Acute Limb Ischaemia

Definition

- Sudden decrease in arterial blood flow to a limb that threatens its viability.
- Most of the ALI cases involve the lower limbs.
- It’s a surgical emergency.

Aetiology

Thrombotic

- PVD patients having Plaque rupture
- Arteritis
- Prothrombotic states
- Thrombosis of a previous graft
- Hypovolaemia
- Hypotension
- Malignancy

Embolic

- AF
- Atherosclerotic emboli
- Rheumatic heart disease, Paradoxical embolus
- Prostheses
- Aneurysms

Trauma

- Iatrogenic
- Thrombosis secondary to trauma

Other

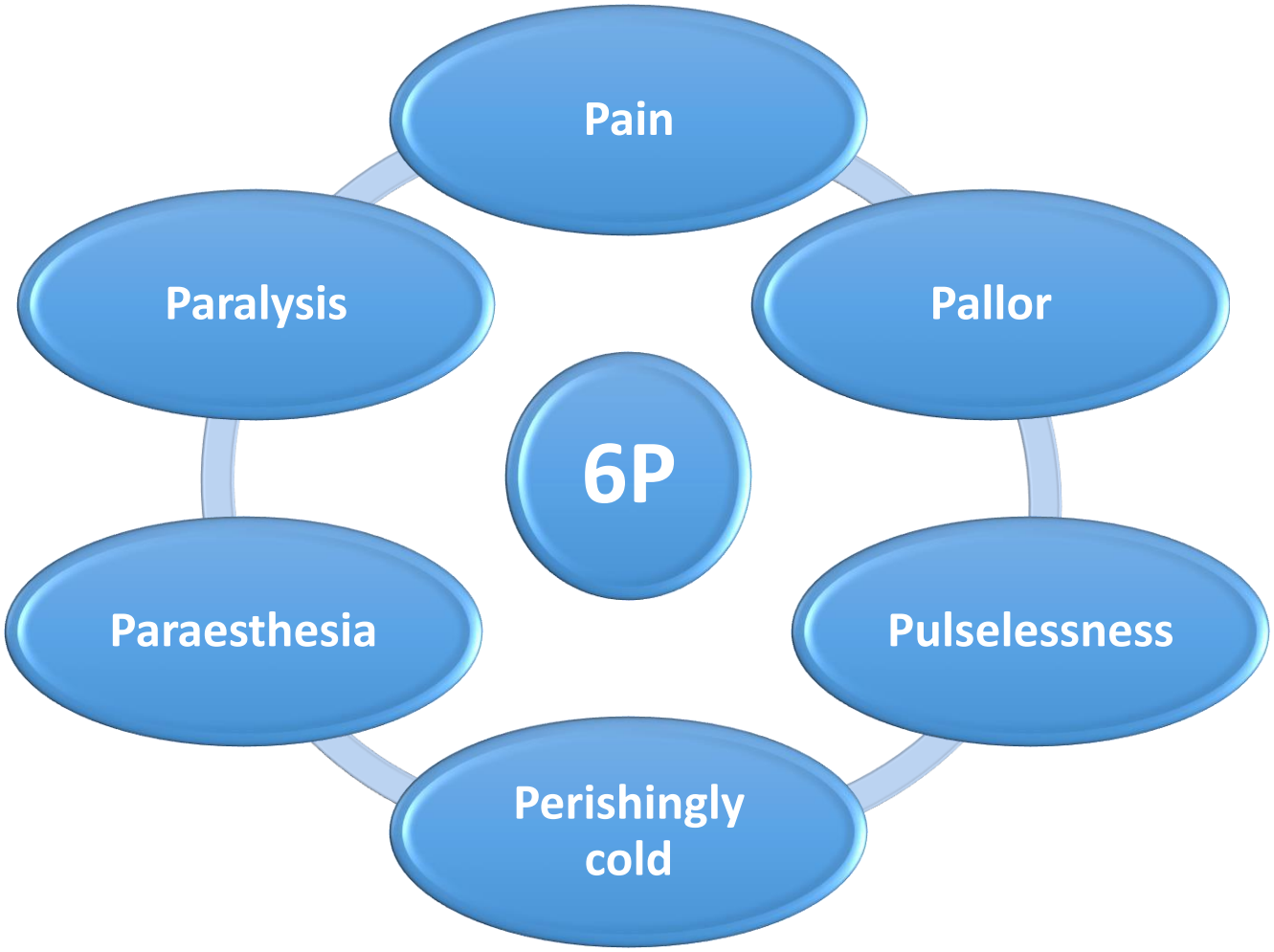
- Intraluminal dissection
- Extraluminal arterial compression (compartment syndrome)

Risk factors

- Similar to the risk factors for peripheral vascular disease.

Modifiable	Non-modifiable
• Smoking • DM • Hypertension • Hyperlipidaemia • Hypercoagulability	• Age • Gender • Ethnicity

Clinical features



Symptoms

- Pain in the affected limb usually present at rest.
- Altered sensation.
- Paralysis in the affected limb(Late sign).

Signs

- Most common findings,
  - ❑Marble white appearance of the skin
  - ❑Absent limb pulses on palpation
  - ❑Cold limb
- Less common findings, which usually appear in later stages,
  - ❑Paraesthesia (with reduced or complete loss of light touch sensation in the distal limb)
  - ❑Paralysis (with the inability to wiggle toes or move fingers)
  - ❑Muscle weakness Gangrene

Embolic vs Thrombotic

Clinical features	Thrombosis	Embolic
• Onset	Gradual, vague	Sudden
• Severity	Less severe	Severe
• Peripheral arterial disease	History of PAD symptoms	Unlikely
• Previous vascular surgery or endovascular interventions	Likely	Unlikely
• Cardiac history	Unlikely	AF, Recent MI
• Appearance and feel	Less cold, cyanotic	Cold, mottled
• Palpation of artery	Hard, calcified	Soft, tender
• Contralateral leg pulses	Absent	Present

Rutherford classification

Stage	Prognosis	Findings		Doppler Signal	
		Sensory loss	**Muscle weakness**	**Pedal arteries**	**Popliteal veins**
I	Limb viable, not immediately threatened	None	None	Audible	Audible
IIa	Limb marginally threatened, salvageable if promptly treated	Minimal (toes)	None	Often inaudible	Audible
IIb	Limb immediately threatened, salvageable with immediate revascularisation	More than toes, pain at rest	Mild or moderate	Inaudible	Audible
III	Limb irreversibly damaged, major tissue loss or permanent nerve damage inevitable	Profound, anesthetic	Paralysis	Inaudible	Inaudible

ALI vs CLI

Clinical features	Acute limb ischaemia	Critical limb ischaemia
Onset	≤ 2 weeks	≥ 2 weeks
Pulses	Absent	Reduced/absent
Pain	Sudden, at rest, calf tenderness	Gradual, at rest
Appearance	Pale, “marble white”	Pink
Temperature	Cold	Warm
Other	Paraesthesia, paralysis	Ulcers, gangrene
Emergency?	Yes	No

Investigations

Bedside

- Duplex ultrasound/Doppler scan - confirm the absence of pulses.
- ECG - AF

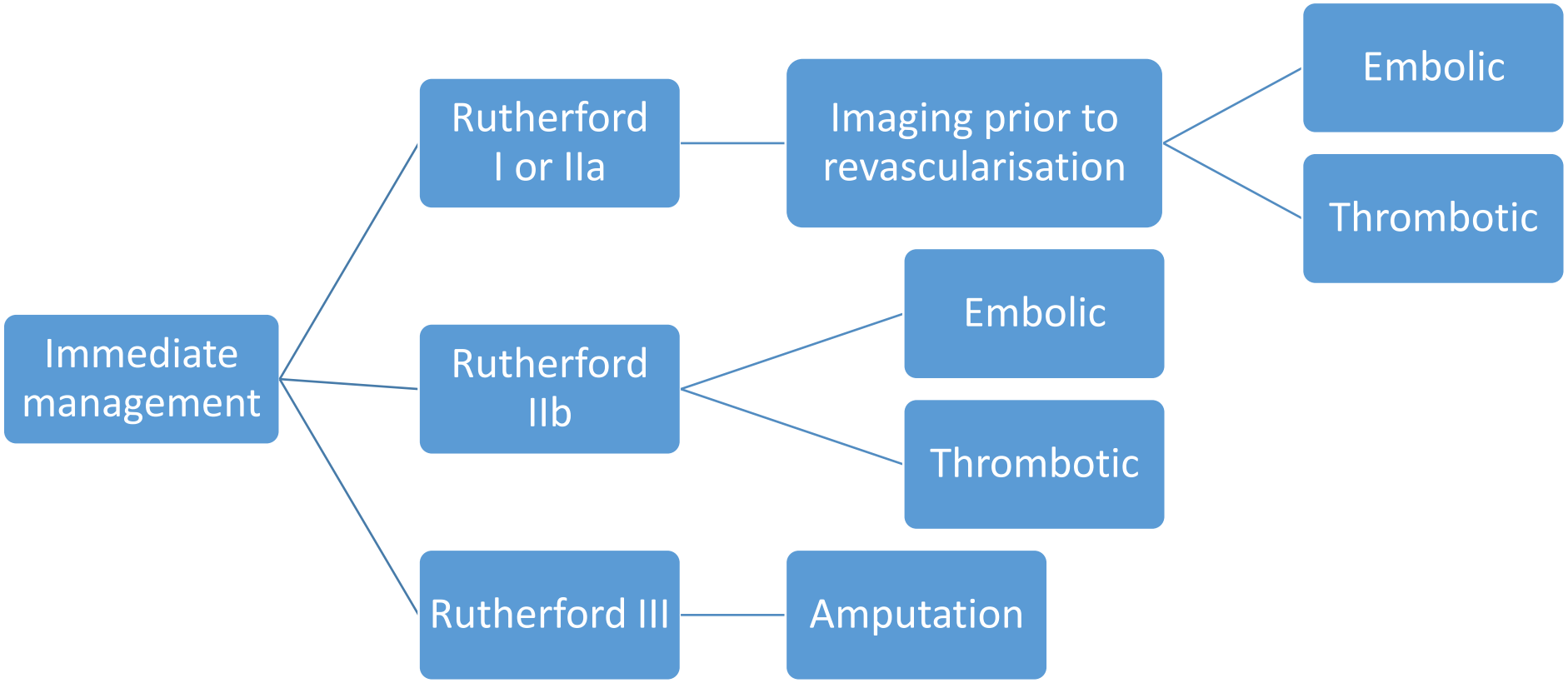
Laboratory

- Baseline blood tests (FBC, U&E, LFTs, coagulation)
- Serum lactate
- Thrombophilia screen
- Grouping and DT

Imaging

- CT/MR angiography to guide revascularisation if the limb is viable.
- Echocardiography if cardiac origin suspected.

Management


Immediate management
Rutherford I or IIa
Imaging prior to revascularisation
Embolic
Thrombotic
Rutherford IIb
Embolic
Thrombotic
Rutherford III
Amputation

Immediate management

- If patient has evidence of ALI
- Systemic anticoagulation with heparin
  - ❑Stat dose of heparin 80mg/kg, and start the patient on an hourly drip of 18mg/kg
- Analgesia: paracetamol and an opioid

Rutherford I or IIA limb

- Imaging prior to revascularisation - Arterial duplex or CTA .
- Unlikely due to embolus but if imaging shows an embolus, embolectomy is indicated.
- Thrombus,
  - ❑Catheter guided thrombolysis
  - ❑Surgery
    - ➢Endarterectomy/arterial bypass on an urgent basis
    - ➢if patient is not suitable for thrombolysis

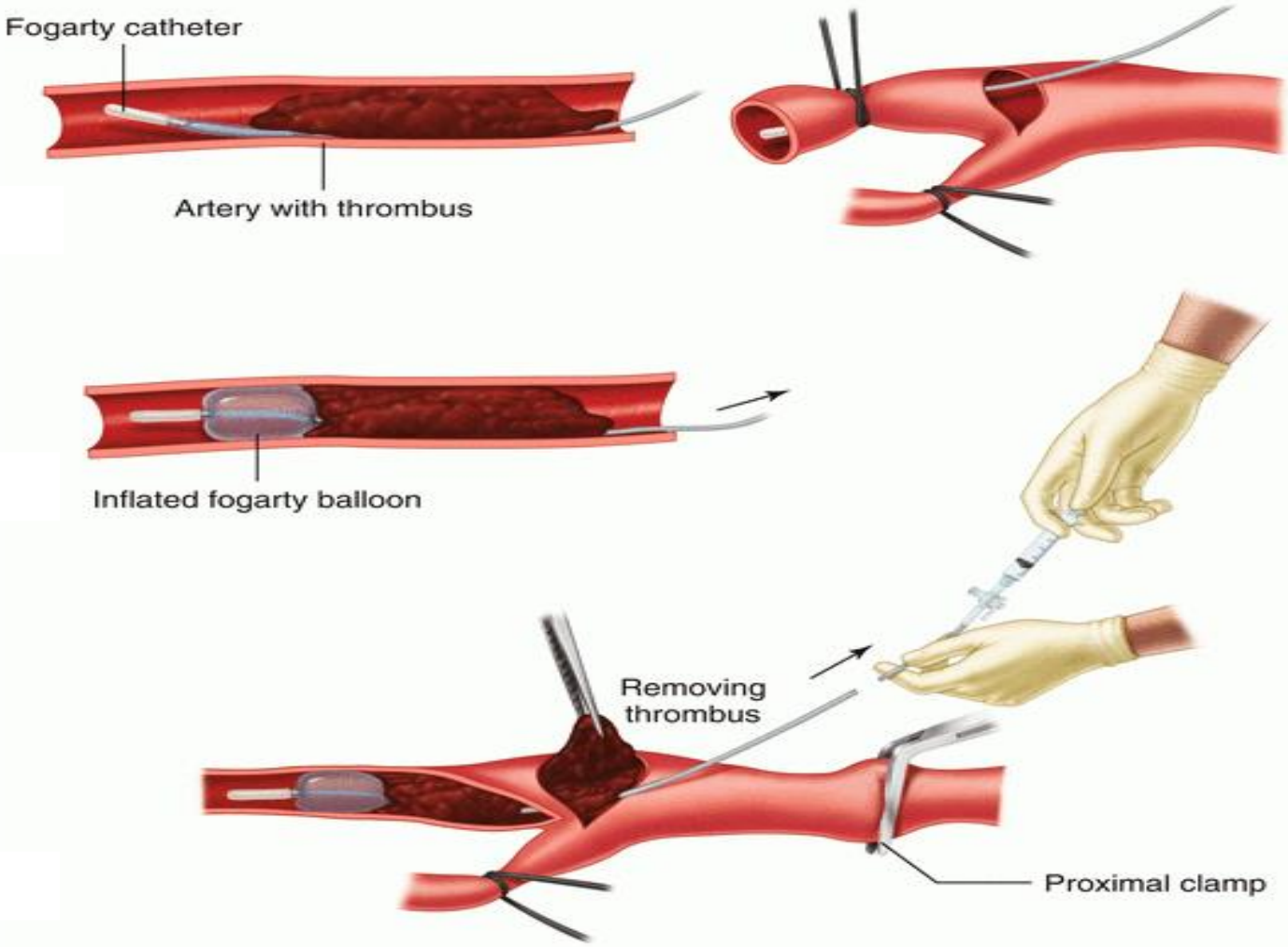
Rutherford IIb

- Immediately requires revascularisation without imaging.
- If limb viability is uncertain, perform a fasciotomy first and then proceed to revascularization.
- Embolus,
  - ❑If no contraindication for embolectomy → embolectomy → on-table angiography to see if residual occlusion is present or not → if present → thrombolysis
  - ❑If embolectomy is unsuccessful or embolectomy is contraindicated → urgent arterial bypass
- Thrombus,
  - ❑Endarterectomy/urgent arterial bypass.

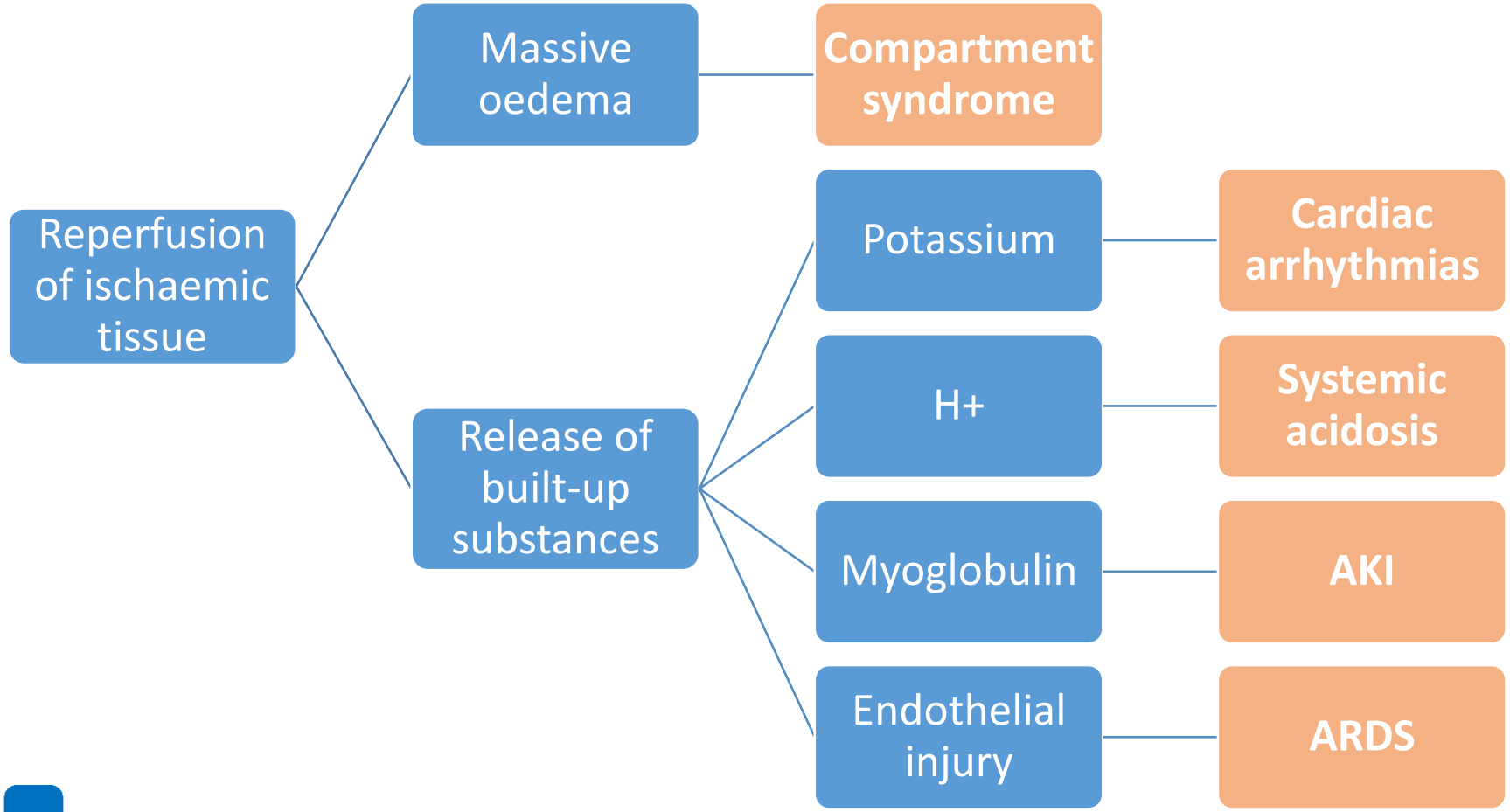
Catheter-guided Thrombolysis

- Indications
  - If limb is immediately not threatened and suspicion of acute on chronic disease
- Agents
  - Urokinase
  - r-tPA - recombinant tissue plasminogen activator
- Advantages
  - Less invasive
  - Can do angioplasty at the same time if indicated
- Disadvantages
  - Risk of bleeding
  - Stroke
  - Embolism

Embolectomy



Reperfusion injury



Management Of Reperfusion Injury

- Hydrate
- Maintain blood pressure
- Mannitol - scavenger of free radicals
- Alkaline diuresis

Fasciotomy indications

Therapeutic

- Confirmed compartment syndrome
- Impending compartment syndrome

Diagnostic

- Before proceeding with revascularisation, to ensure limb is viable

Prophylactic

- After revascularisation if compartment syndrome is expected to develop
- After vascular ligation in trauma

Follow up management

- Investigate to identify the source of emboli,
  - ❑Cardiac assessment - 24-hour Halter monitoring, ECG, 2D echo
  - ❑CT aorta (AAA, popliteal, femoral aneurysms)
  - ❑Thrombophilia screening
- 3-6 months of anticoagulation for those with proven thrombotic or embolic ALI.

Long-term management

- Smoking cessation
- Diet and exercise
- Statin therapy and managing cholesterol
- Preventing, diagnosing, and managing diabetes
- Preventing, diagnosing, and managing hypertension
- Antiplatelet therapy