
Felodipine	5 mg o.d.	15–30 mg o.d.
Nifedipine	10 mg t.i.d.	20–60 mg b.i.d. or t.i.d.
Endothelin receptor antagonists (oral administration)		
Ambrisentan	5 mg o.d.	10 mg o.d.
Bosentan	62.5 mg b.i.d.	125 mg b.i.d.
Macitentan	10 mg o.d.	10 mg o.d.
Phosphodiesterase 5 inhibitors (oral administration)		
Sildenafil	20 mg t.i.d.	20 mg t.i.d.
Tadalafil	20 or 40 mg o.d.	40 mg o.d.

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Dosing of pulmonary arterial hypertension medications in adults (2)

	Starting dose	Target dose
Prostacyclin analogues (oral administration)		
Beraprost sodium	20 µg t.i.d.	Maximum tolerated dose up to 40 µg t.i.d.
Beraprost extended release	60 µg b.i.d.	Maximum tolerated dose up to 180 µg b.i.d.
Treprostinil	0.25 mg b.i.d. or 0.125 mg t.i.d.	Maximum tolerated dose
Prostacyclin receptor agonist (oral administration)		
Selexipag	200 µg b.i.d.	Maximum tolerated dose up to 1600 µg b.i.d.
Soluble guanylate cyclase stimulator (oral administration)		
Riociguat	1 mg t.i.d.	2.5 mg t.i.d.

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Dosing of pulmonary arterial hypertension medications in adults (3)

	Starting dose	Target dose
Prostacyclin analogues (inhaled administration)		
Iloproste	2.5 µg 6–9 times per day	5.0 µg 6–9 times per day
Treprostinile	18 µg 4 times per day	54–72 µg 4 times per day
Prostacyclin analogues (i.v. or s.c. administration)		
Epoprostenol i.v.	2 ng/kg/min	Determined by tolerability and effectiveness; typical dose range at 1 year is 16–30 ng/kg/min with wide individual variability
Treprostinil s.c. or i.v.	1.25 ng/kg/min	Determined by tolerability and effectiveness; typical dose range at 1 year is 25–60 ng/kg/min with wide individual variability

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Recommendations for initial oral drug combination therapy for patients with idiopathic, heritable, or drug-associated PAH without cardiopulmonary comorbidities

Recommendations	Class	Level
Initial combination therapy with ambrisentan and tadalafil is recommended	I	B
Initial combination therapy with macitentan and tadalafil is recommended	I	B
Initial combination therapy with other ERAs and PDE5is should be considered	IIa	B
Initial combination therapy with macitentan and tadalafil and selexipag is not recommended	III	B

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Recommendations for sequential drug combination therapy for patients with idiopathic, heritable, or drug-associated PAH (1)

Recommendations	Class	Level
General recommendation for sequential combination therapy		
It is recommended to base treatment escalations on risk assessment and general treatment strategies	I	C
Evidence from studies with a composite morbidity/mortality endpoint as primary outcome measure		
Addition of macitentan to PDE5is or oral/inhaled prostacyclin analogues is recommended to reduce the risk of morbidity/mortality events	I	B
Addition of selexipag to ERAs and/or PDE5is is recommended to reduce the risk of morbidity/mortality events	I	B
Addition of oral treprostinil to ERA or PDE5i/riociguat monotherapy is recommended to reduce the risk of morbidity/mortality events	I	B
Addition of bosentan to sildenafil is not recommended to reduce the risk of morbidity/mortality events	III	B

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Clinical classification of pulmonary arterial hypertension associated with congenital heart disease (1)

1. Eisenmenger's syndrome
Includes all large intra- and extracardiac defects that begin as systemic-to-pulmonary shunts and progress to severely elevated PVR and to reverse (pulmonary-to-systemic) or bidirectional shunting. Cyanosis, secondary erythrocytosis, and multiple organ involvement are usually present. Closing the defects is contraindicated.
2. PAH associated with prevalent systemic-to-pulmonary shunts
• Correctable • Non-correctable Include moderate-to-large defects. PVR is mildly to moderately increased and systemic-to-pulmonary shunting is still prevalent, whereas cyanosis at rest is not a feature.

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Clinical classification of pulmonary arterial hypertension associated with congenital heart disease (2)

3. PAH with small/coincidental defects
Markedly elevated PVR in the presence of cardiac defects considered haemodynamically non-significant (usually ventricular septal defects <1 cm and atrial septal defects <2 cm of effective diameter assessed by echocardiography), which themselves do not account for the development of elevated PVR. The clinical picture is very similar to IPAH. Closing the defects is contraindicated.
4. PAH after defect correction
Congenital heart disease is repaired, but PAH either persists immediately after correction or recurs/develops months or years after correction in the absence of significant, post-operative, haemodynamic lesions.

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Recommendations for shunt closure in patients with pulmonary-systemic flow ratio >1.5 : 1 based on calculated pulmonary vascular resistance

Recommendations	Class	Level
In patients with ASD, VSD, or PDA and a PVR <3 WU, shunt closure is recommended	I	C
In patients with ASD, VSD, or PDA and a PVR of 3–5 WU, shunt closure should be considered	IIa	C
In patients with ASD and a PVR >5 WU that declines to <5 WU with PAH treatment, shunt closure may be considered	IIb	C
In patients with VSD or PDA and a PVR >5 WU, shunt closure may be considered after careful evaluation in specialized centres	IIb	C
In patients with ASD and a PVR >5 WU despite PAH treatment, shunt closure is not recommended	III	C

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Recommendations for pulmonary arterial hypertension associated with adult congenital heart disease (1)

Recommendations	Class	Level
Risk assessment		
Risk assessment is recommended for patients with persistent PAH after defect closure	I	C
Risk assessment should be considered in patients with Eisenmenger's syndrome	IIa	C
Treatment		
Bosentan is recommended in symptomatic patients with Eisenmenger's syndrome to improve exercise capacity	I	B
In patients with Eisenmenger's syndrome, the use of supplemental oxygen therapy should be considered in cases where it consistently increases arterial oxygen saturation and reduces symptoms	IIa	C
Supplemental iron treatment should be considered in patients with iron deficiency	IIa	C

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Recommendations for pulmonary arterial hypertension associated with adult congenital heart disease (2)

Recommendations	Class	Level
Treatment (continued)		
In patients with adult CHD, including Eisenmenger's syndrome, other ERAs, PDE5is, riociguat, prostacyclin analogues, and prostacyclin receptor agonists should be considered	**IIa**	**C**
In patients with PAH after corrected adult CHD, initial oral combination therapy with drugs approved for PAH should be considered for patients at low- and intermediate risk, while initial combination therapy including i.v./s.c. prostacyclin analogues should be considered for patients at high risk	**IIa**	**C**
In patients with adult CHD, including Eisenmenger's syndrome, sequential combination therapy should be considered if patients do not meet treatment goals	**IIa**	**C**

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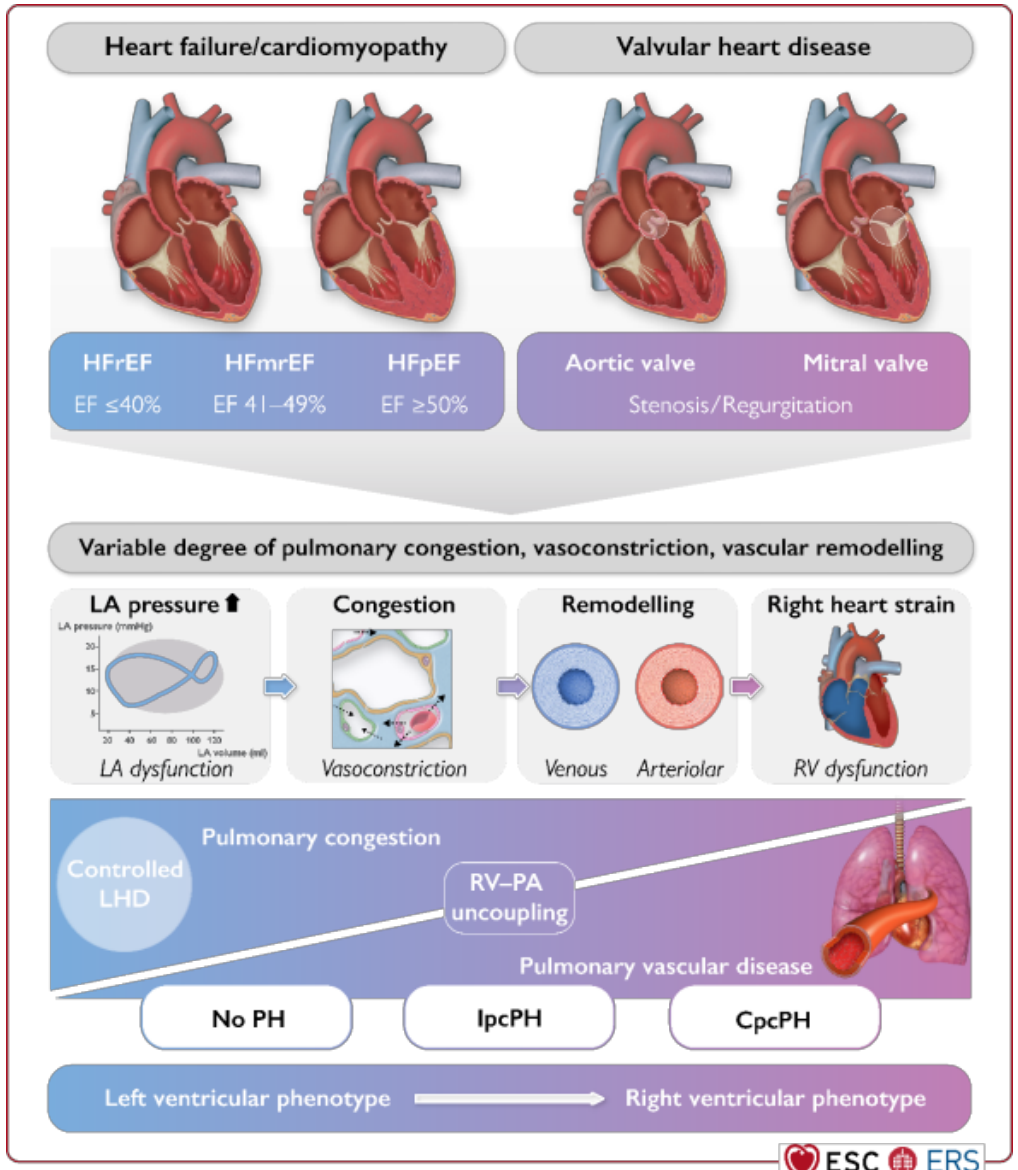
Figure 11

Pathophysiology of pulmonary hypertension associated with left heart disease (group 2)



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Recommendations for pulmonary hypertension associated with left heart disease (2)

Recommendations	Class	Level
In patients with LHD and CpcPH with a severe pre-capillary component (e.g. PVR >5 WU), an individualized approach to treatment is recommended	I	C
When patients with PH and multiple risk factors for LHD, who have a normal PAWP at rest but an abnormal response to exercise or fluid challenge, are treated with PAH drugs, close monitoring is recommended	I	C
In patients with PH at RHC, a borderline PAWP (13–15 mmHg) and features of HFpEF, additional testing with exercise or fluid challenge may be considered to uncover post-capillary PH	IIb	C
Drugs approved for PAH are not recommended in PH-LHD	III	A

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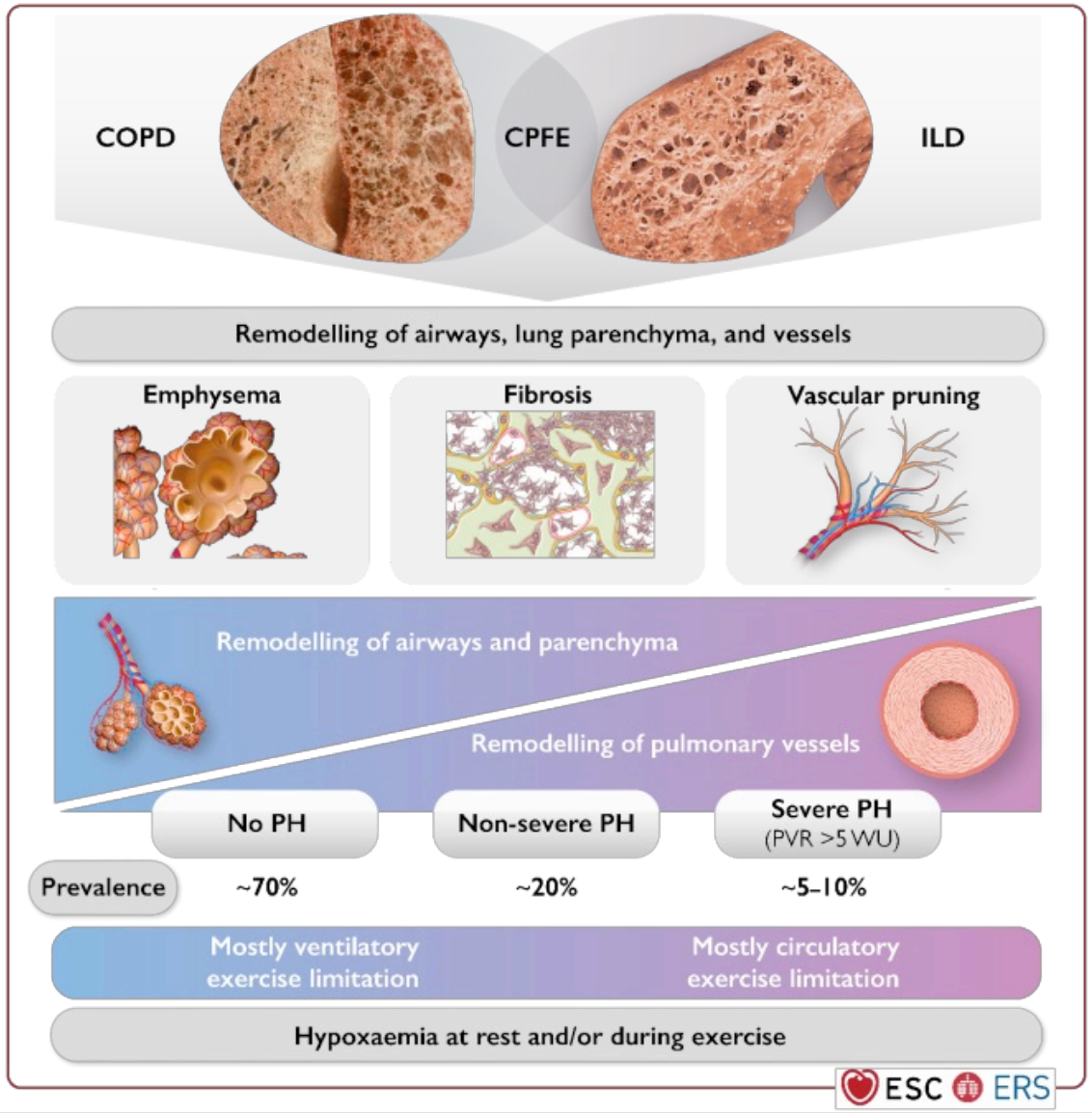
Figure 12

Pathophysiology of pulmonary hypertension associated with lung disease (group 3)



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Recommendations for pulmonary hypertension associated with lung disease and/or hypoxia (2)

Recommendations	Class	Level
In patients with lung disease and severe PH, an individualized approach to treatment is recommended	I	C
It is recommended to refer eligible patients with lung disease and PH for LTx evaluation	I	C
In patients with lung disease and suspected PH, RHC is recommended if the results are expected to aid management decisions	I	C
Inhaled treprostinil may be considered in patients with PH associated with ILD	IIb	B
The use of ambrisentan is not recommended in patients with PH associated with IPF	III	B
The use of riociguat is not recommended in patients with PH associated with IIP	III	B
The use of PAH medications is not recommended in patients with lung disease and non-severe PH	III	C

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Figure 13

Diagnostic strategy in chronic thrombo-embolic pulmonary hypertension

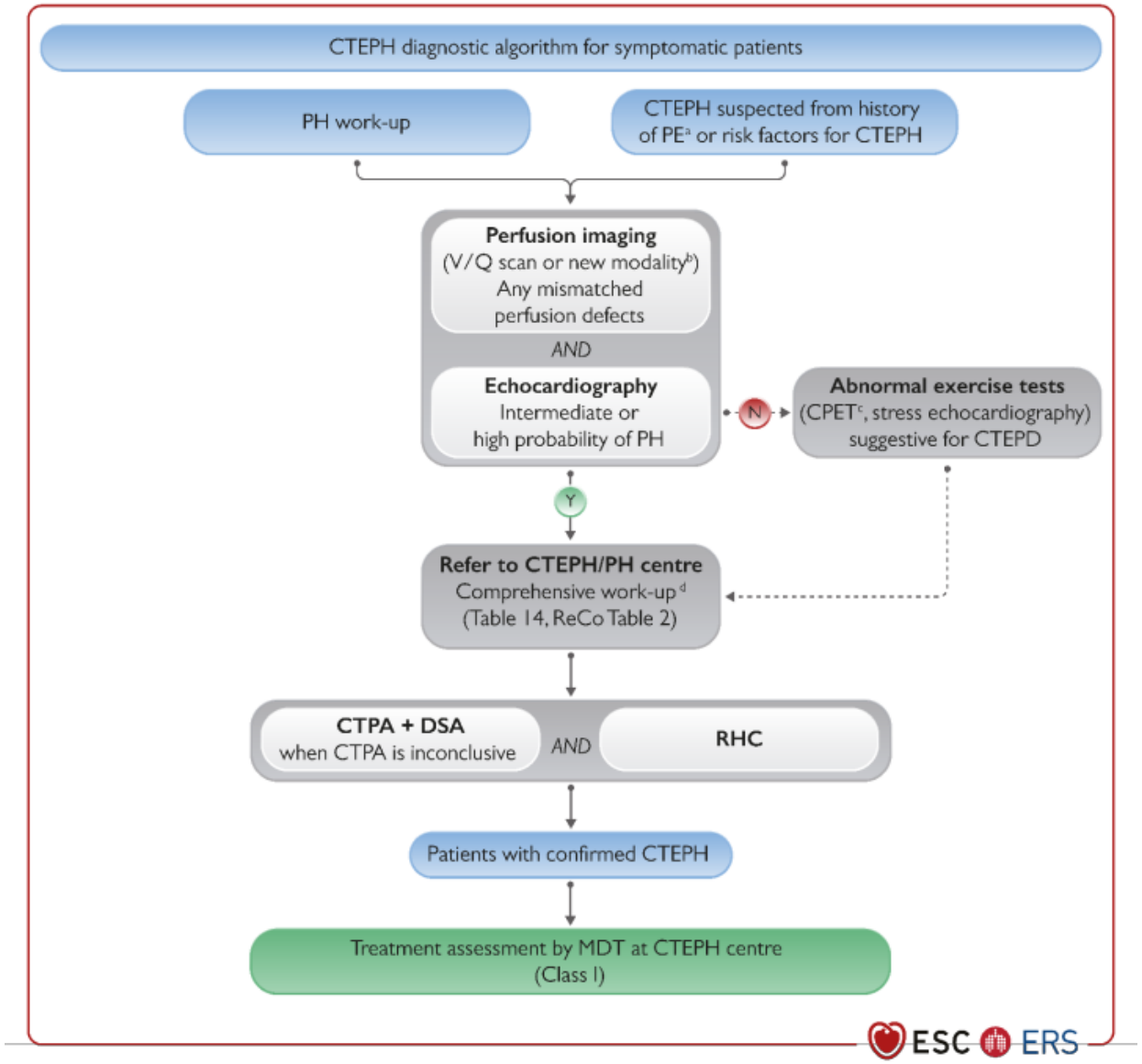

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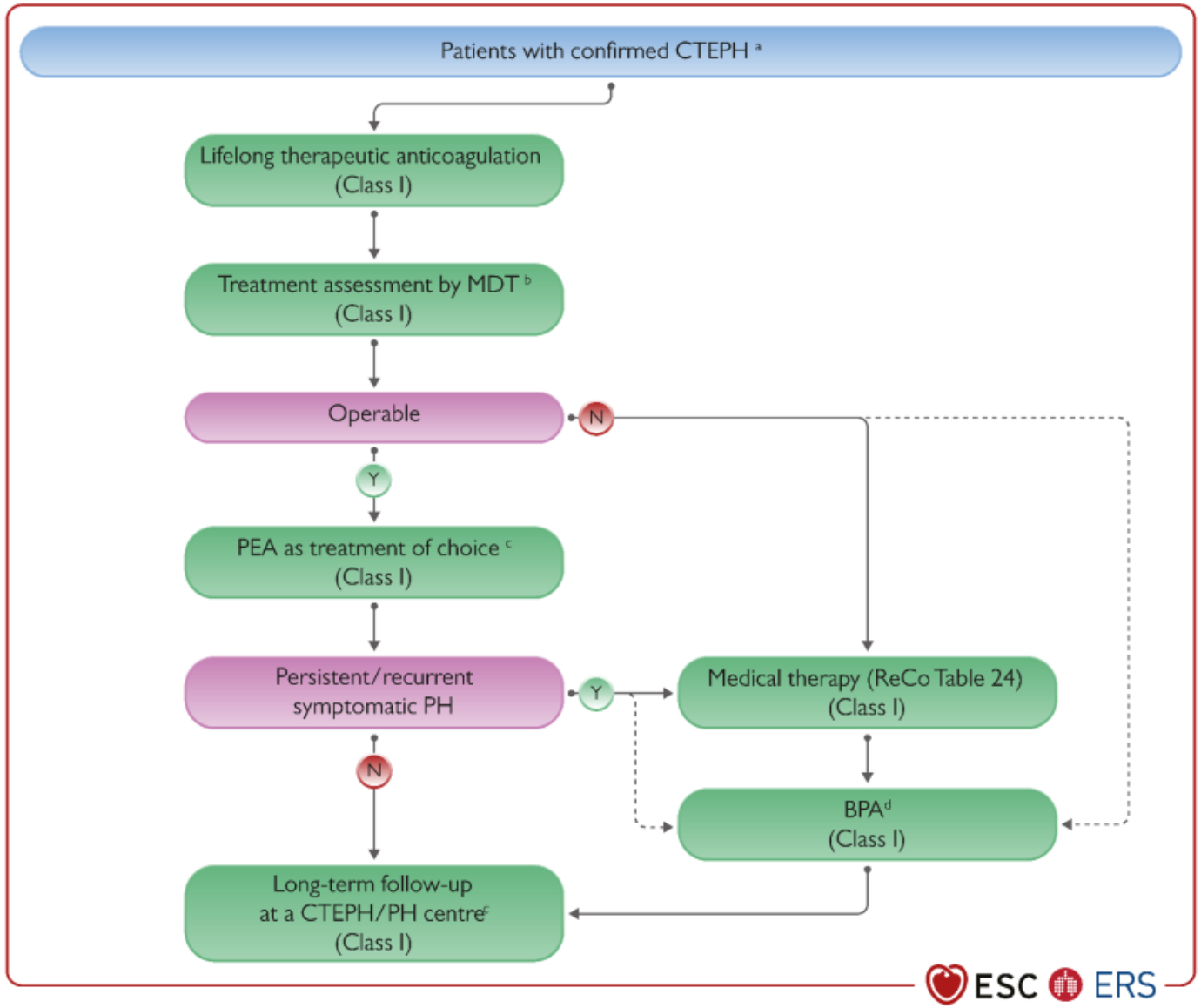
Figure 14

Management strategy in chronic thrombo-embolic pulmonary hypertension



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Recommendations for chronic thrombo-embolic pulmonary hypertension and chronic thrombo-embolic pulmonary disease without pulmonary hypertension (1)

Recommendations	Class	Level
CTEPH		
Lifelong, therapeutic doses of anticoagulation are recommended in all patients with CTEPH	I	C
Antiphospholipid syndrome testing is recommended in patients with CTEPH	I	C
In patients with CTEPH and antiphospholipid syndrome, anticoagulation with VKAs is recommended	I	C
It is recommended that all patients with CTEPH are reviewed by a CTEPH team for the assessment of multi-modality management	I	C

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Recommendations for chronic thrombo-embolic pulmonary hypertension and chronic thrombo-embolic pulmonary disease without pulmonary hypertension (2)

Recommendations	Class	Level
CTEPH (continued)		
PEA is recommended as the treatment of choice for patients with CTEPH and fibrotic obstructions within pulmonary arteries accessible by surgery	I	B
BPA is recommended in patients who are technically inoperable or have residual PH after PEA and distal obstructions amenable to BPA	I	B
Riociguat is recommended for symptomatic patients with inoperable CTEPH or persistent/recurrent PH after PEA	I	B
Long-term follow-up is recommended after PEA and BPA, as well as for patients with CTEPH established on medical therapy	I	C

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Recommendations for chronic thrombo-embolic pulmonary hypertension and chronic thrombo-embolic pulmonary disease without pulmonary hypertension (4)

Recommendations	Class	Level
CTEPD without PH		
In patients with CTEPD without PH, long-term anticoagulant therapy should be considered on individual basis	IIa	C
PEA or BPA should be considered in selected symptomatic patients with CTEPD without PH	IIa	C

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Recommendations for pulmonary hypertension centres (1)

Recommendations	Class	Level
It is recommended that PH centres provide care by a multidisciplinary team (cardiologist, pneumologist, rheumatologist, nurse specialist, radiologist, psychological and social work support, appropriate on-call expertise)	I	C
It is recommended that PH centres have direct links and quick referral patterns to other services (such as genetic counselling, PEA/BPA, lung transplantation, adult congenital heart disease service)	I	C
It is recommended that PH centres maintain a patient registry	I	C
It is recommended that PH centres collaborate with patient associations	I	C

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ĐIỀU TRỊ KÈM THEO

- Điều trị lợi tiểu, chống đông.
- Điều trị thiếu máu và bù sắt.
- Tập thể dục phục hồi chức năng thể lực
- Mang thai và tránh thai: Tránh mang thai
- Gây mê/tê và Các phẫu thuật có kế hoạch
- Tiêm phòng vacxin cúm, phế cầu, COVID-19
- Du lịch độ cao
- Hỗ trợ tâm lý
- Tư vấn di truyền với các trường hợp có yếu tố di truyền
- Gắn kết và tuân thủ điều trị

Kết luận

- Tăng áp phổi: Chiếm khoảng 1% dân số. Gặp ở mọi lứa tuổi và giới tính
- Nguyên nhân thường gặp: Do bệnh lý tim trái và Do bệnh lý phổi.
- Chẩn đoán xác định: Dựa vào các thông số áp lực và sức cản mạch phổi trên Thông tim phải
- Phân loại: 5 nhóm (group)
- Đánh giá nguy cơ: Dựa trên lâm sàng (WHO FC, triệu chứng lâm sàng) và cận lâm sàng (siêu âm tim, ProBNP, MRI, Thông tim P), thang điểm Reveal.
- Điều trị: Hiện còn nhiều thách thức. Cần phối hợp đa chuyên khoa theo Nhóm bệnh.

XIN CHÂN THÀNH CẢM ƠN!