Anticoagulants

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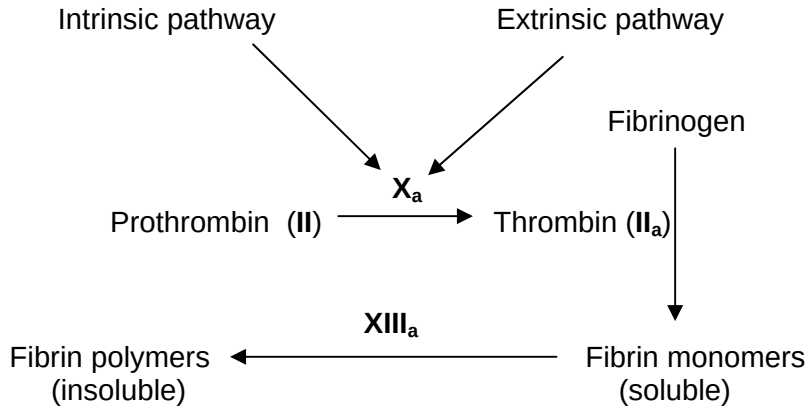
Fibrin Formation



Categories

	Heparin and LMW-heparins	Coumarins
Mechanism of action	Inhibit pre-formed activated clotting factors -- thrombin (**II_a**) and factor **X_a**	Inhibit the formation of activated clotting factors
Require the presence of	Antithrombin	--
Duration of action	Immediate	Delayed
Mode of delivery	Intravenous	Oral
Nature of molecule	Hydrophilic	Hydrophobic
Uses	Thrombosis, pulmonary embolism, disseminated intravascular coagulation, Atrial fibrillation, blood transfusions, extracorporeal circulation	Rodenticide, pulmonary embolism, prophylactic in prosthetic cardiac valves; atrial fibrillation
Examples	Heparin calcium; heparin sodium; ardeparin sodium; enoxaparin sodium	Warfarin; coumadin

Heparin and LMW-heparins

- √ linear polysaccharides; MW ~13,000 (heparin) and ~5,000 (LMW-heparin)
- √ alternating glucosamine and uronic acid residues
- √ highly sulfated and polyanionic polymers
- √ require the presence of antithrombin for anticoagulant action
- √ activate antithrombin, present in our plasma, to rapidly inhibit activated forms of II and factor X.
- √ key structural unit of both is a pentasaccharide sequence

Coumarins

- √ inhibit the vitamin K-dependent γ-carboxylation of pro-enzymes that prevents the formation of activated forms of clotting factors
- √ delayed onset of action (~48 h) and prolonged duration of action
- √ orally active
- √ marginally soluble in water

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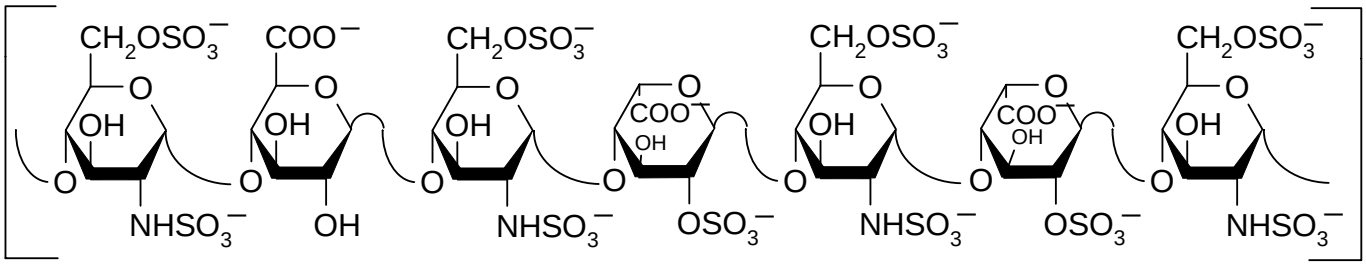
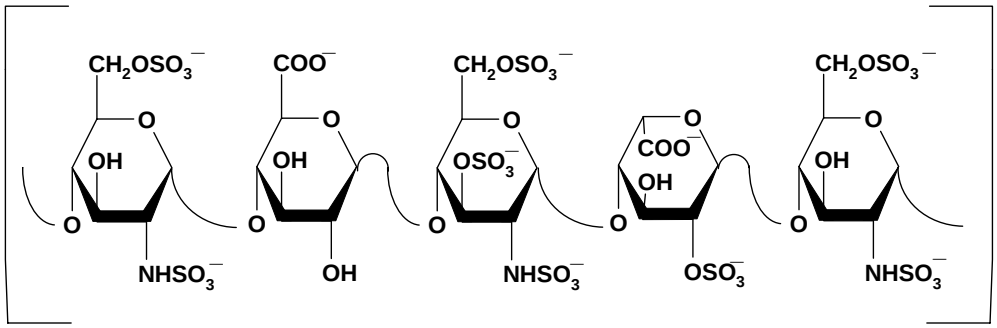
Structures

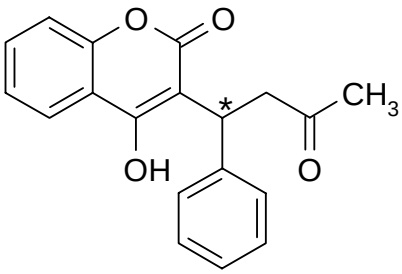


Heparin or LMW-heparin



Pentasaccharide sequence in heparin / LMW-heparin neccessary for activation of antithrombin

Warfarin



(*chiral center)

dicoumarol