

Anticoagulant pharmacokinetics and effects on coagulation markers

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Anticoagulant pharmacokinetics^{1,2,3}

Agent	Warfarin	Dabigatran	Rivaroxaban	Apixaban	Edoxaban
Target(s)	IIa (thrombin), VIIa, IX, Xa	IIa (thrombin)	Xa	Xa	Xa
Prodrug	No	Yes	No	No	No
Bioavailability (%)	100	7	80	60	62
Food effect	Yes (vitamin K-containing foods reduces effect)	No	Yes (66% bioavailability without food, 99% with)	No	No
Peak effect	4-5 days	1-3 h	2-4 h	1-2 h	1-2 h
Half-life	40 h	14-17 h	7-11 h	8-14 h	5-11 h
Renal excretion (%)	None	80	33	25	35
Dialyzable	No	Yes	No	No	No
Drug interactions	Many	P-glycoprotein (P-gp)	CYP3A4, P-gp	CYP3A4, P-gp	P-gp
Specific antidote	Vitamin K	Idarucizumab	None (Use PCC if bleeding)	None (Use PCC if bleeding)	None (Use PCC if bleeding)
Best laboratory monitoring	PT/INR	Dilute thrombin time (dTT)	Anti-Xa	Anti-Xa	Anti-Xa

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Effects of DOACs on coagulation markers^{3,4}

Test*	Dabigatran	Rivaroxaban	Apixaban	Edoxaban
*DOAC drug levels are based on dTT (dabigatran) or anti-Xa (apixaban, rivaroxaban, edoxaban).				
*Drug levels are available only at select centers (at OHSU, request levels be sent to University of Washington anticoag lab)				
Therapeutic peak level	64-443 (ng/mL)	184-343 (ng/mL)	69-321 (ng/mL)	91-321 (ng/mL)
Therapeutic trough level	32-225 (ng/mL)	12-137 (ng/mL)	34-230 (ng/mL)	31-230 (ng/mL)
aPTT	↑↑	↑	↑	↑
PT	↑	↑ Normal PT may not exclude clinically relevant levels	Minimal effect	↑ Normal PT may not exclude clinically relevant levels
Diluted TT	↑↑↑ Normal TT rules out clinically relevant levels	No effect	No effect	No effect
ECT	↑↑	No effect	No effect	No effect
Anti-Xa	No effect	↑↑ Normal anti-Xa activity likely excludes clinically relevant drug levels	↑↑ Normal anti-Xa activity likely excludes clinically relevant drug levels	↑↑ Normal anti-Xa activity likely excludes clinically relevant drug levels

 = Best available test

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*These tests are NOT meant to be used for routine monitoring of DOACs

References

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3. [Shih AW, Crowther MA. Reversal of direct oral anticoagulants: a practical approach. Hematology Am Soc Hematol Educ Program. 2016;2016\(1\):612-619.](#)
4. [Steffel J, Verhamme P, Potpara TS, et al. The 2018 European Heart Rhythm Association Practical Guide on the use of non-vitamin K antagonist oral anticoagulants in patients with atrial fibrillation. Eur Heart J. 2018](#)

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