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THE UNIVERSITY HOSPITAL

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Albert Einstein College of Medicine
OF YESHIVA UNIVERSITY

Anticoagulant and Anti-Platelet Medications

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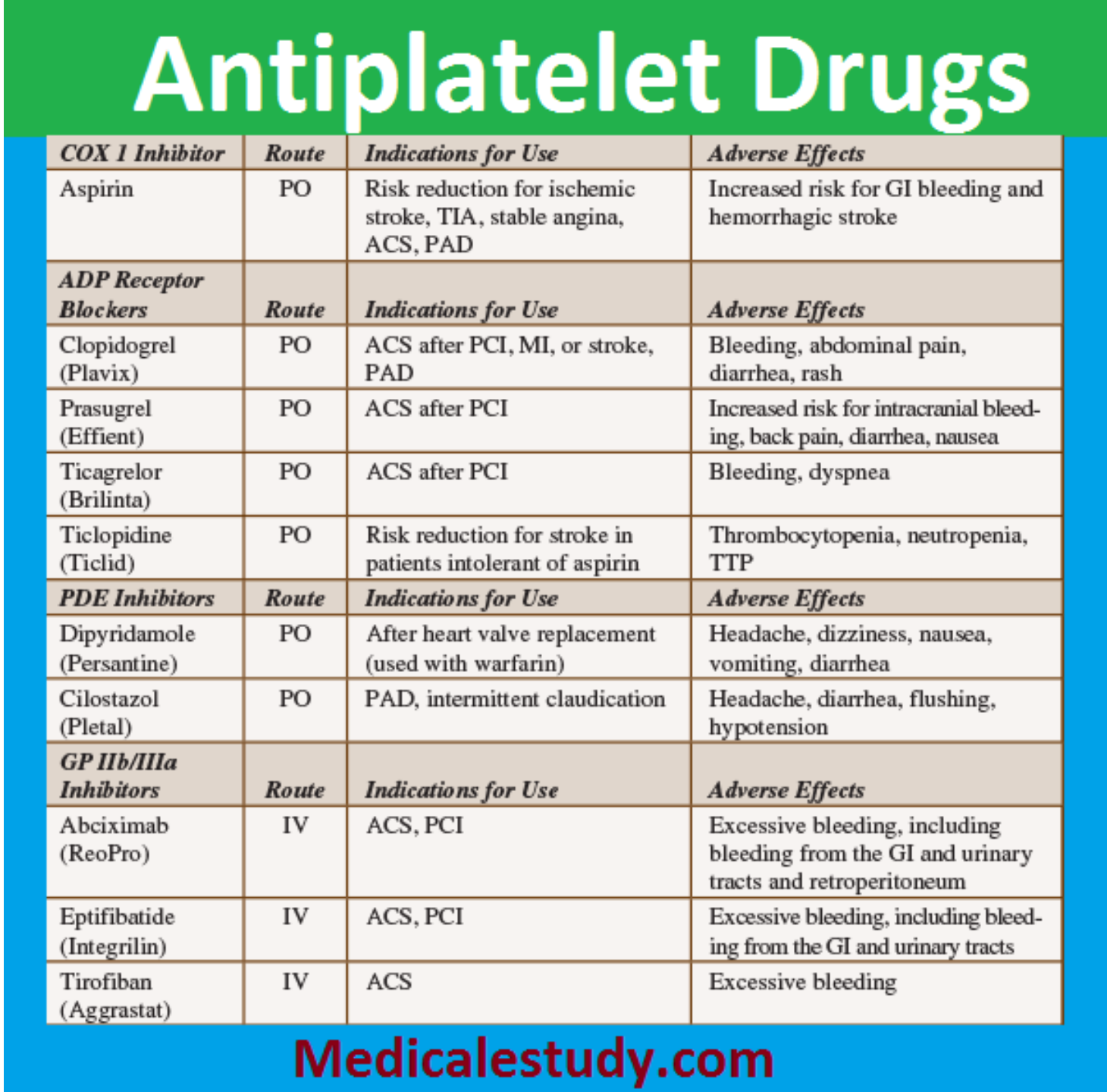
Disclosures

- Consultant
  - Boston Scientific
- PI
  - MOTION trial

Outline

- Antiplatelets
- Anticoagulants
- Intrinsic and Extrinsic Coagulation Pathways
- Mechanism of Action of Pharmacotherapy
- Other considerations

Antiplatelets



http://www.medicalestudy.com/pharma-antiplatelet-drugs-cheat-sheet/

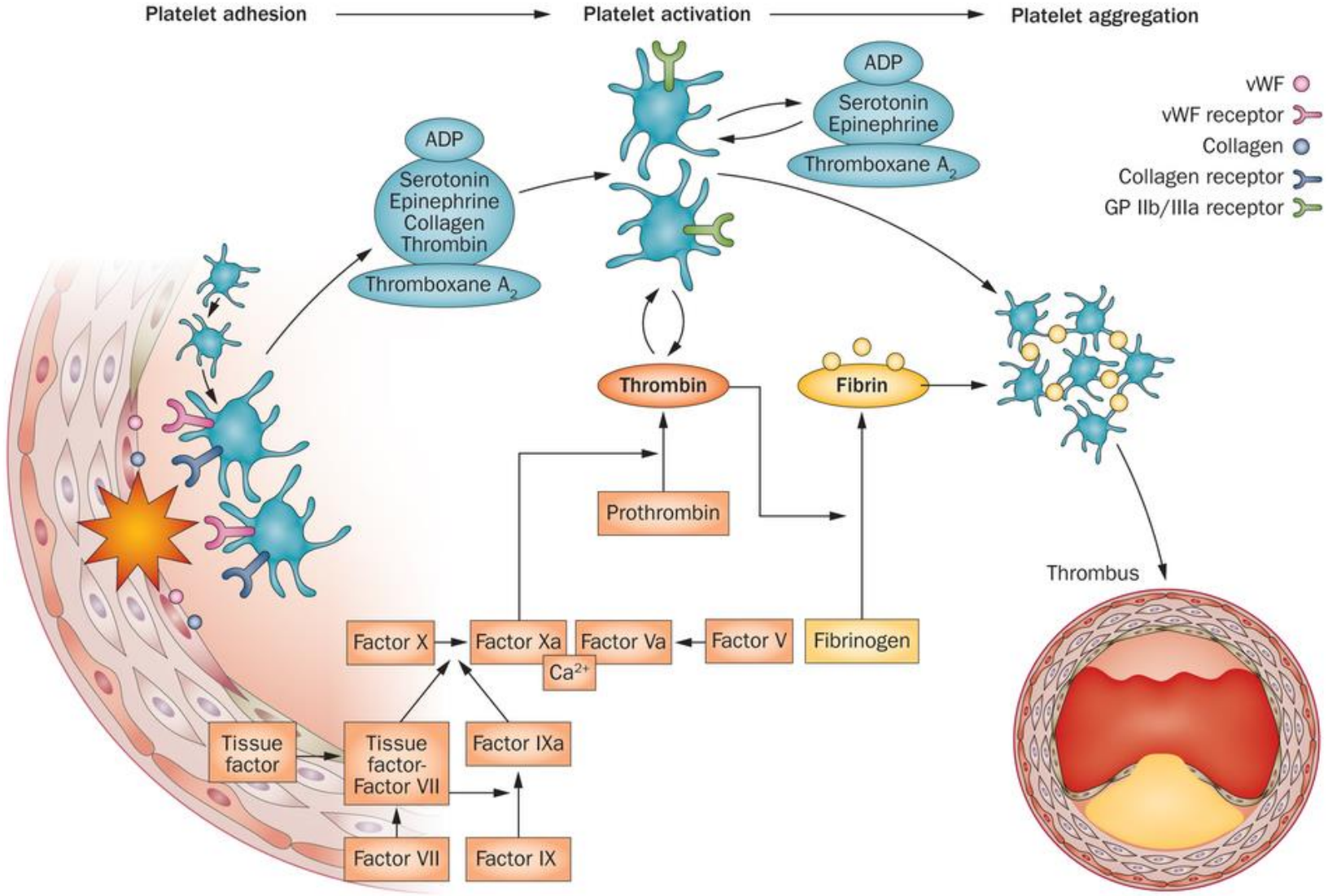
Anticoagulants

Anticoagulant Drugs Cheat Sheet

Vitamin K Antagonist	*Route*	*Indications for Use*	*Adverse Effects*
Warfarin (Coumadin)	PO	Prevention of venous thrombosis, PE, prevention of thrombosis in patients with prosthetic heart valves, and thrombosis in atrial fibrillation	Bleeding
Factor Xa and Thrombin Inhibitors	***Route***	***Indications for Use***	***Adverse Effects***
Heparin	IV, subcutaneously	PE, evolving stroke, DVT, adjunct to thrombolytic therapy in acute MI	Bleeding, HIT, thrombocytopenia
Low Molecular Weight Heparins			
Dalteparin (Fragmin)	subcutaneously	Prevention and treatment of DVT, PE	Bleeding
Enoxaparin (Lovenox)	subcutaneously	Prevention and treatment of DVT, PE	Bleeding
Tinzaparin (Innohep)	subcutaneously	Prevention and treatment of DVT, PE	Bleeding
Direct Thrombin Inhibitors	***Route***	***Indications for Use***	***Adverse Effects***
Argatroban (Acova)	IV	Treatment/prevention of thrombosis in patients with HIT	Bleeding
Bivalirudin (Angiomax)	IV	ACS, PCI	Bleeding, back pain, nausea
Lepirudin (Refludan)	IV	Treatment/prevention of thrombosis in patients with HIT	Bleeding
Desirudin (Iprivask)	subcutaneously	Prevention of DVT in patients undergoing hip replacement surgery	Bleeding
Dabigatran (Pradaxa)	PO	Atrial fibrillation (nonvalvular etiology)	GI bleed, abdominal pain, dyspepsia
Selective Factor Xa Inhibitors	***Route***	***Indications for Use***	***Adverse Effects***
Apixaban (Eliquis)	PO	Atrial fibrillation (non-valvular etiology	Bleeding
Fondaparinux (Arixtra)	subcutaneously	Acute DVT treatment (in conjunction with warfarin), DVT prophylaxis, acute PE	Bleeding, thrombocytopenia
Bivalirudin (Angiomax)	IV	ACS, PCI	Bleeding, back pain, nausea
Rivaroxaban (Xarelto)	PO	DVT prophylaxis, Atrial fibrillation	Bleeding

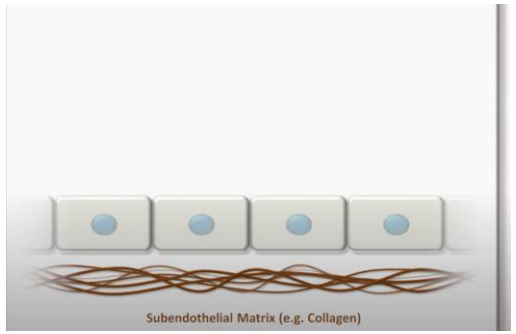
http://www.medicalestudy.com/anticoagulant-drugs-cheat-sheet/

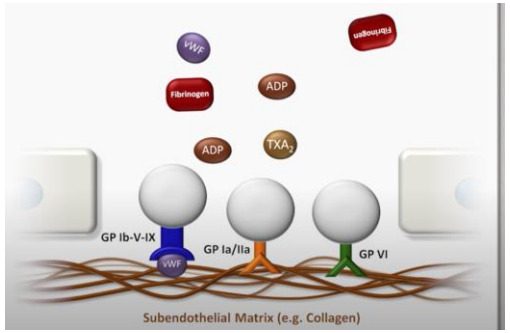
Thrombin and Platelet Thrombus Formation

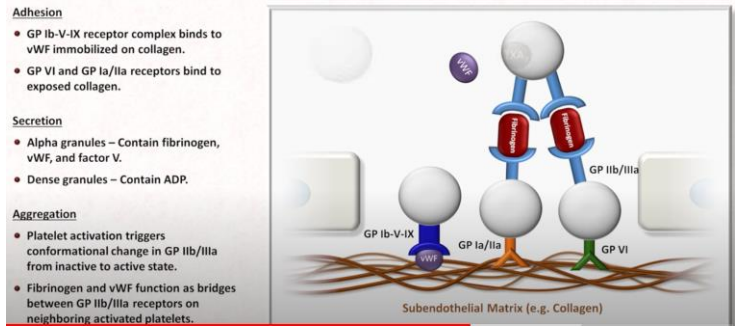


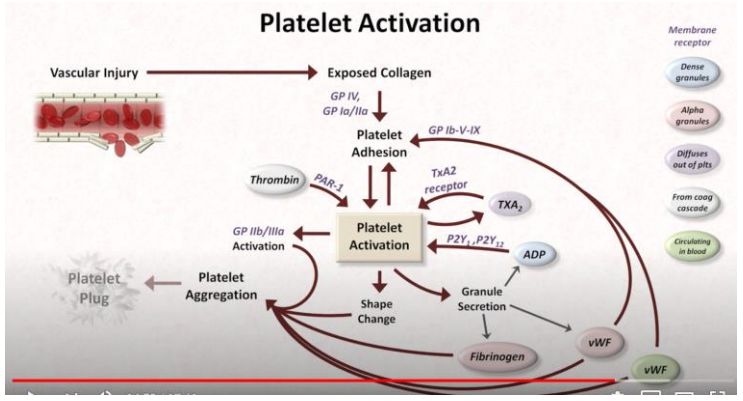
Franchi F, Rollini F, Park Y, Angiolillo DJ. Platelet thrombin receptor antagonism with vorapaxar: pharmacology and clinical trial development. *Future Cardiol*. 2015;11(5):547-564. doi:10.2217/fca.15.50

Antiplatelet Mechanism of Action

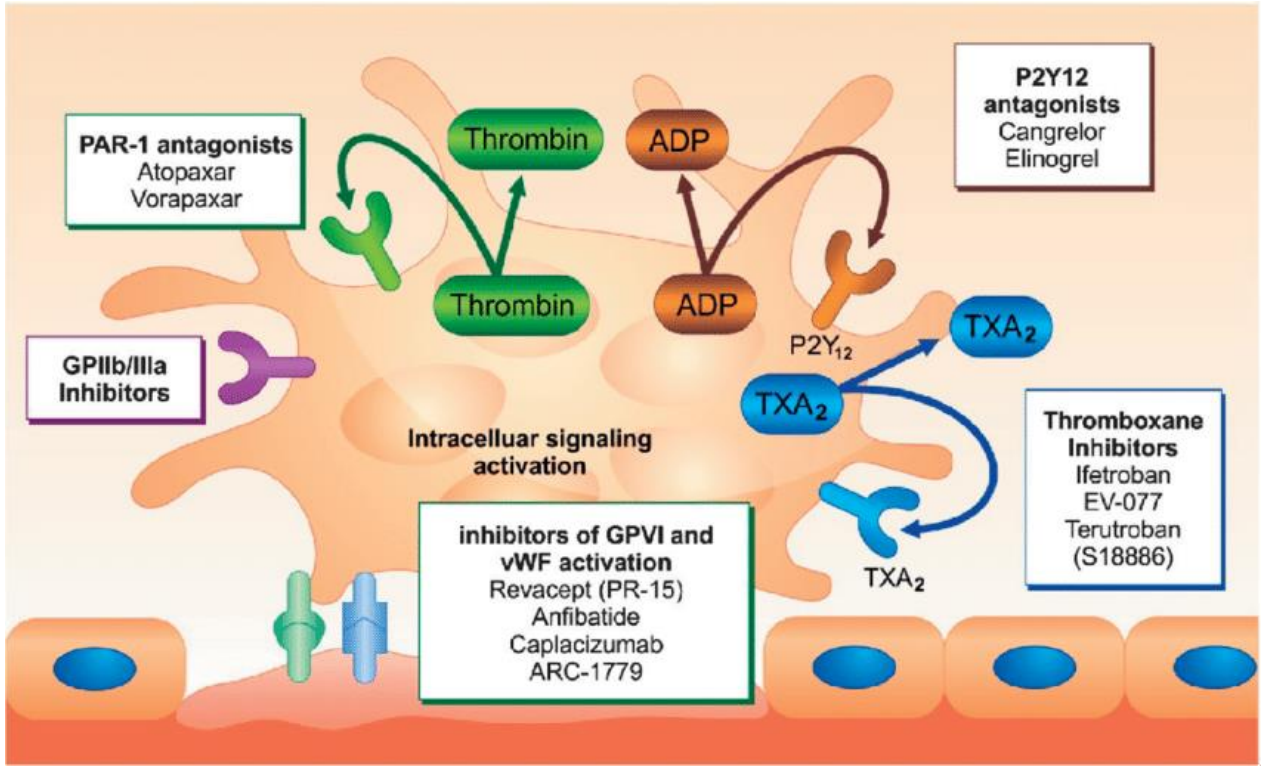






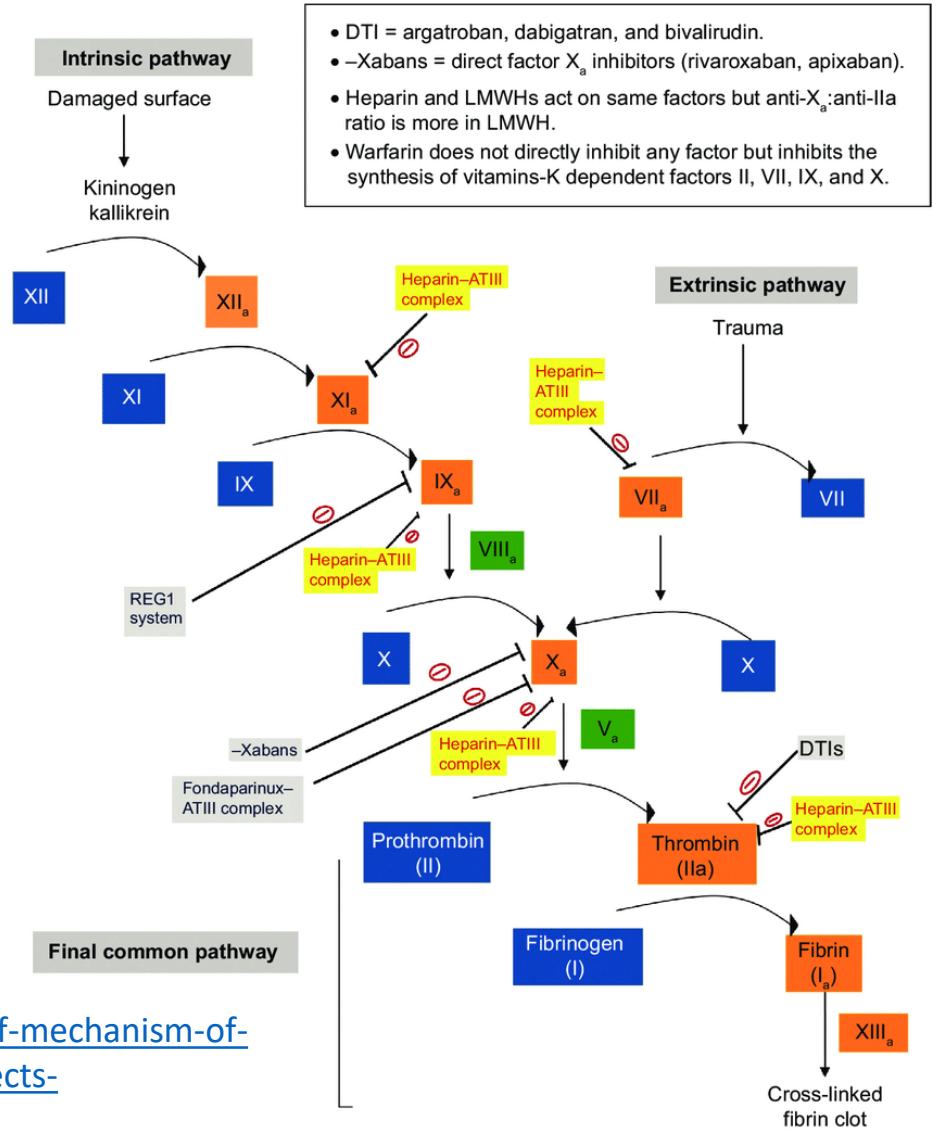


https://www.youtube.com/watch?v=ANXn3pUc9CA



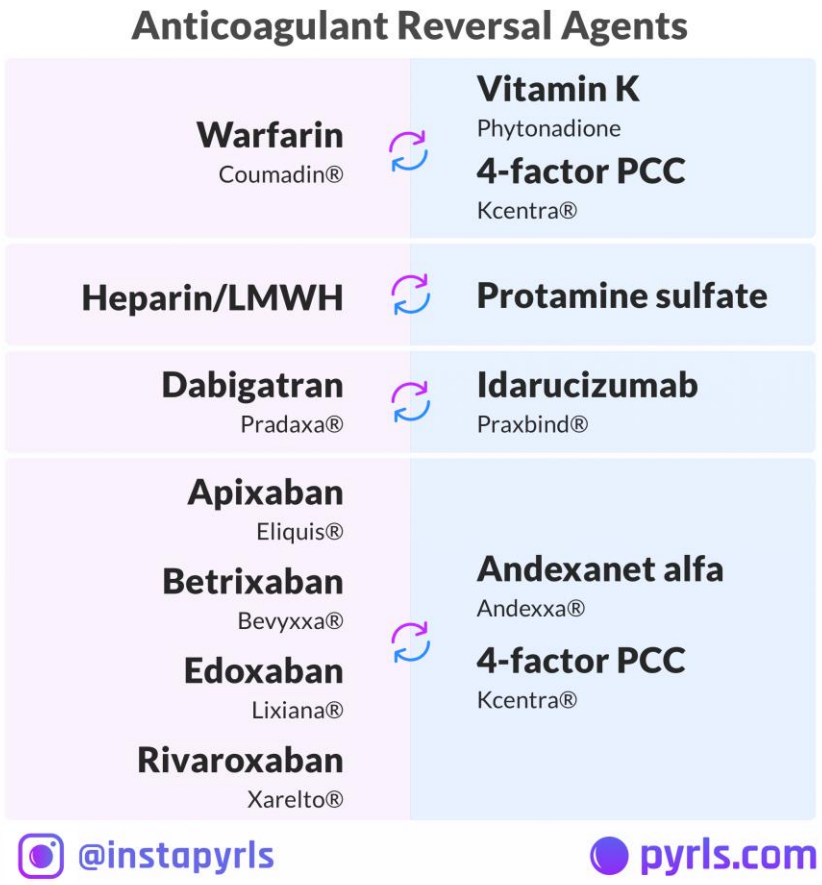
https://www.researchgate.net/figure/Schematic-overview-of-new-antiplatelet-drugs-in-clinical-development-which-inhibit_fig1_257599204

Anticoagulant Mechanism of Action



https://www.researchgate.net/figure/An-overview-of-mechanism-of-action-of-the-anticoagulant-drugs-showing-their-effects-on_fig2_267753112

Anticoagulant Reversal



https://www.grepmed.com/images/7778/anticoagulation-criticalcare-pharmacology-medications-cardiology-comparison-hematology

Other Considerations

- Garlic
- Don Quai
- Danshen
- Panax Ginseng
- Ginkgo Biloba
- Vit E
- Fish Oil

	Warfarin	Dabigatran	Rivaroxaban
Targets	Factors II, VII, IX and X Proteins C and S	Thrombin (inhibits)	Factor Xa (inhibits)
Effective half-life	20-60 h (mean ~40 h)	Adult 12-17 h; old people 14-17 h (assuming no renal impairment)	Young individual 5-9 h; Old people 11-13 h
Food and other effects on absorption	Food may delay rate	Acidic environment needed. Absorption may be reduced by drugs such as proton pump inhibitors and antacids	Food increases rate and extent of absorption by 25-35%
Need for routine monitoring of coagulation	Yes (PT/INR)	No	No
Antidote/reversal agent available	Yes (vitamin K)	No	No
Drug and food interactions: **increased** anticoagulation	**Antifungals**: miconazole, ketoconazole, fluconazole (lesser degree: itraconazole) **Antibiotics**: erythromycin, clarithromycin, (metronidazole possibly) azithromycin, tetracycline, doxycycline, cephalosporins, levofloxacin **Analgesics**: NSAIDs, (antiplatelet agents: aspirin, clopidogrel), ibuprofen, diclofenac, paracetamol (prolonged regular use) **Food/herbs**: cranberry juice, St John's wort, alcohol, many dietary supplements	**Antifungals**: ketoconazole, itraconazole **Antibiotics**: **erythromycin**, clarithromycin **Analgesics**: NSAIDs, (antiplatelet agents: aspirin, clopidogrel), ketorolac (**diclofenac** appears not to interact) **Food/herbs**: alfalfa, anise, bilberry	**Antifungals**: ketoconazole, itraconazole (miconazole if renal function impaired) **Analgesics**: NSAIDs, (antiplatelet agents: aspirin, clopidogrel) **Food/herbs**: grapefruit juice, alfalfa, anise, bilberry
Drug and food interactions: **decreased** anticoagulation	Green leafy vegetables (vitamin K), vitamin E	Dexamethasone Carbamazepine Rifampicin St John's wort	Phenytoin Rifampicin St John's wort

https://www.researchgate.net/figure/Data-comparing-warfarin-with-new-anticoagulant-drugs_tbl1_230644934

AC and Antiplatelet Recommendations for Pain Procedures

TABLE 8. Summary of Periprocedural Management of Anticoagulants and Antiplatelet Medications

Drug	When to Stop			When to Restart
	High-Risk Procedures	Intermediate-Risk Procedures	Low-Risk Procedures	
ASA and ASA combinations	Primary prophylaxis: 6 d Secondary prophylaxis: shared assessment and risk stratification	Shared assessment and risk stratification*†	No	24 h
NSAIDs	5 Half-lives	No‡	No	24 h
Diclofenac	1 d			
Ketorolac	1 d			
Ibuprofen	1 d			
Etodolac	2 d			
Indomethacin	2 d			
Naproxen	4 d			
Meloxicam	4 d			
Nabumetone	6 d			
Oxaprozin	10 d			
Piroxicam	10 d			
Phosphodiesterase inhibitors				
Cilostazol	2 d	No	No	24 h
Dipyridamole	2 d	No	No	
ASA combinations	Follow ASA recommendations	Shared assessment and risk stratification*		
Anticoagulants				
Coumadin	5 d, Normal INR	5 d, Normal INR	No Shared assessment and risk stratification*	6 h
Acenocoumarol	3 d, Normal INR	3 d, Normal INR	No Shared assessment and risk stratification*	24 h
IV heparin	6 h	6 h	6 h	2 h§
Subcutaneous heparin, BID & TID	24 h	6 h	6 h	2 h (Low-risk procedures) 6–8 h (Intermediate- and high-risk procedures)
LMWH				
Enoxaparin (prophylactic)	12 h	12 h	12 h	4 h (Low risk) 12–24 h (Intermediate-/high-risk procedures)
Enoxaparin (therapeutic)	24 h	24 h	24 h	4 h (Low-risk procedures) 12–24 h (Intermediate-/high-risk procedures)
Dalteparin	24 h	24 h	24 h	4 h (Low-risk procedures) 12–24 h (Intermediate-/high-risk procedures)
Fibrinolytic agents	48 h	48 h	48 h	NA‖

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Interventional Spine and Pain Procedures

https://rapm.bmj.com/content/rapm/43/3/225.full.pdf

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END

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