

What are blood clots?

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Blood clots

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Blood clots can be very serious and need to be treated quickly. Staying healthy and active can help prevent them.

See a GP urgently if you think you have a blood clot

Symptoms of a blood clot include:

- throbbing or cramping pain, swelling, redness and warmth in a leg or arm
- sudden breathlessness, sharp chest pain (may be worse when you breathe in) and a cough or coughing up blood

Blood clots can be life threatening if not treated quickly.

Go to A&E or call 111 for advice if you can't get a GP

What is a blood clot?

Is a vital part of our system that keeps the blood in the pipes



What is a Thrombus?

- Solid mass of blood constituents
- Formed within the vascular system
- In life

Thrombus is different to Clot!

- Clotting means coagulation which can occur within or outside the vascular system in life or post mortem.

Why does Thrombus occur?

- Abnormalities of the vessel wall
 - atheroma
 - direct injury
 - inflammation

Why does Thrombus occur?

- **Abnormalities of blood flow**
 - stagnation
 - turbulence
- **Abnormalities of blood components**
 - smokers
 - post-partum
 - post-op

Lets form a Thrombus

- What do we need
 - Blood
 - Stimulation

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 - Blood
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 - Vessel wall damage
 - Vasoconstriction
 - Stagnation of the blood

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- What do we need
 - Blood
 - Stimulation
 - Vessel wall damage
 - Vasoconstriction
 - Stagnation of the blood
 - Exposure of the collagen and/or fibrin

Lets form a Thrombus

- Platelet activation

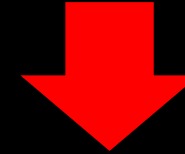
Lets form a Thrombus

- Platelet activation
 - Derived from megakaryocytes in bone marrow
 - No nucleus
 - Contain
 - Alpha granules (adhesion substances)
 - Dense granules (aggregation substances)

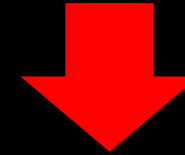
Lets form a Thrombus

On contact with fibrin or collagen platelets release granules which promote aggregation of adjacent platelets to form a mass which covers, for example, an endothelial defect.

Contact with Fibrin or Collagen



Release Granules

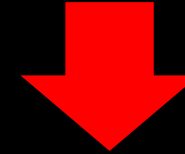


Aggregate to form a mass
E.g. Covering Endothelial
Defect

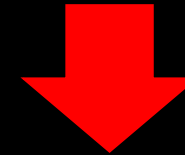
Lets form a Thrombus

Platelet aggregation in this way is a normal phenomenon, and occurs continuously in the body to repair minor endothelial injury.

Contact with Fibrin or Collagen



Release Granules



Aggregate to form a mass
E.g. Covering Endothelial
Defect

Lets form a Thrombus

- Not the whole story!

Lets form a Thrombus

- **Stimulation**

- Vessel wall damage

- Vasoconstriction

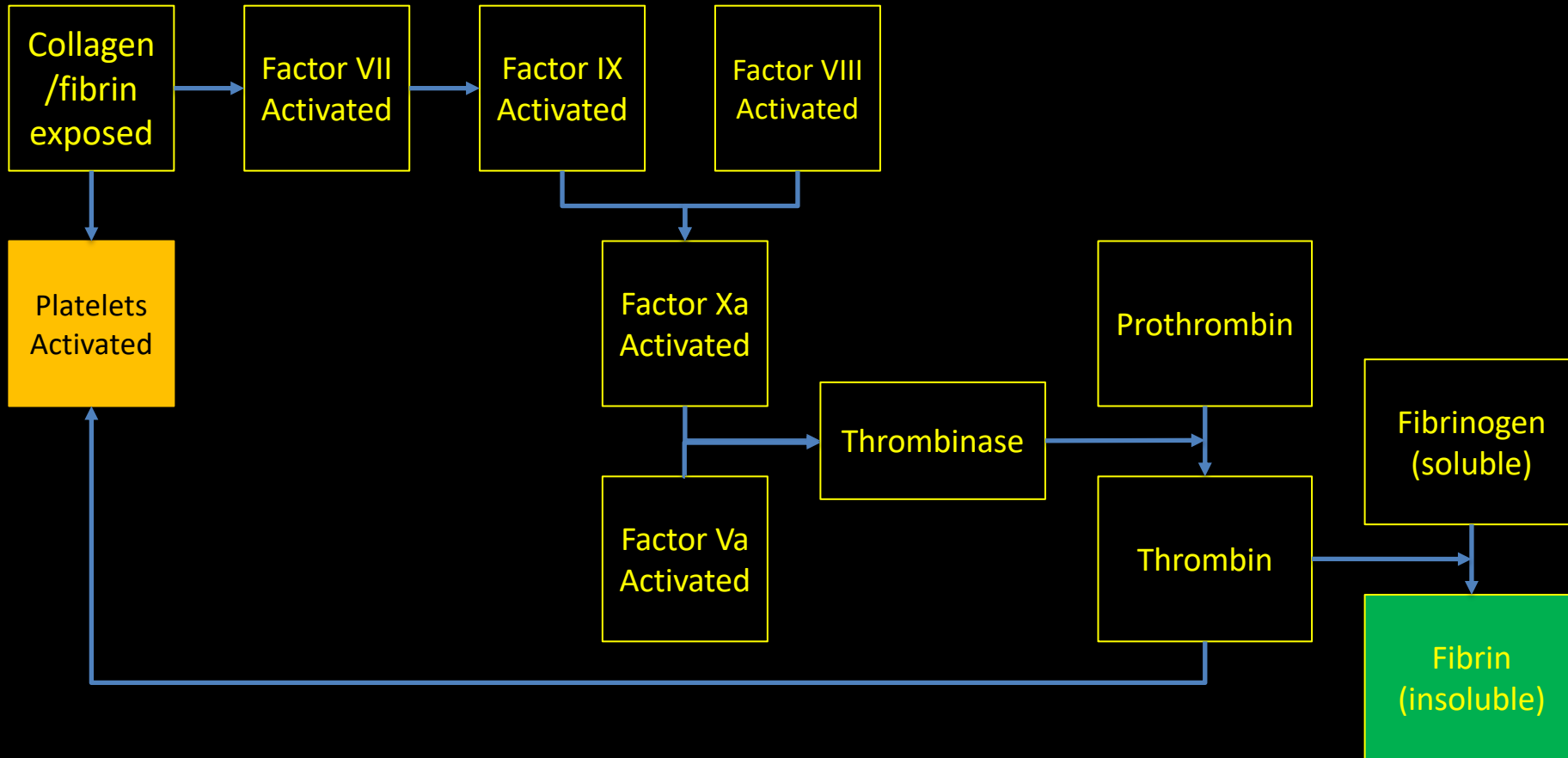
- Stagnation of the blood

- Exposure of the collagen and/or fibrin**

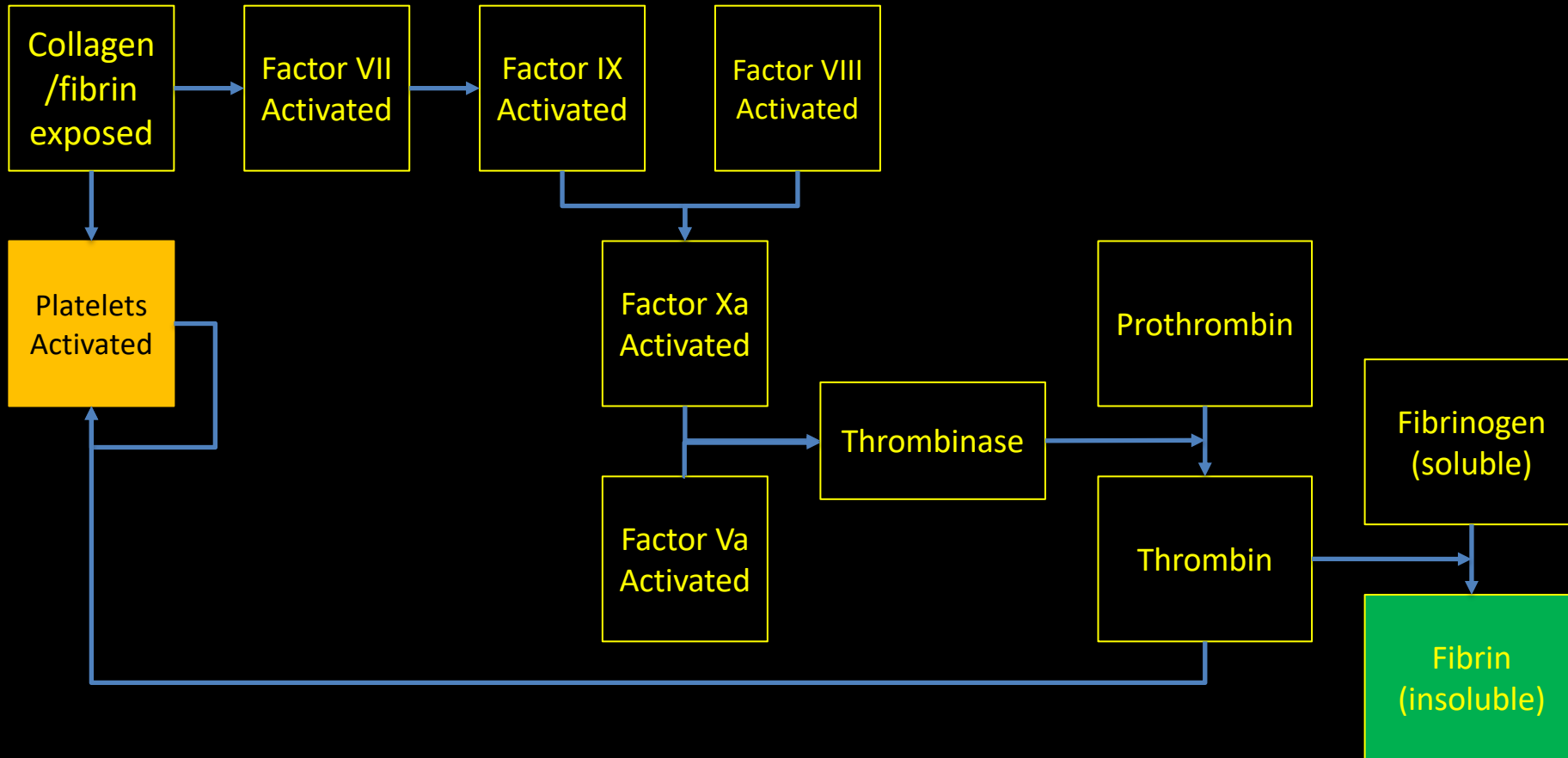
Lets form a Thrombus

- What happens next (simplified)

Lets form a Thrombus



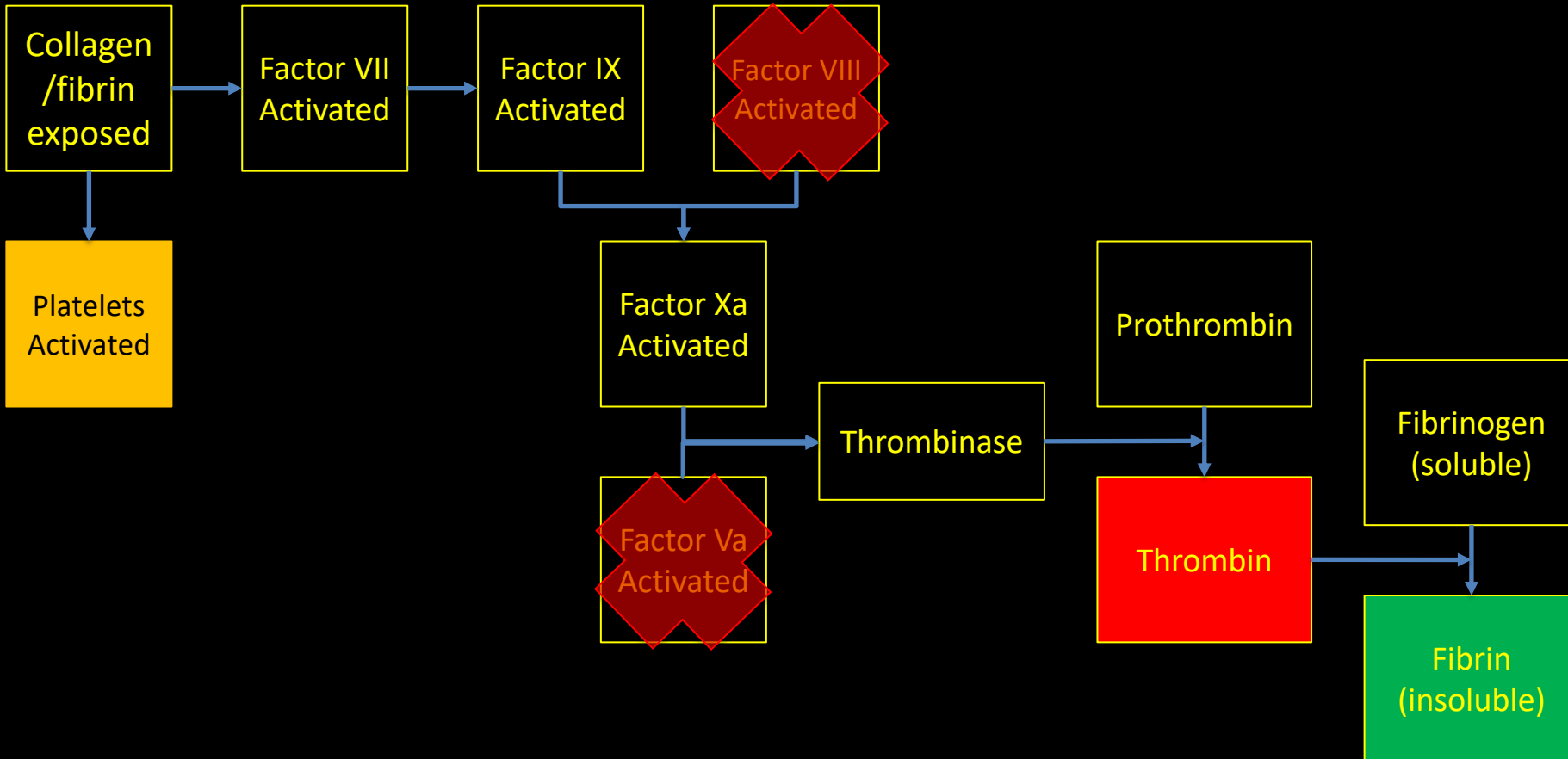
Lets form a Thrombus



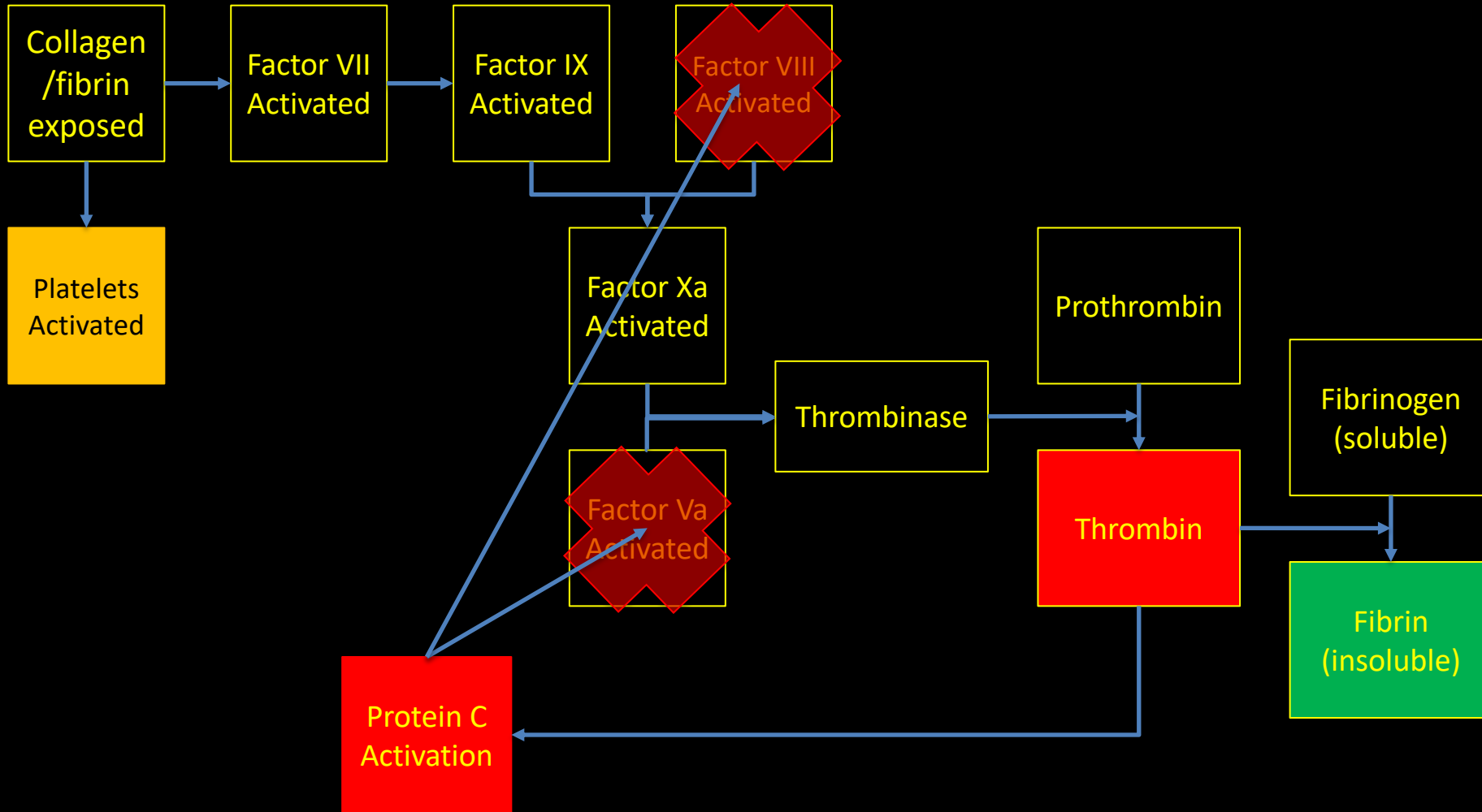
Lets form a Thrombus

- 1 ml of blood can generate enough thrombin to convert all the fibrinogen in the body to fibrin
- Tight regulation therefore required
- Balance of procoagulant and anticoagulant forces

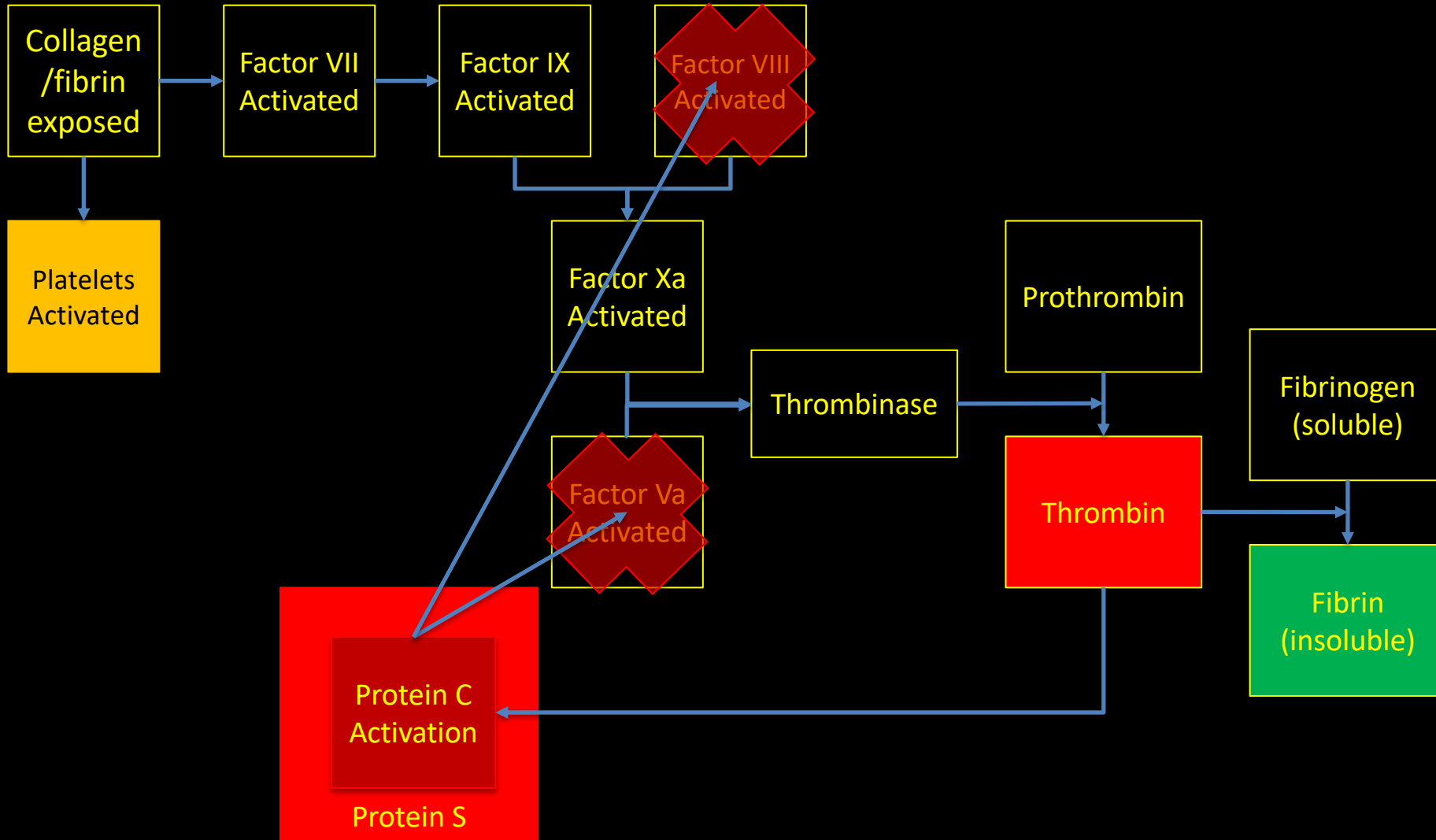
Lets form a Thrombus-Regulation



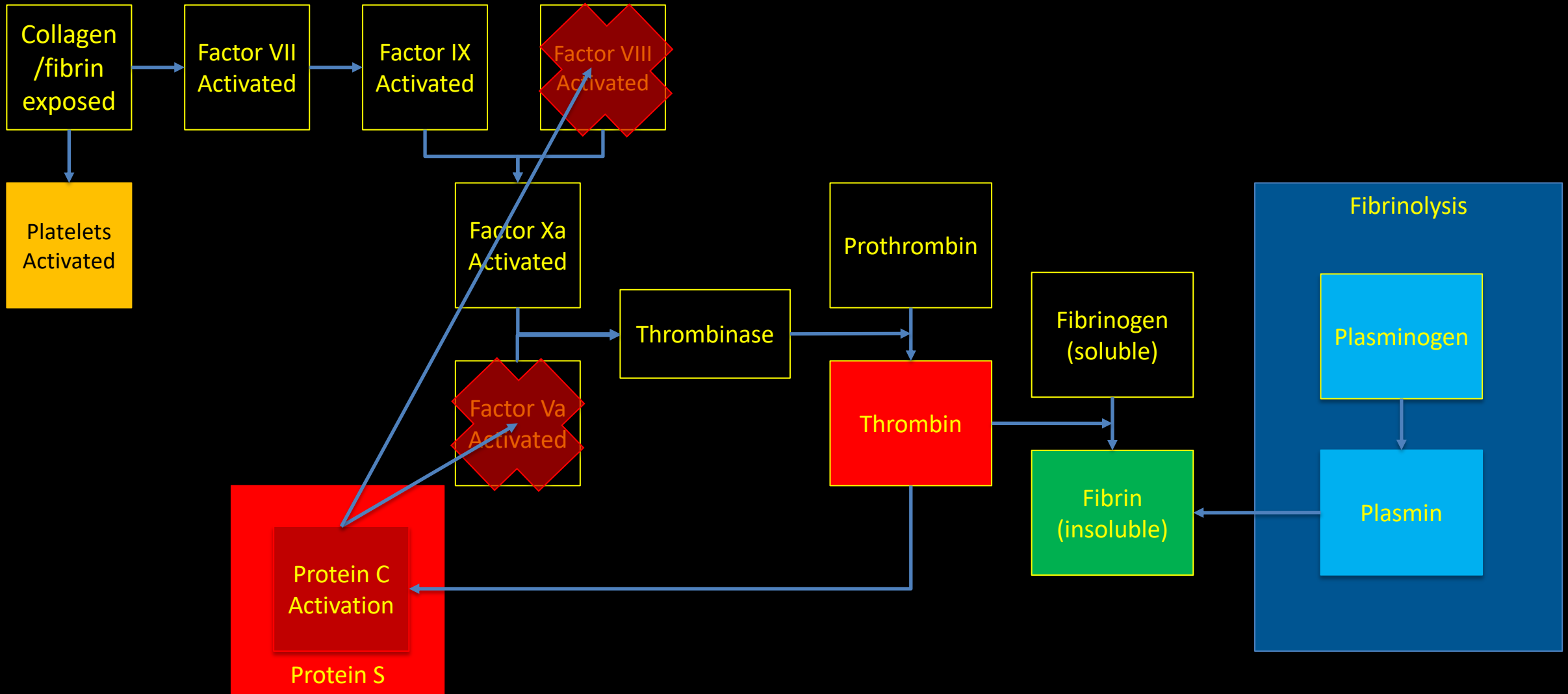
Lets form a Thrombus-Regulation



Lets form a Thrombus-Regulation



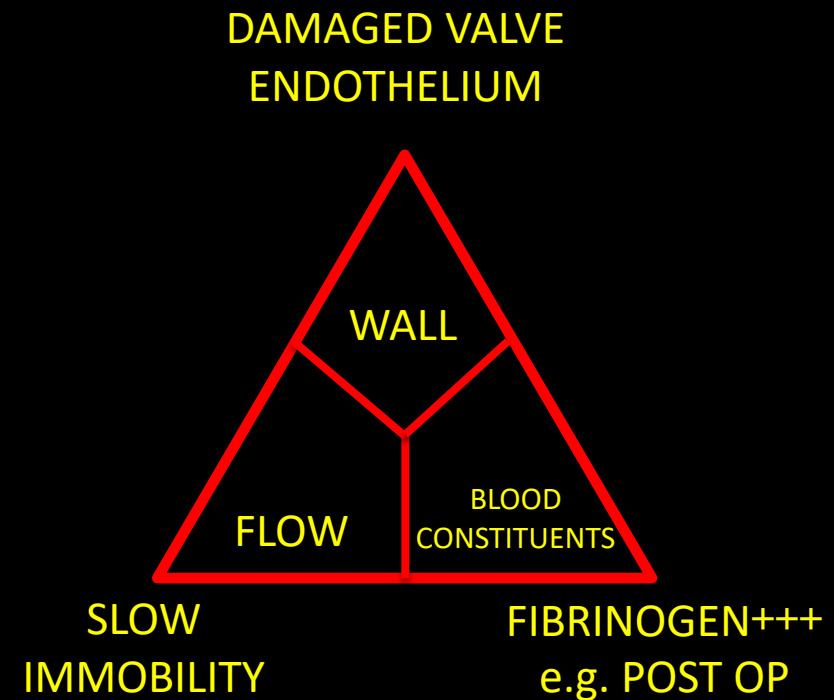
Lets form a Thrombus-Regulation



VENOUS THROMBOSIS: AETIOLOGY

Causes of venous thrombosis can be considered under Virchow's triad.

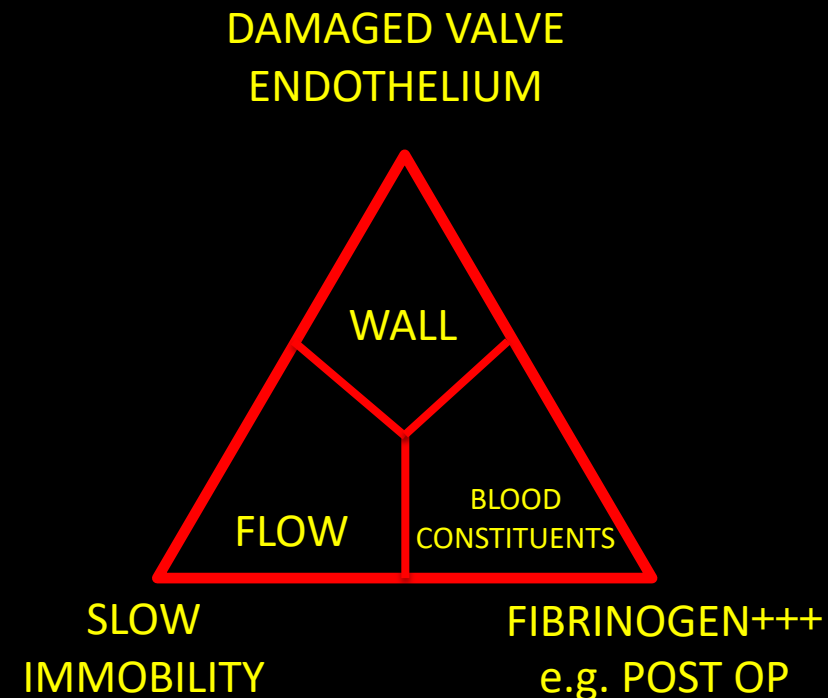
The most important site of venous thrombosis is in the deep veins of the leg.



VENOUS THROMBOSIS: AETIOLOGY

Causes of venous thrombosis can be considered under Virchow's triad.

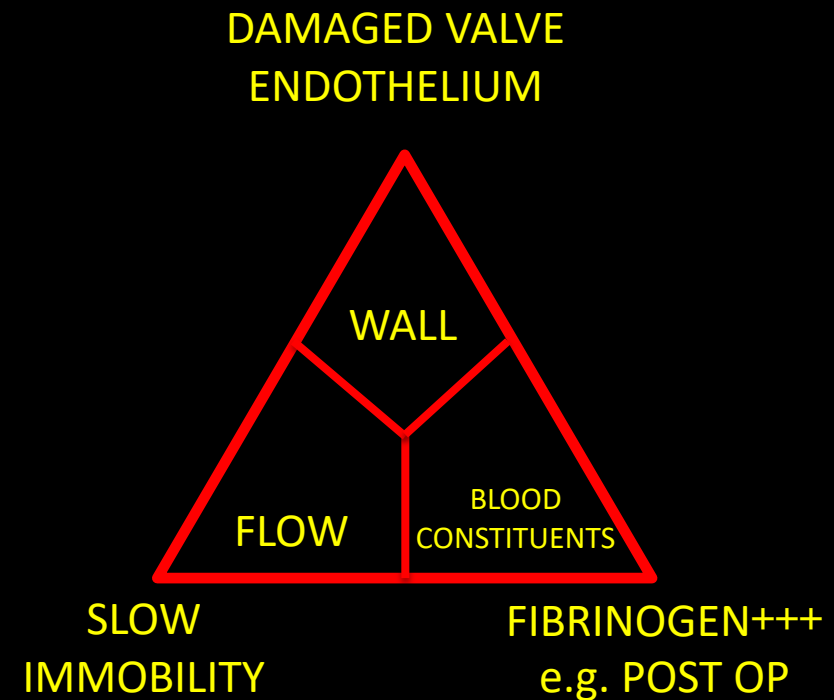
After operations, injury or severe illness of many kinds fibrinogen and other coagulation factors in the blood are increased due to increased hepatic synthesis. This leads to an increased risk of deep vein thrombosis.



VENOUS THROMBOSIS: AETIOLOGY

Causes of venous thrombosis can be considered under Virchow's triad.

Slow blood flow promoted by immobility due to chronic illness, or bed rest post-operatively can promote venous thrombosis.



VENOUS THROMBOSIS: AETIOLOGY

PREDISPOSING FACTORS FOR DEEP VENOUS THROMBOSIS

Immobility, bed rest

Post op coagulability changes

Pregnancy

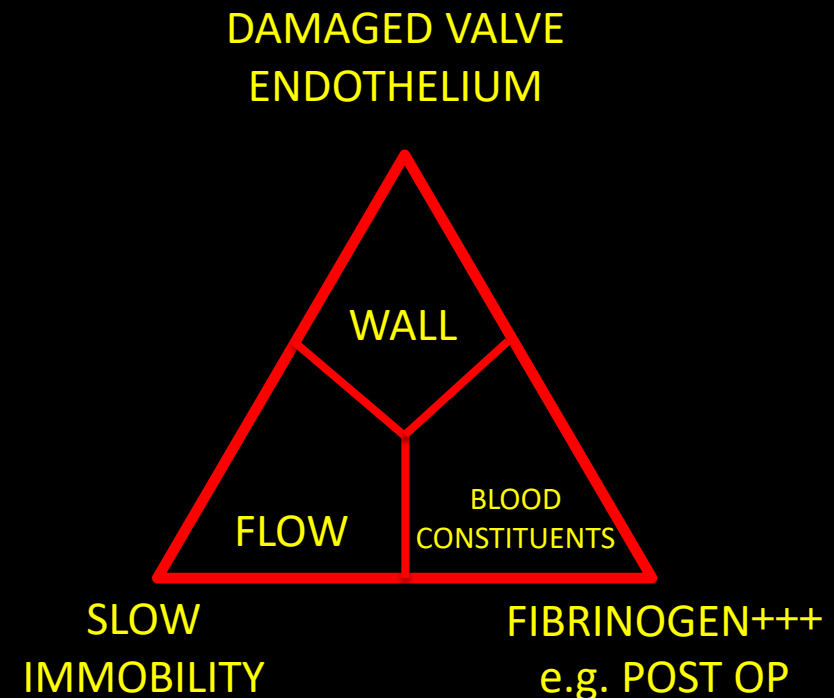
OC pill

Severe burns and trauma

Cardiac failure

Disseminated malignancy

Economy class syndrome



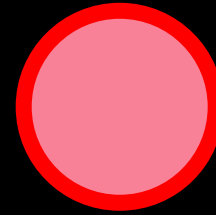
Lets form a Thrombus?

Thrombi can occlude a vessel which may result in necrosis of the part served (infarction).

Mural thrombus can release fragments (emboli) which can travel in the bloodstream to block distal vessels.

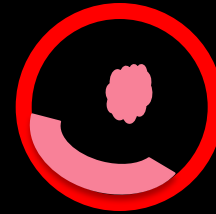
Thrombus on heart valves due to infection can also embolise.

Occlusive



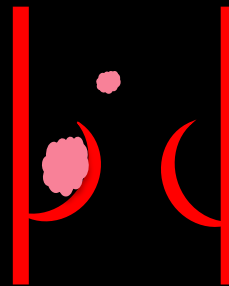
Infarction

Mural



Embolism

Vegetation

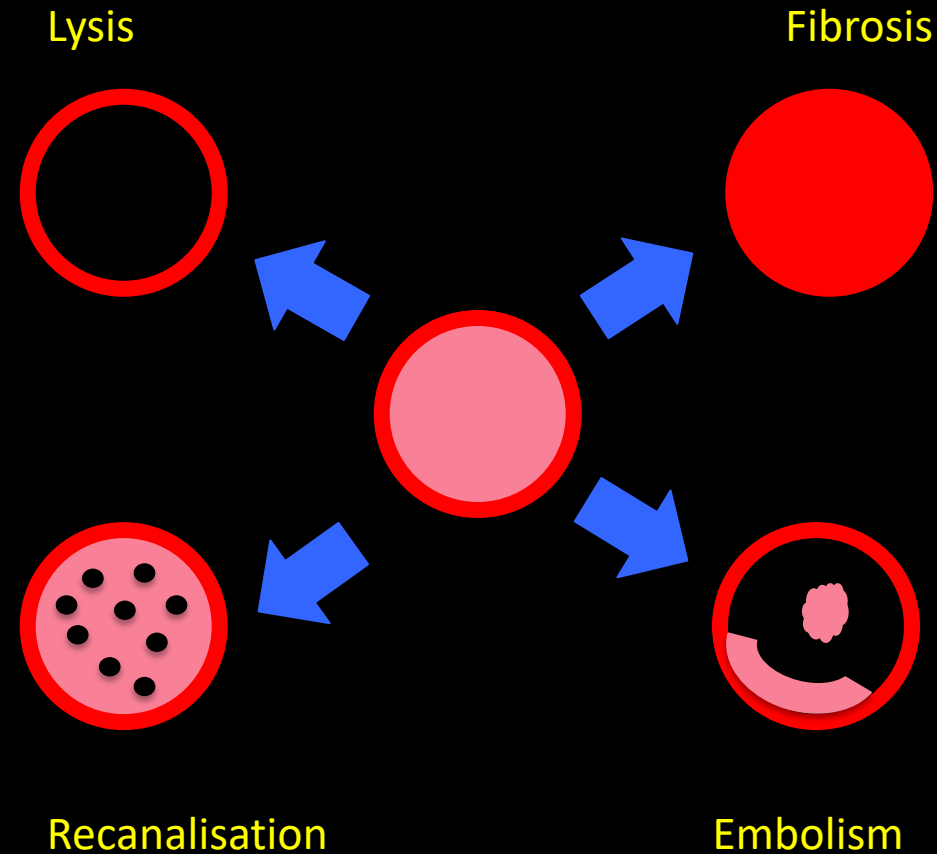


Embolism

OUTCOMES OF THROMBOSIS 1

THROMBOLYSIS

Thrombosis can be cleared by the fibrinolytic system. Plasminogen activator released from endothelial cells converts plasminogen to plasmin which dissolves fibrin.

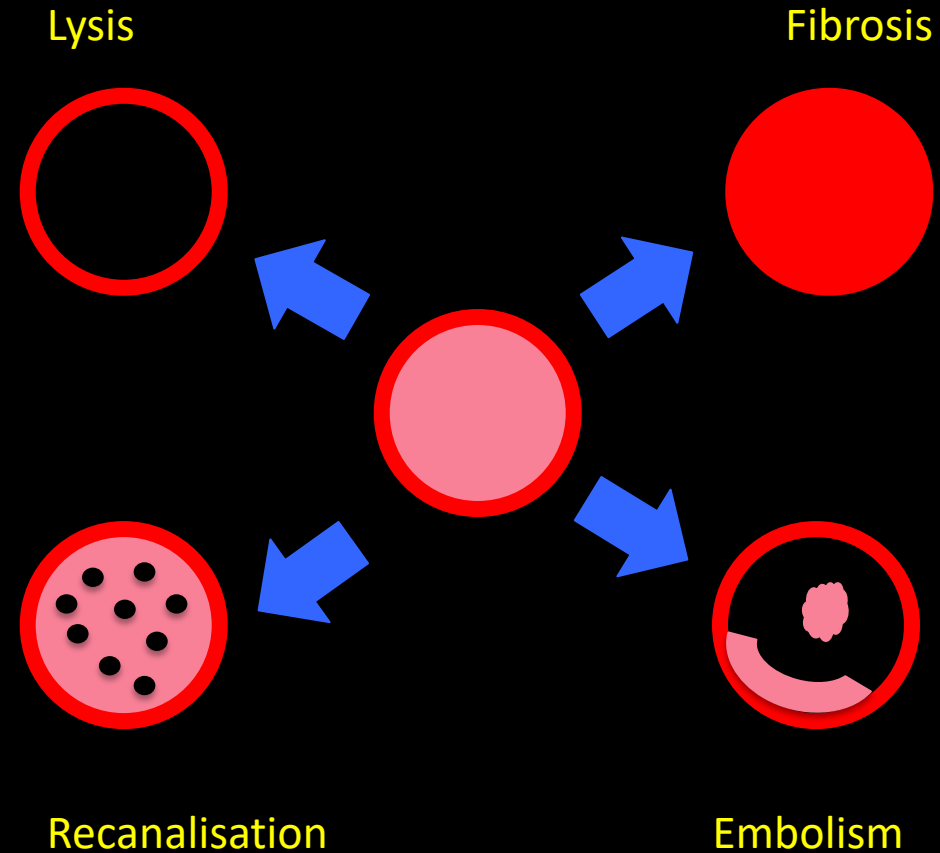


OUTCOMES OF THROMBOSIS 2

RECANALISATION

Thrombosis can undergo recanalisation.

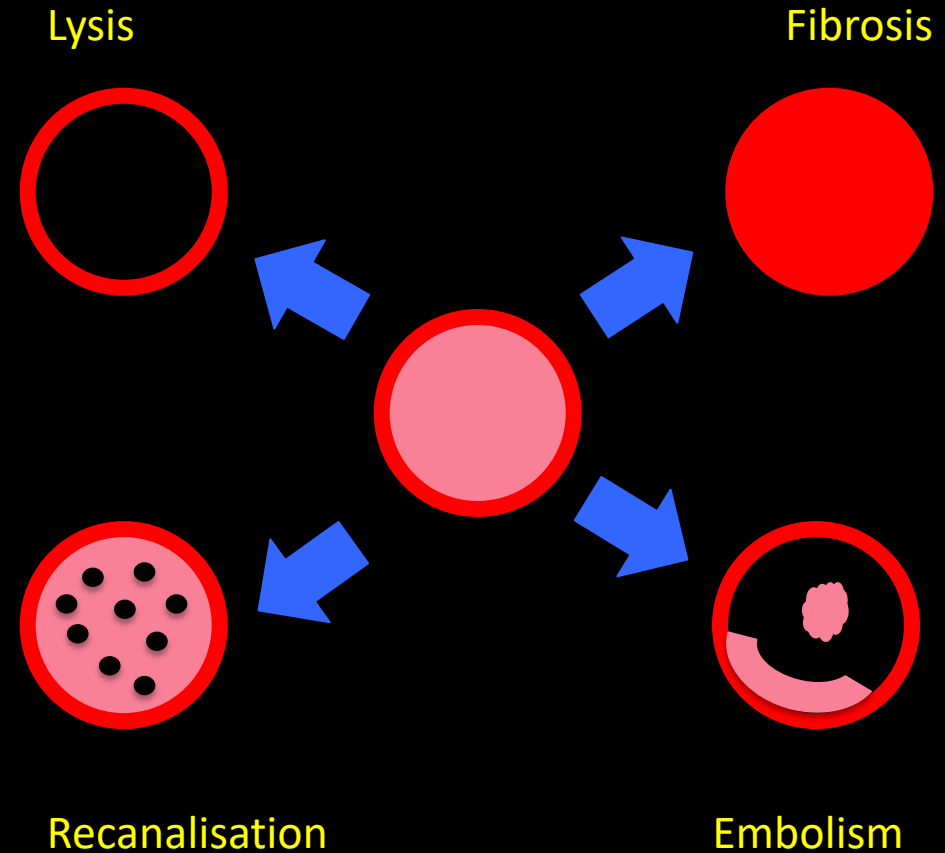
Endothelial cells grow out from the vessel wall and create new channels through the thrombus:



OUTCOMES OF THROMBOSIS 3

EMBOLISM

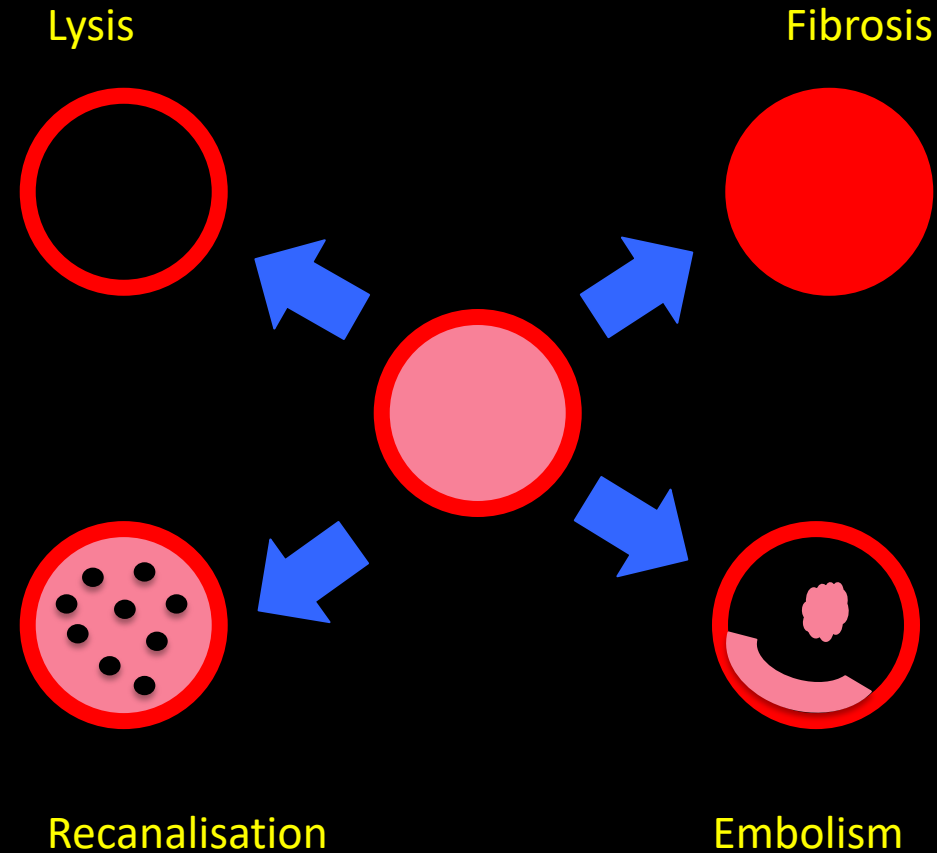
Thrombosis can throw off emboli which can occlude distal vessels



OUTCOMES OF THROMBOSIS 4

FIBROSIS: ORGANISATION

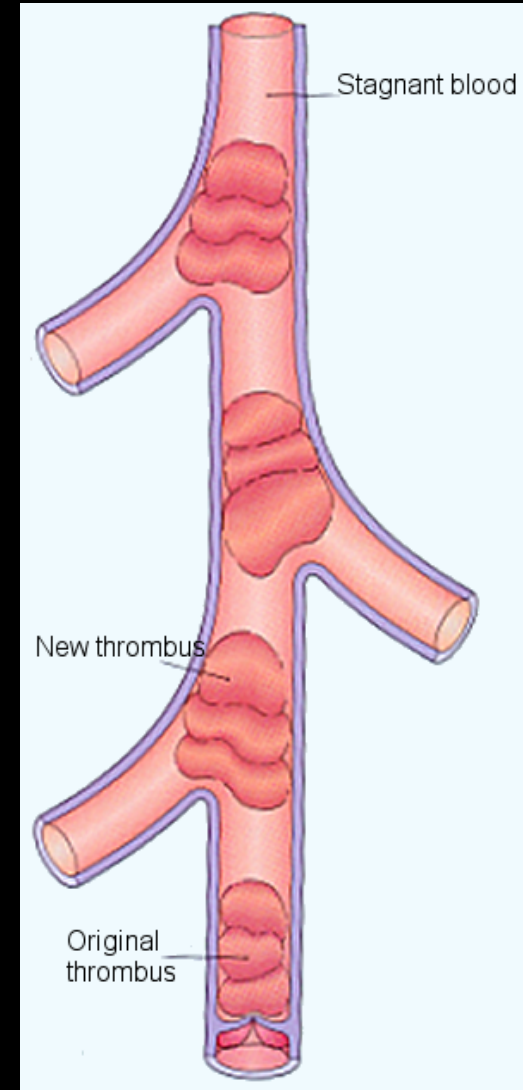
Thrombosis can simply be organised i.e undergo fibrous tissue replacement



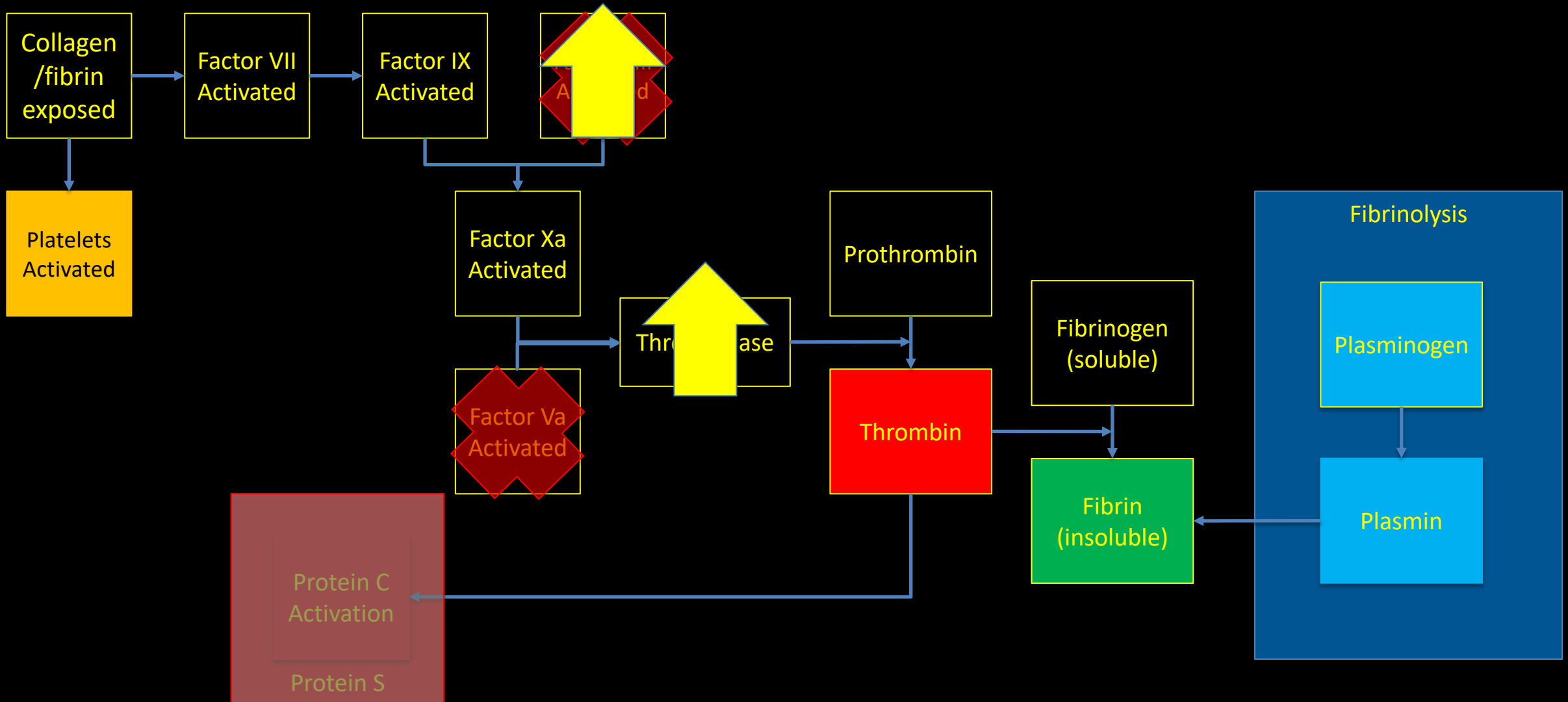
OUTCOMES OF THROMBOSIS 5

Propagation

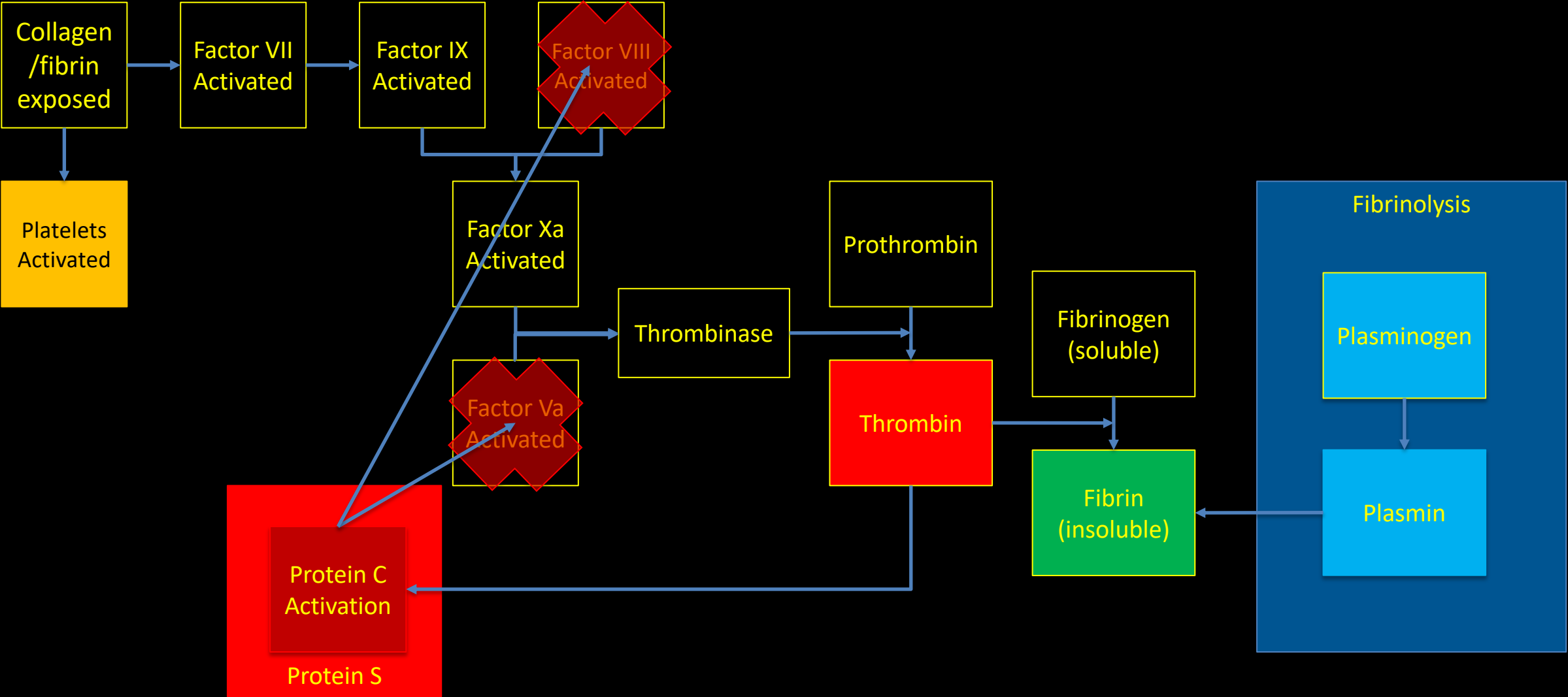
progressive spread
of thrombosis
distally in arteries
proximally in veins



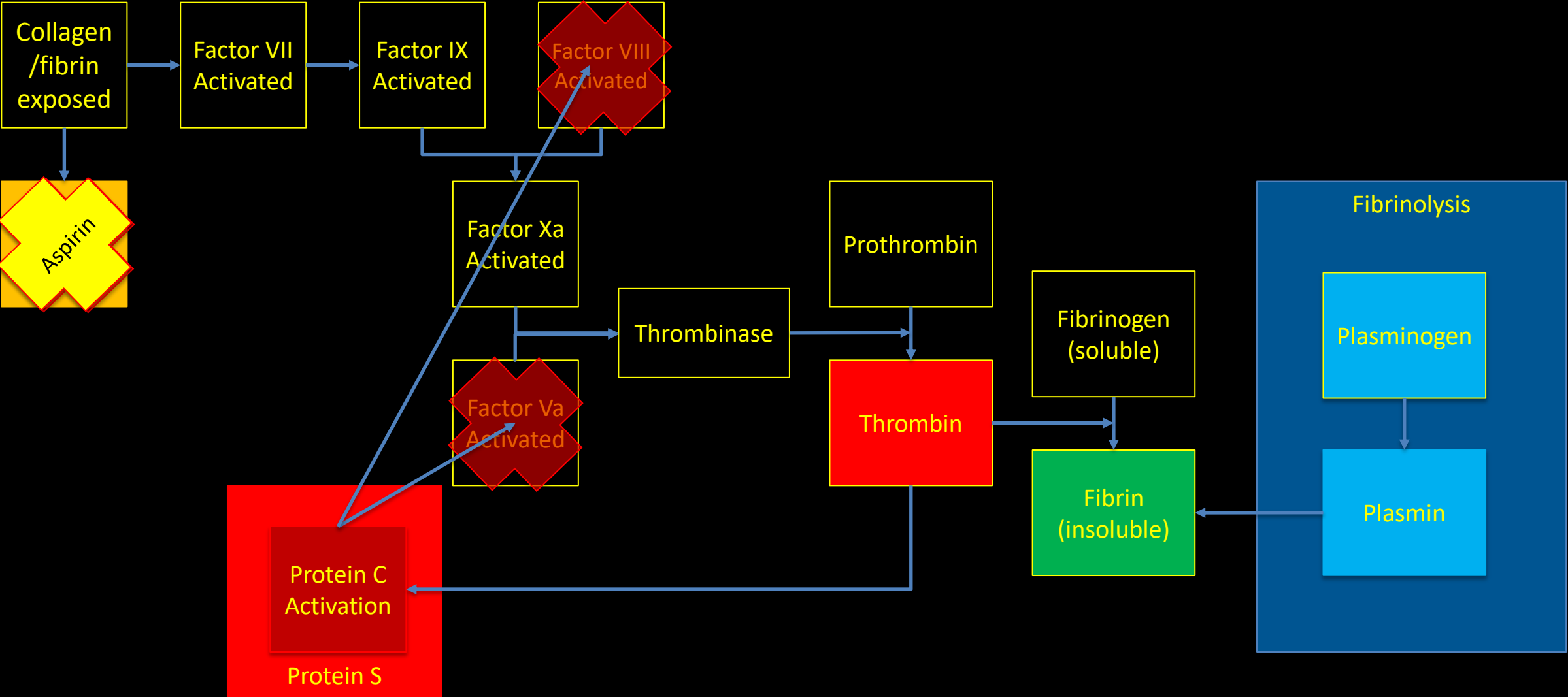
Lets form a Thrombus-Malfunctions



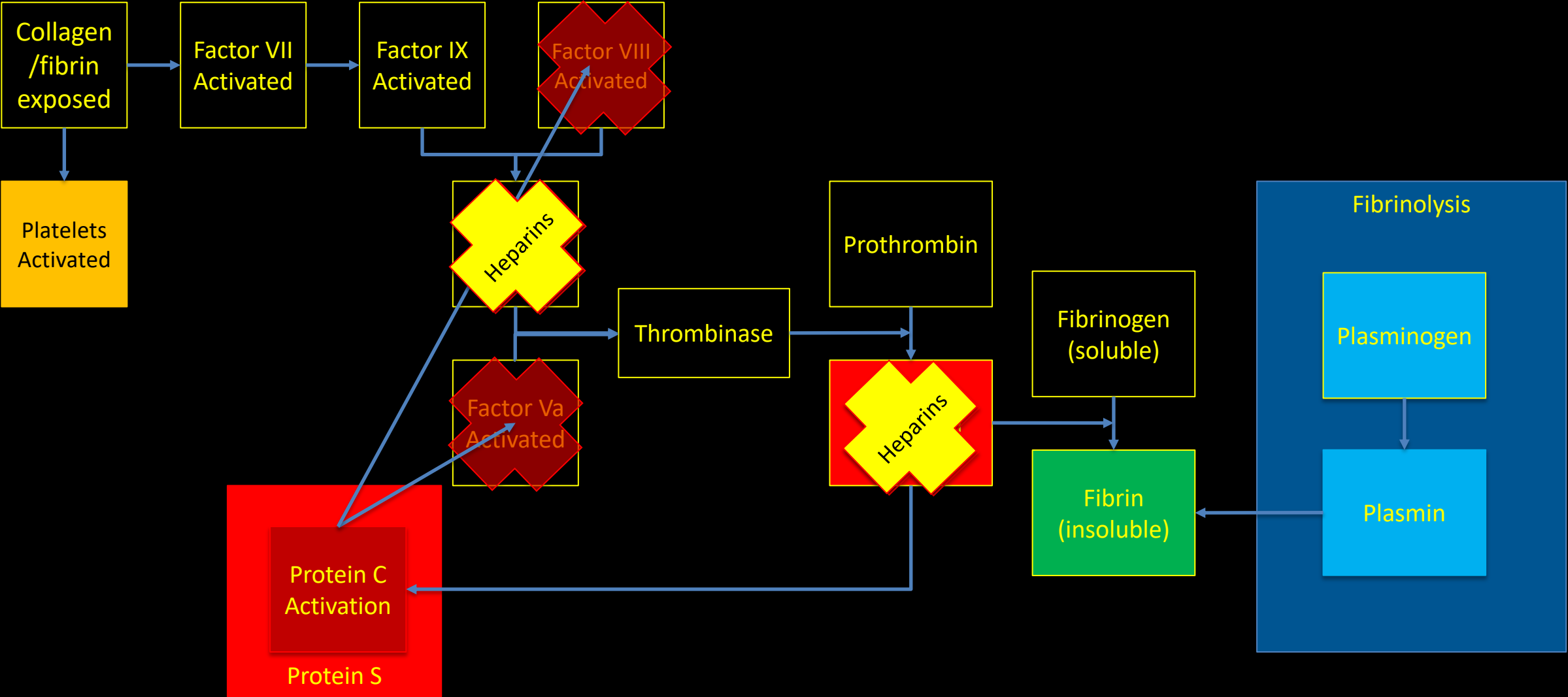
Lets NOT form a Thrombus-Treatment



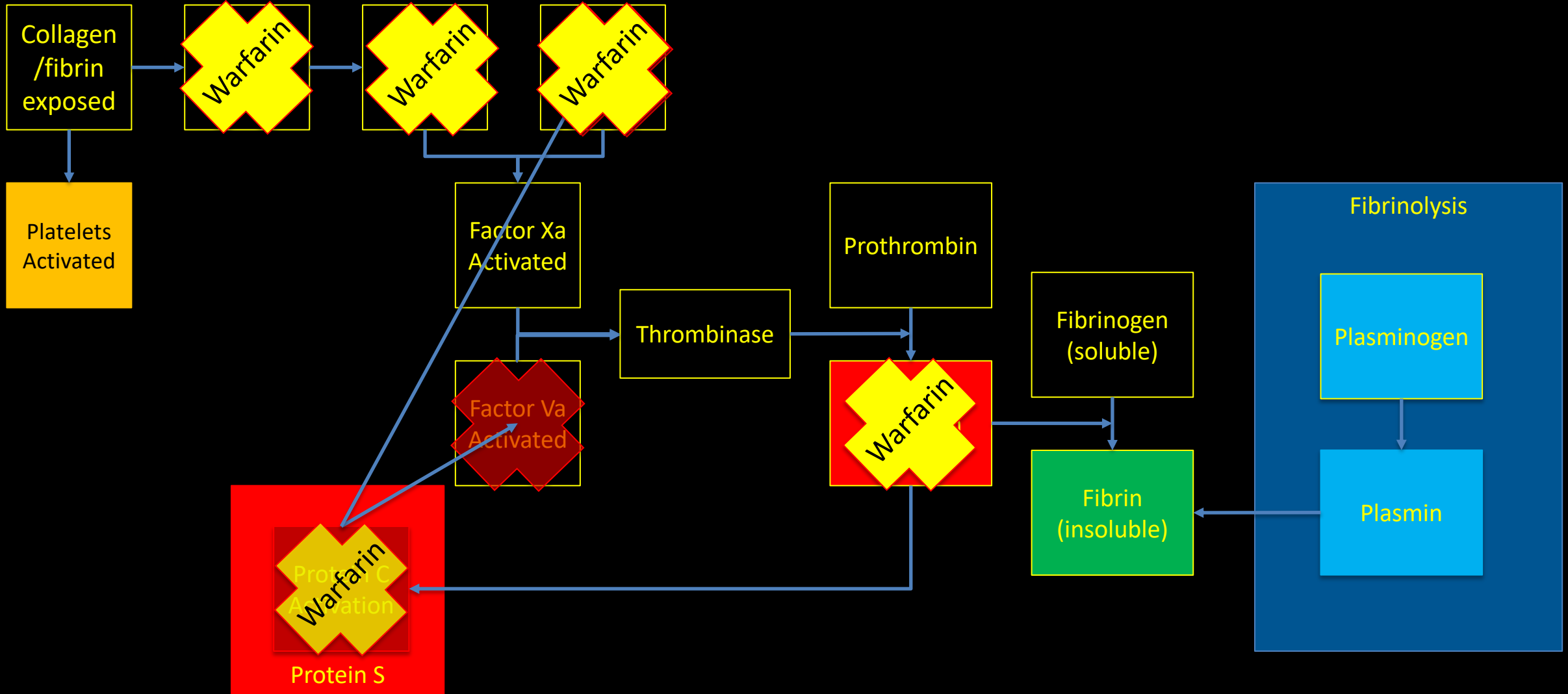
Lets NOT form a Thrombus-Treatment



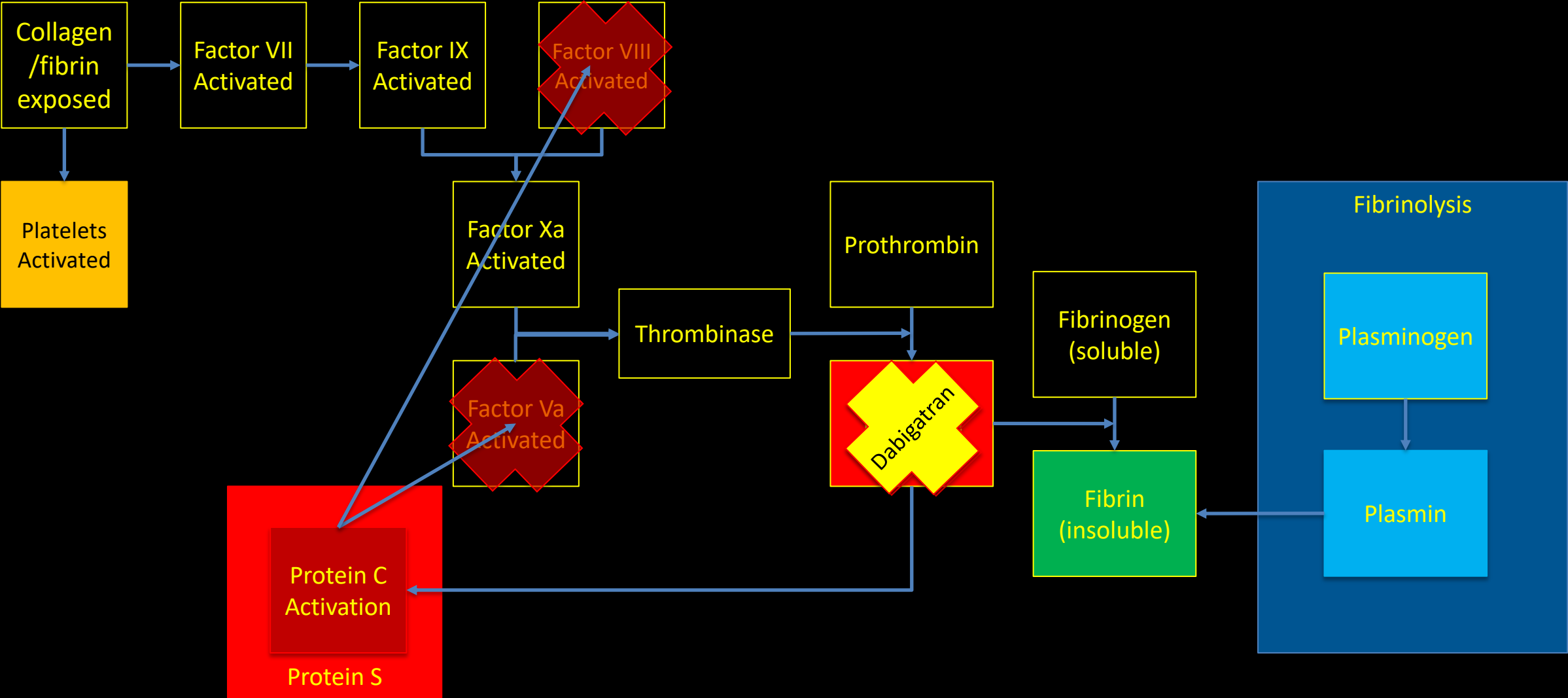
Lets NOT form a Thrombus-Treatment



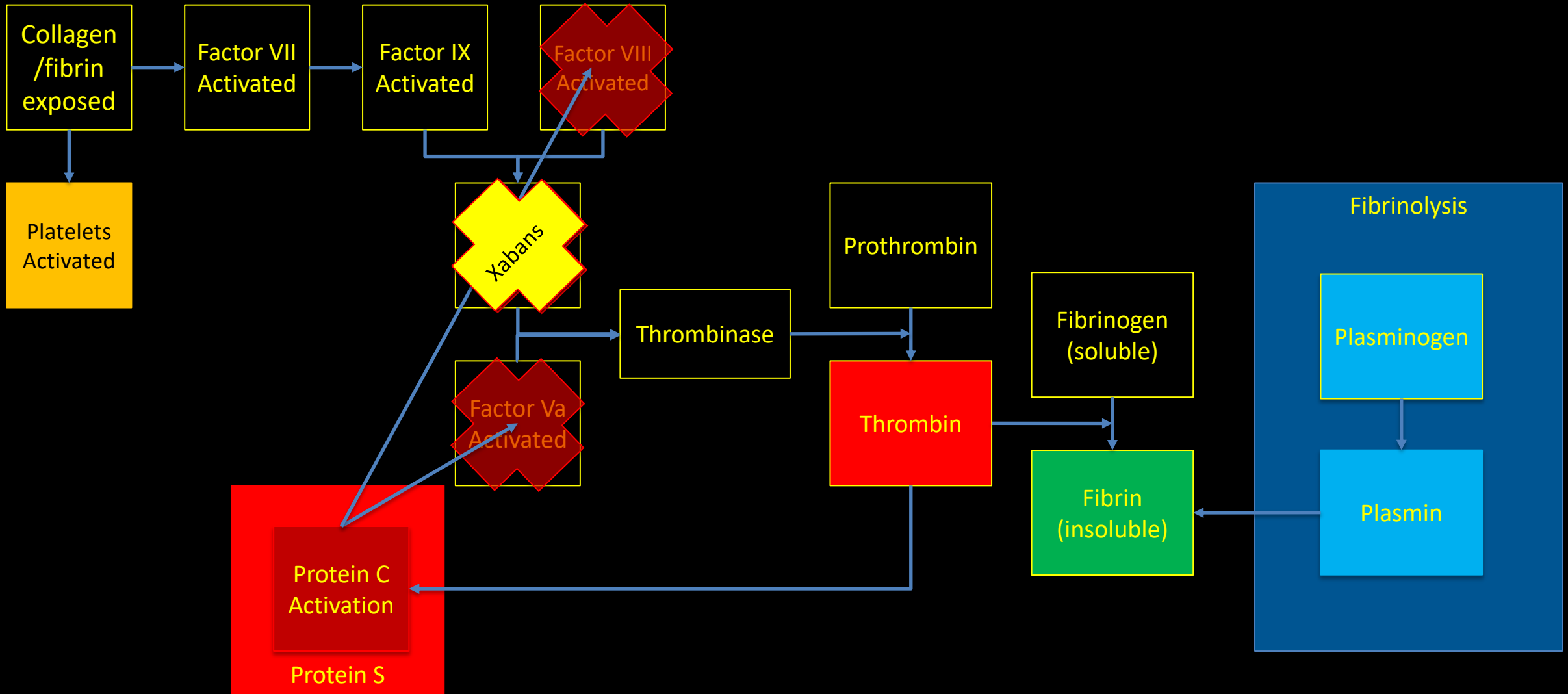
Lets NOT form a Thrombus-Treatment



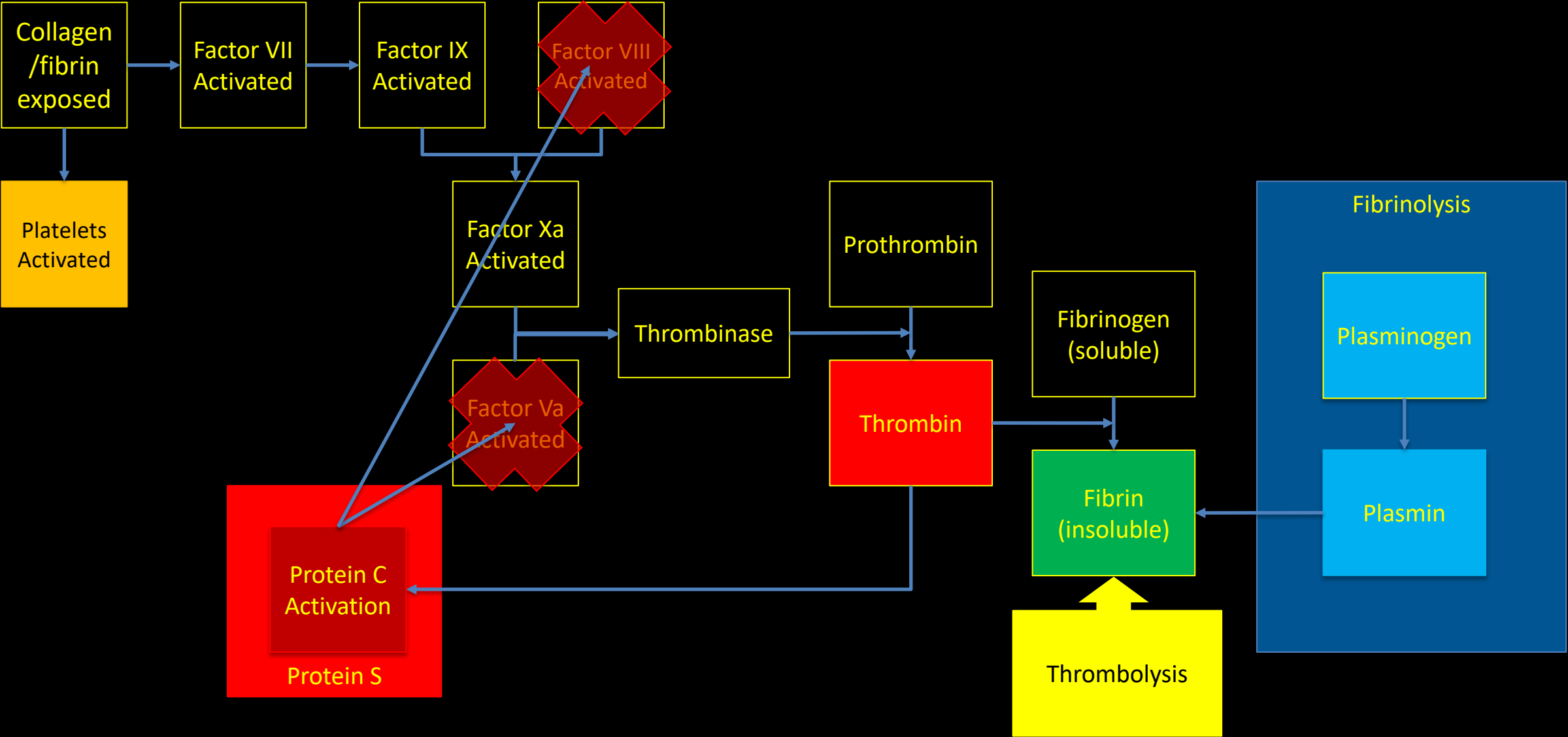
Lets NOT form a Thrombus-Treatment



Lets NOT form a Thrombus-Treatment



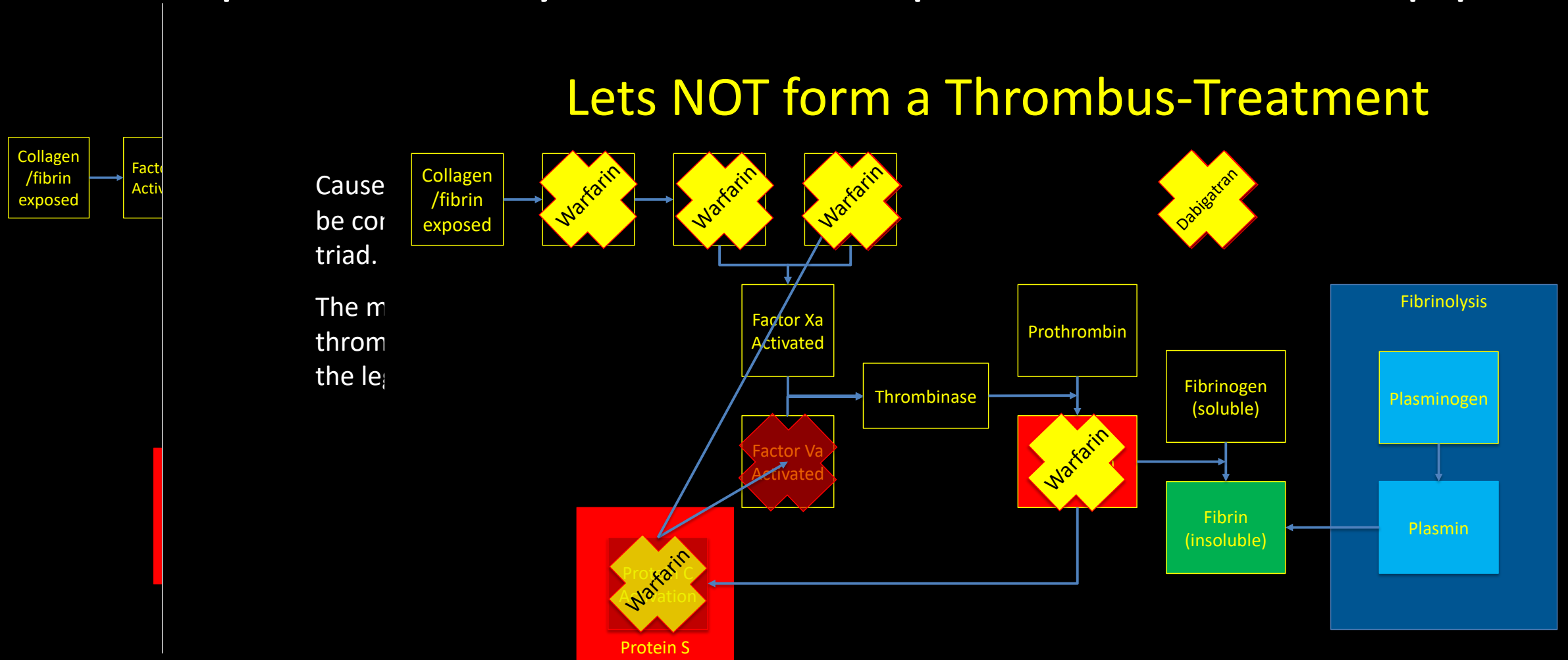
Lets NOT form a Thrombus-Treatment



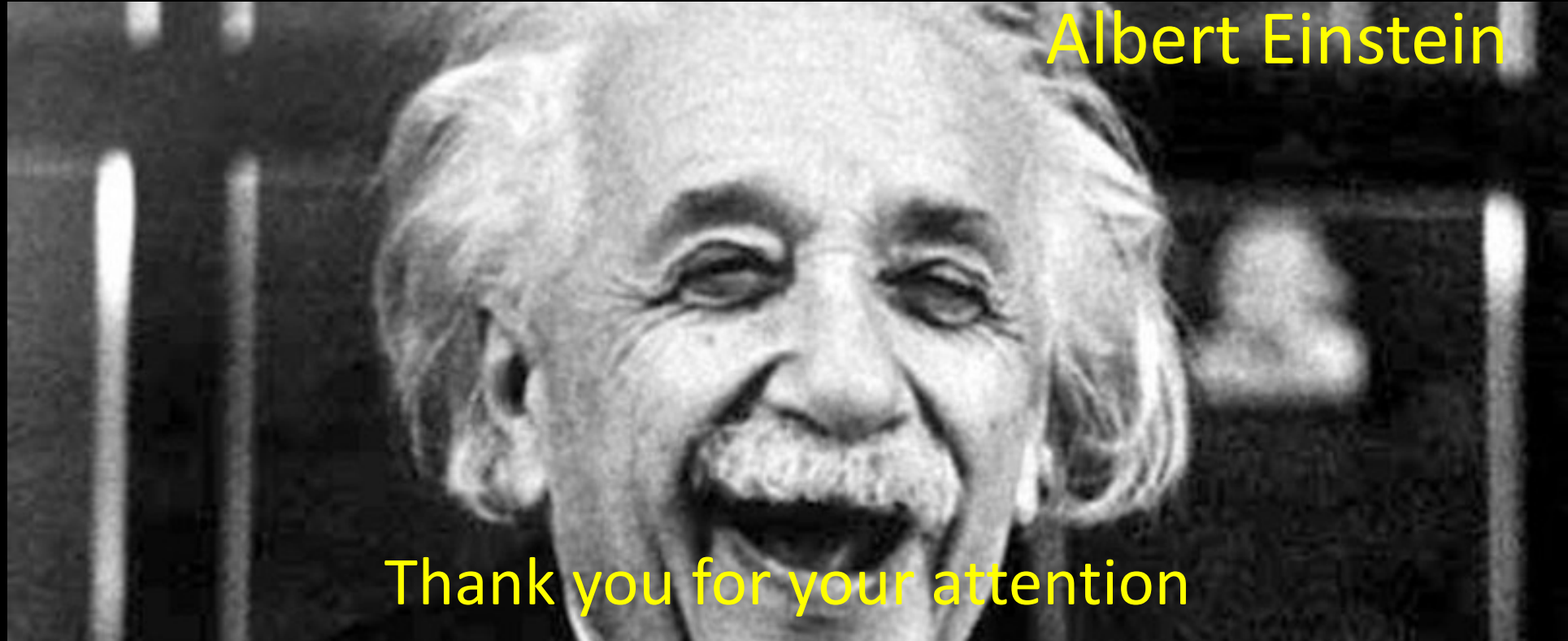
What is a blood clot-Summary

Is a vital part of our system that keeps the blood in the pipes

Lets NOT form a Thrombus-Treatment



The important thing is not to stop
questioning. Curiosity has its own reason for
existing



Albert Einstein

Thank you for your attention

Questions?

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