



Algoritmi terapeutici 2026: terapia anticoagulante

**(nuovi) Anticoagulanti per la terapia del
TromboEmbolismo
(nelle neoplasie ematologiche)**

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ISSUES ▾

CME ↗

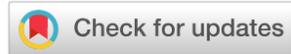
ABOUT ▾



DECODING THE ENIGMA: CHALLENGES IN CLASSICAL HEMATOLOGY CONSULTATIONS | DECEMBER 5, 2025

Anticoagulation in malignancy: the patient who bleeds and clots simultaneously

Sargam Kapoor, Andrew M. Peseski, Thomas L. Ortel



Hematology Am Soc Hematol Educ Program (2025) 2025 (1): 176–182.

<https://doi.org/10.1182/hematology.2025000703>



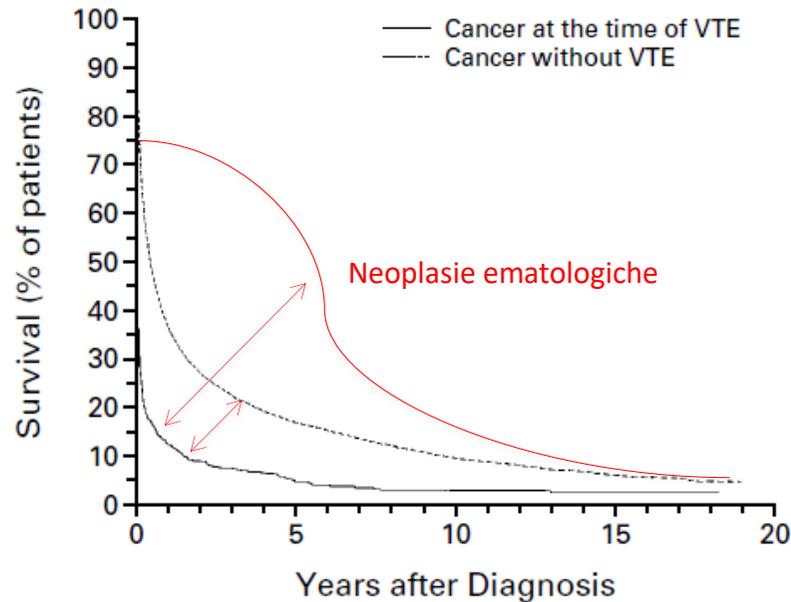
- 1. Rilevanza del TEV in (onco)-ematologia**
- 2. Attuali e nuove terapie**



Tumore come (non unica) causa di morte nel paziente oncologico

Circa il 25% del TEV oggi diagnosticato in Italia è correlato a neoplasie

Esso incide sulla sopravvivenza del paziente oncologico



No. AT RISK				
Cancer at the time of VTE	668	23	10	3
Cancer without VTE	6668	913	338	87



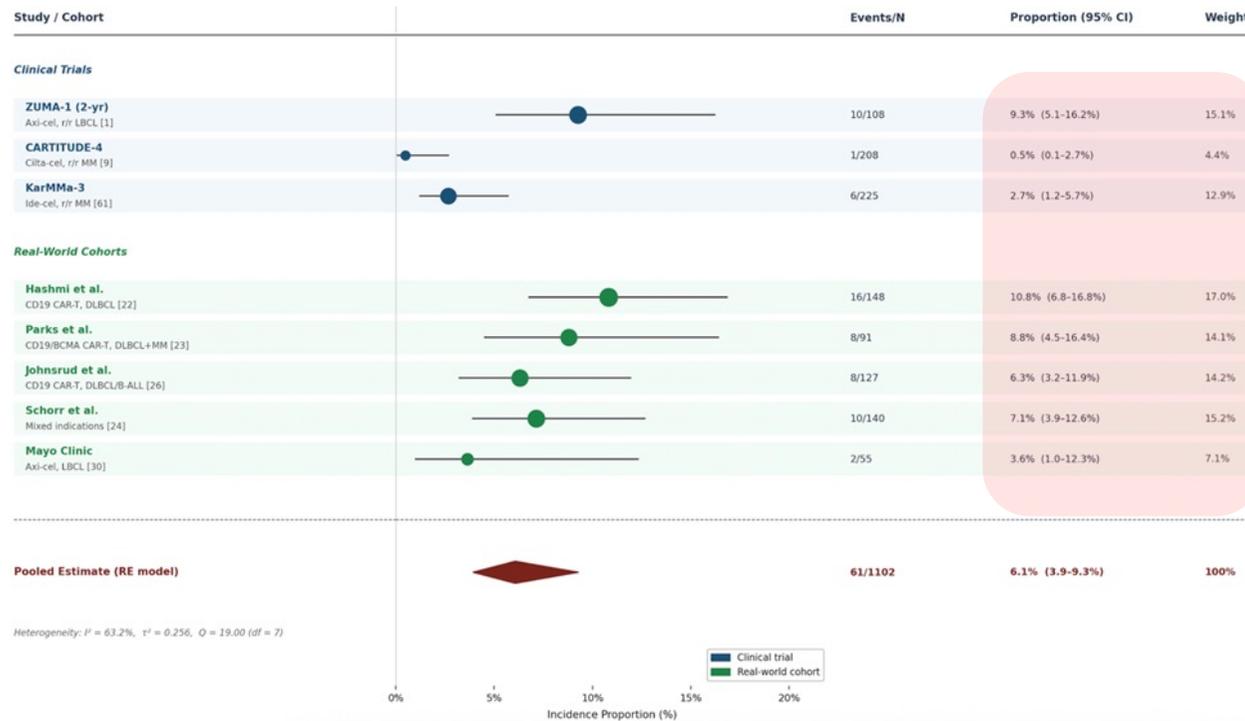
Q1. Secondo voi il rischio tromboembolico è sottostimato tra gli oncologi/ematologi?



L'incidenza del tromboembolismo venoso (TEV) nelle neoplasie ematologiche è significativamente più alta rispetto alla popolazione generale, con alcuni studi che riportano un rischio fino a 4 volte superiore o addirittura fino a 7 volte superiore nei pazienti sottoposti a chemioterapia. I **linfomi** (Hodgkin e non-Hodgkin) hanno un'incidenza del TEV di circa il **10%**. I pazienti con **mieloma multiplo**, specialmente se trattati con polichemioterapia che include talidomide e steroidi ad alto dosaggio, hanno un rischio elevato, stimato intorno al **28%**. Le **LA** incidenza pari al **4-11%**

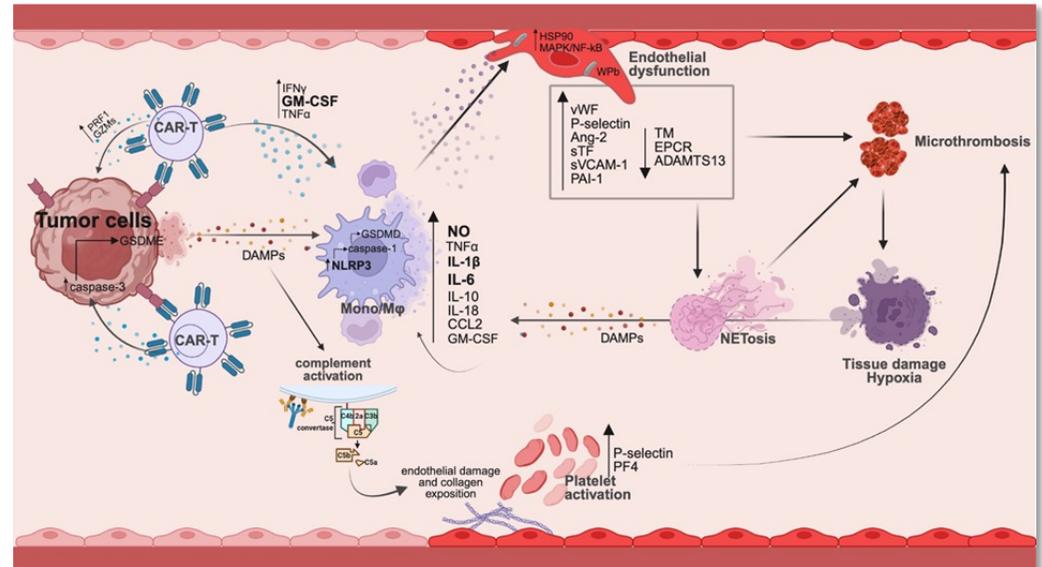
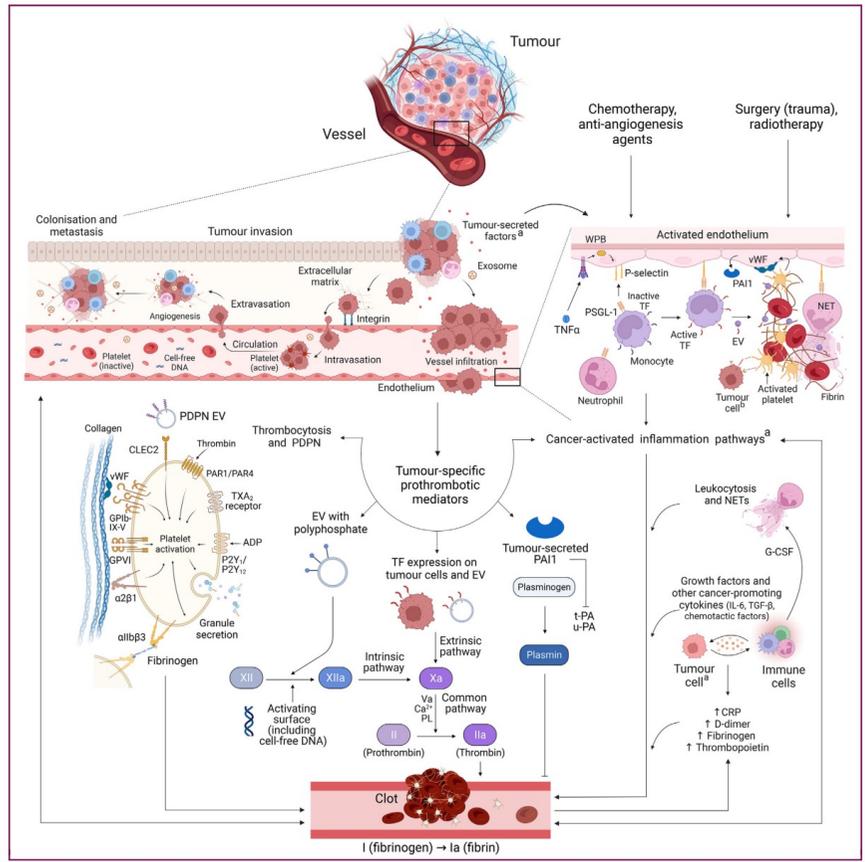


Thrombotic events in pivotal/registrative CAR-T clinical trials and real life cohorts



⇒ 7%

(nuova) Fisiologia della trombosi nel cancro





1. Rilevanza del TEV in (onco)-ematologia

2. Attuali e nuove terapie



National
Comprehensive
Cancer
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NCCN Guidelines Version 1.2025 Cancer-Associated Venous Thromboembolic Disease

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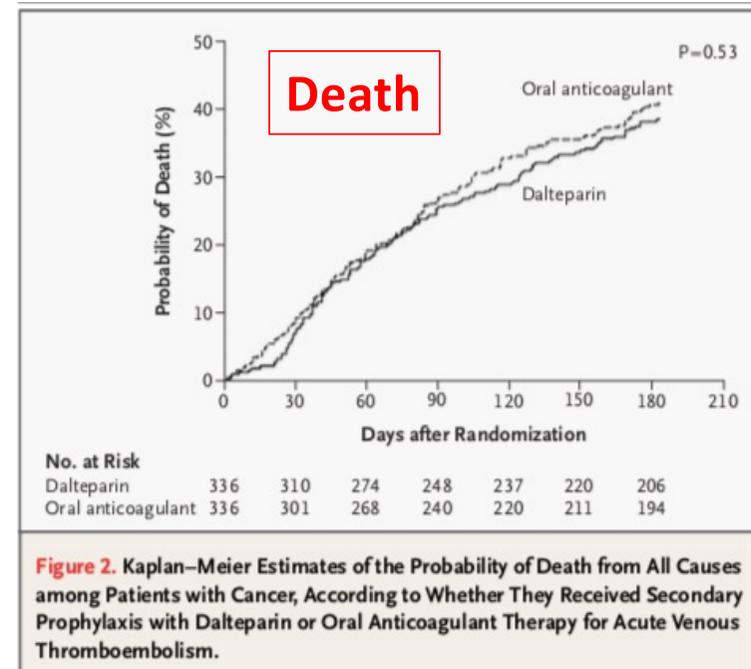
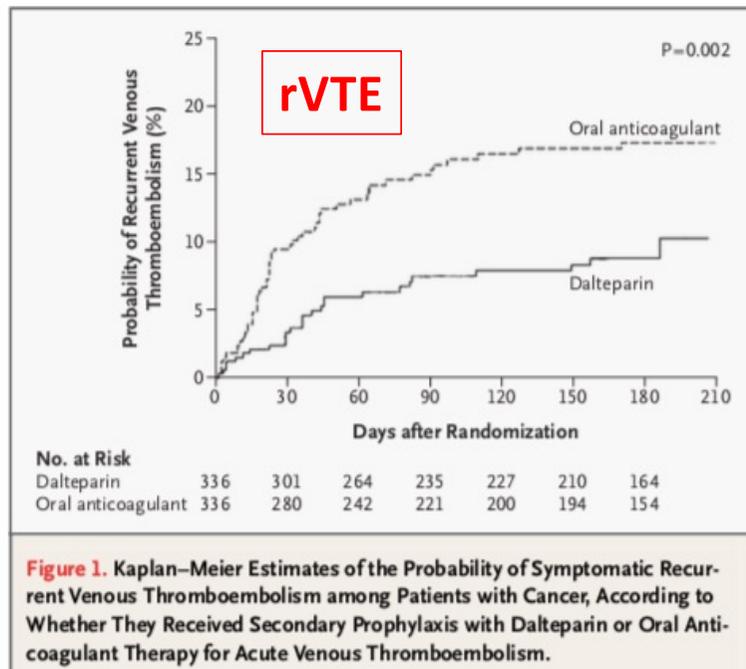
THERAPEUTIC ANTICOAGULATION FOR VTE (CONTINUED)[§]

Agent(s)	Contraindications and Warnings	
LMWH: Dalteparin and enoxaparin Tinzaparina	<ul style="list-style-type: none"> • Use with caution in patients with renal dysfunction. Consider dose adjustments or alternative therapy for patients with severe renal dysfunction (CrCl <30 mL/min).^l • Follow package insert for renal dysfunction dosing. • Anti-Xa monitoring (peak and trough) of LMWH has been recommended for patients with severe renal dysfunction, although limited data are available to support the clinical relevance of anti-Xa levels. • Absolute contraindication: recent/acute HIT • Relative contraindication: past history of HIT • Pork product allergy 	
Fondaparinux	<ul style="list-style-type: none"> • Contraindicated in patients with CrCl <30 mL/min • Use with caution in patients with moderate renal insufficiency (CrCl 30–50 mL/min), weight <50 kg, or age >75 y 	
UFH	<ul style="list-style-type: none"> • Absolute contraindication: recent/acute HIT • Relative contraindication: past history of HIT 	
Warfarin	<p>Relative contraindications:</p> <ul style="list-style-type: none"> • Concomitant inhibitors and inducers of CYP2C9, 1A2, or 3A4 	
DOACs: Apixaban, dabigatran, edoxaban, and rivaroxaban	<p>Contraindications:</p> <ul style="list-style-type: none"> • Antiphospholipid syndrome (APS)^k • Pregnancy or breastfeeding • Stage IV/V chronic kidney disease: <ul style="list-style-type: none"> ▸ Apixaban^l: CrCl <30 mL/min⁴ ▸ Dabigatran, edoxaban,²⁶ rivaroxaban¹²: CrCl <30 mL/min • Active/clinically significant liver disease: <ul style="list-style-type: none"> ▸ Apixaban⁶: Child-Pugh Class B or C or alanine aminotransferase (ALT)/aspartate aminotransferase (AST) >3x upper limit of normal (ULN); total bilirubin >2x ULN ▸ Rivaroxaban¹²: Child-Pugh class B or C or ALT/AST >3x ULN ▸ Dabigatran^{19,27-29}: Child-Pugh class C or ALT/AST >2x ULN or active/acute hepatitis or cirrhosis ▸ Edoxaban⁸: Child-Pugh class B or C or AST/ALT >3x ULN and bilirubin >2x ULN, cirrhosis, or active hepatitis ▸ Strong dual inhibitors/inducers of CYP3A4 and P-gp: see prescribing information for rivaroxaban and apixaban • Inducers/inhibitors of P-gp: see prescribing information for dabigatran and edoxaban 	<p>Relative contraindications, use with caution:</p> <ul style="list-style-type: none"> • DOACs have been associated with an increased risk of GI and possibly genitourinary tract bleeding, and should be used with caution in patients with genitourinary or GI tract lesions, pathology, or instrumentation. • Use with caution in patients with compromised renal or liver function. • For patients receiving nephrotoxic or hepatotoxic chemotherapy, consider monitoring patients more closely with laboratory testing. • Consider drug-drug interactions.



LMWH > VKA in the treatment of cancer-associated VTE

LMWH 100 UI/Kg/12h per il primo mese -> dose al 75%

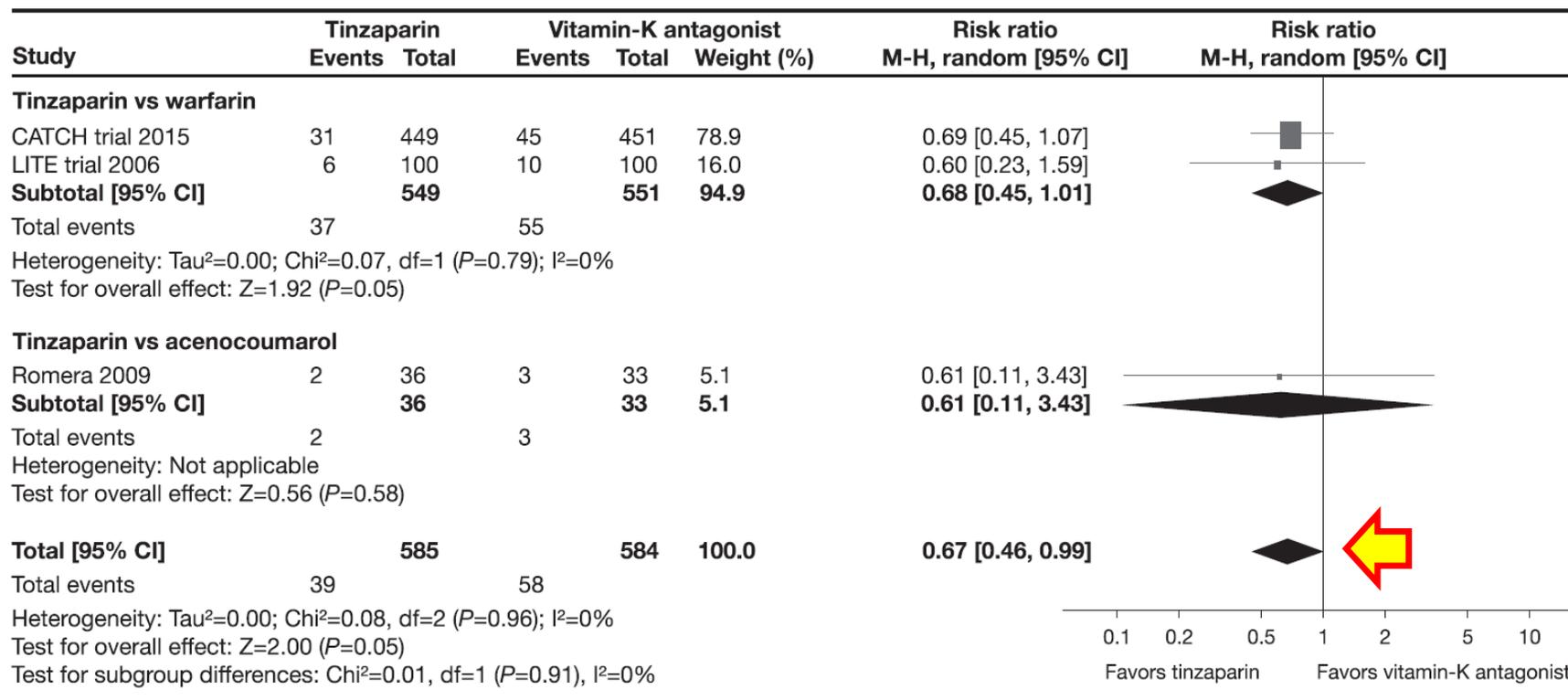




**Q2. Le EBPM sono tutte uguali
(soprattutto nel paziente oncologico)?**



Review Sistematica e meta-analisi: Tinzaparina nella CAT



Martinez-Zapata MJ et al. Clin Appl Thromb Hemost 2018;24:226-234; Lee AY et al. JAMA2015;314:677-86; Hull RD et al. Am J Med 2006;119:1062-72; Romera A et al. Eur J Vasc Endovasc Surg 2009;37:349-56;

Renal clearance among anticoagulants

Table 1. Comparison of the characteristics of the major anticoagulant classes.

	Vitamin K Antagonists	Low Molecular Weight Heparins	Direct Oral Anticoagulants
Route of intake	Oral	Subcutaneous injection	Oral
Problems with oral intake in cancer	Yes	No	Yes
Problems with absorption in cancer	Yes	No	Yes
Renal clearance	No	Yes (except tinzaparin)	Yes
Food interactions	Yes	No	Yes
Influence of fasted/fed status	No	No	Yes *
Pharmacokinetic drug–drug interactions	Yes, with chemotherapeutics	No	Yes
Need to monitor	Yes	Not routine	No

* Rivaroxaban should be taken with food. Prolonged fasting in patients on DOAC treatment may affect drug absorption leading to ineffective therapy [60].



Q3. Secondo voi questi farmaci (VKA, LMWH & DOACs) sono interscambiabili nella pratica clinica? Abbiamo bisogno di «personalizzare» la terapia anticoagulante?



Direct Oral Anticoagulants (DOACs) and Cancer

Table 1. Recurrent VTE and major bleeding event rates in cancer patients enrolled in the RECOVER, EINSTEIN-DVT, EINSTEIN-PE, AMPLIFY, and Hokusai trials³³⁻³⁶

	VTE or VTE death, patients, n/N (%)		Major bleed, patients, n/N (%)	
RECOVER				
Cancer status*	Dabigatran	Control	Dabigatran	Control
No cancer	58/2380 (2.4)	50/2392 (2.1)	18/2297 (0.8)	33/2310 (1.4)
Active cancer	10/173 (5.8)	12/162 (7.4)	6/159 (3.8)	7/152 (4.6)
EINSTEIN				
Cancer status†	Rivaroxaban	Control	Rivaroxaban	Control
No cancer				58/3832 (1.5)
Cancer at entry				8/196 (4.1)
Cancer diagnosis				6/82 (7.3)
AMPLIFY				
Cancer status‡				Control
No cancer				45/2609 (1.7)
Active cancer				4/80 (5.0)
Hokusai				
Cancer status§				Control
No cancer	103/3658 (2.8)	99/3629 (2.7)	39/3658 (1.1)	48/3629 (1.3)
History of cancer	10/269 (3.7)	21/294 (7.1)	5/269 (1.9)	10/294 (3.4)
Active cancer	4/109 (3.7)	7/99 (7.1)	5/109 (4.6)	3/99 (3.0)

Studi con i DOACs: pochi pazienti oncologici, pochissimi oncoematologici

*Active cancer defined as having metastatic disease, recurrent cancer, or having been diagnosed or received treatment for cancer within 5 years prior to study enrollment.

†Active cancer was not defined.

‡Active cancer defined as having metastatic disease, recurrent cancer, or having been diagnosed or received treatment for cancer within 6 months prior to study enrollment.

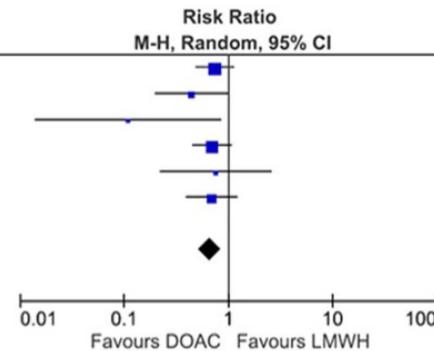
§Active Cancer was defined according to the discretion of the local investigator.



DOACs vs LMWH for the treatment of CAT (systematic review and meta-analysis of randomized controlled trials)

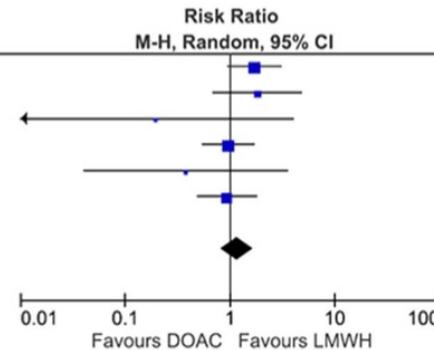
A. Recurrent venous thromboembolism

Study or Subgroup	DOAC		LMWH		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
HOKUSAI-VTE CANCER	34	522	46	524	33.5%	0.74 [0.48, 1.14]
SELECT-D	8	203	18	203	9.3%	0.44 [0.20, 1.00]
ADAM-VTE	1	145	9	142	1.4%	0.11 [0.01, 0.85]
CARAVAGGIO	32	576	46	579	32.0%	0.70 [0.45, 1.08]
CASTA-DIVA	4	74	6	84	4.1%	0.76 [0.22, 2.58]
CANVAS	20	330	27	308	19.6%	0.69 [0.40, 1.21]
Total (95% CI)		1850		1840	100.0%	0.67 [0.52, 0.85]
Total events	99		152			
Heterogeneity: Tau ² = 0.00; Chi ² = 4.36, df = 5 (P = 0.50); I ² = 0%						
Test for overall effect: Z = 3.22 (P = 0.001)						



B. Major bleeding

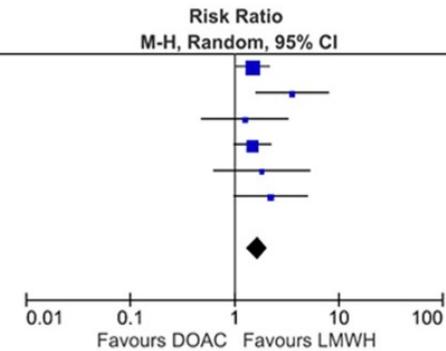
Study or Subgroup	DOAC		LMWH		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
HOKUSAI-VTE CANCER	29	522	17	524	29.2%	1.71 [0.95, 3.08]
SELECT-D	11	203	6	203	12.2%	1.83 [0.69, 4.86]
ADAM-VTE	0	145	2	142	1.4%	0.20 [0.01, 4.04]
CARAVAGGIO	22	576	23	579	30.3%	0.96 [0.54, 1.71]
CASTA-DIVA	1	74	3	84	2.5%	0.38 [0.04, 3.56]
CANVAS	17	330	17	308	24.5%	0.93 [0.49, 1.80]
Total (95% CI)		1850		1840	100.0%	1.17 [0.82, 1.67]
Total events	80		68			
Heterogeneity: Tau ² = 0.02; Chi ² = 5.66, df = 5 (P = 0.34); I ² = 12%						
Test for overall effect: Z = 0.85 (P = 0.39)						





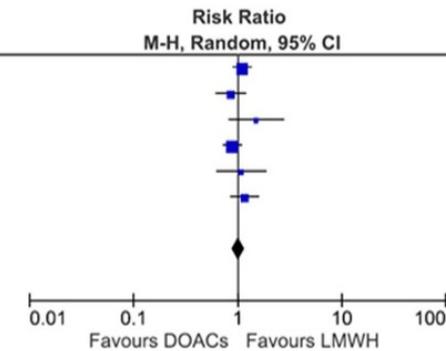
C. Clinically relevant non major bleeding

Study or Subgroup	DOAC		LMWH		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
HOKUSAI-VTE CANCER	64	522	43	524	40.6%	1.49 [1.04, 2.16]
SELECT-D	25	203	7	203	8.2%	3.57 [1.58, 8.07]
ADAM-VTE	9	145	7	142	5.9%	1.26 [0.48, 3.29]
CARAVAGGIO	52	576	35	579	32.1%	1.49 [0.99, 2.26]
CASTA-DIVA	8	74	5	84	4.8%	1.82 [0.62, 5.31]
CANVAS	19	330	8	308	8.3%	2.22 [0.98, 4.99]
Total (95% CI)		1850		1840	100.0%	1.66 [1.31, 2.09]
Total events	177		105			
Heterogeneity: Tau ² = 0.00; Chi ² = 4.82, df = 5 (P = 0.44); I ² = 0%						
Test for overall effect: Z = 4.23 (P < 0.0001)						



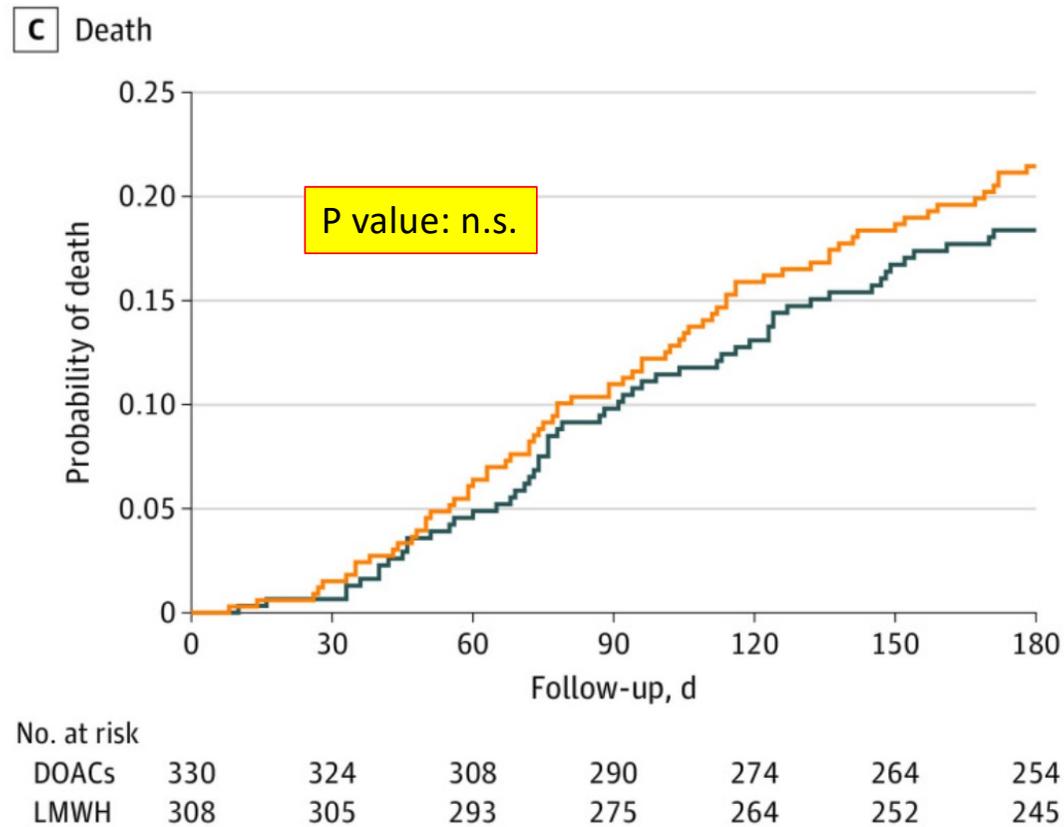
D. Overall Mortality

Study or Subgroup	DOAC		LMWH		Weight	Risk Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
HOKUSAI-VTE CANCER	140	522	127	524	29.9%	1.11 [0.90, 1.36]
SELECT-D	48	203	56	203	13.6%	0.86 [0.61, 1.20]
ADAM-VTE	23	145	15	142	4.4%	1.50 [0.82, 2.76]
CARAVAGGIO	135	576	153	579	31.4%	0.89 [0.73, 1.08]
CASTA-DIVA	19	74	20	84	5.5%	1.08 [0.63, 1.86]
CANVAS	71	330	57	308	15.3%	1.16 [0.85, 1.59]
Total (95% CI)		1850		1840	100.0%	1.02 [0.89, 1.16]
Total events	436		428			
Heterogeneity: Tau ² = 0.00; Chi ² = 5.76, df = 5 (P = 0.33); I ² = 13%						
Test for overall effect: Z = 0.25 (P = 0.80)						





Overall Survival: DOACs vs LMWH





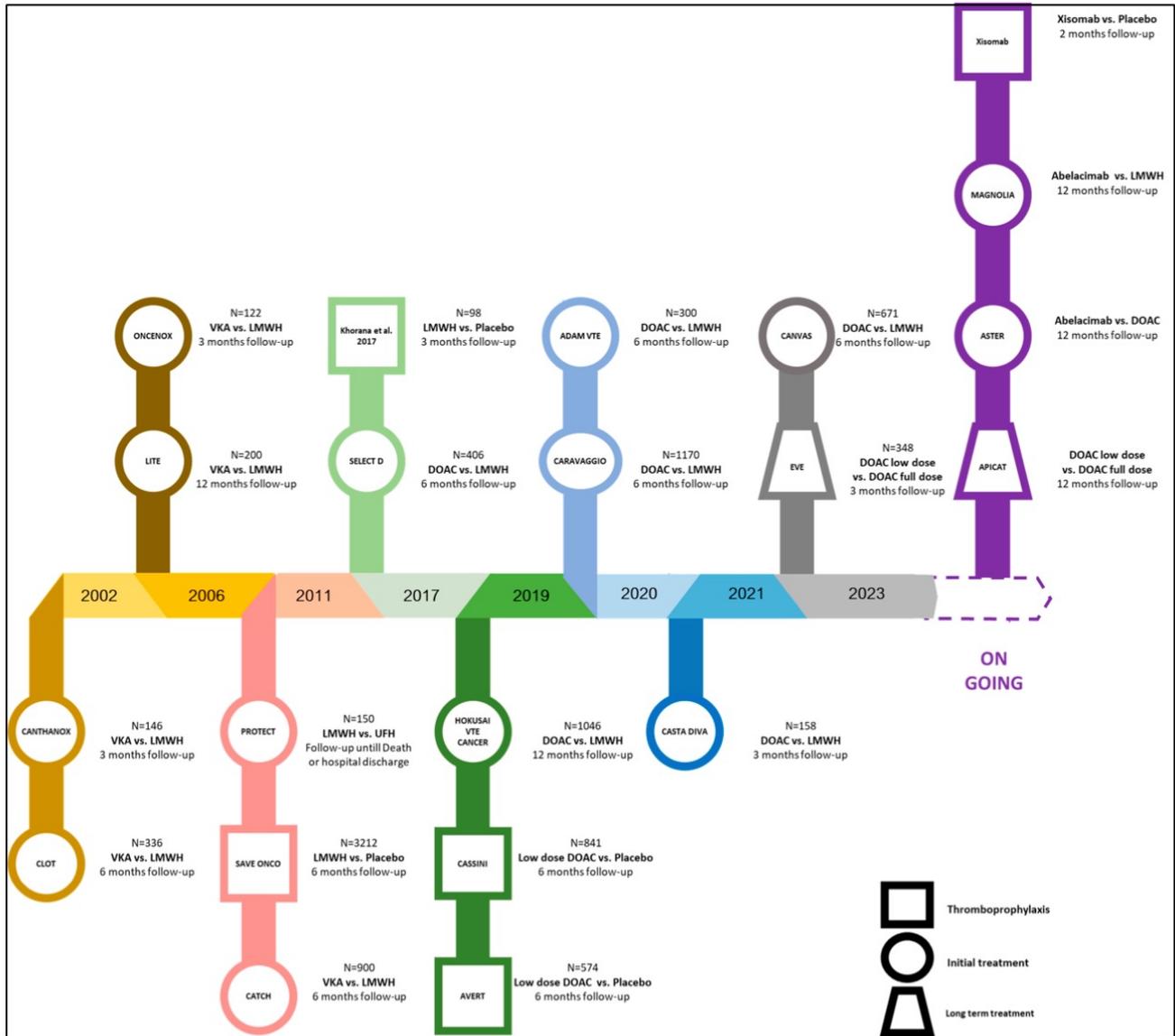
Q: Better LMWH or DOACs?

A: Almost the same!

**LMWH better in high risk patients
(i.e. thrombocytopenic patients)**



I Nuovi Anticoagulanti

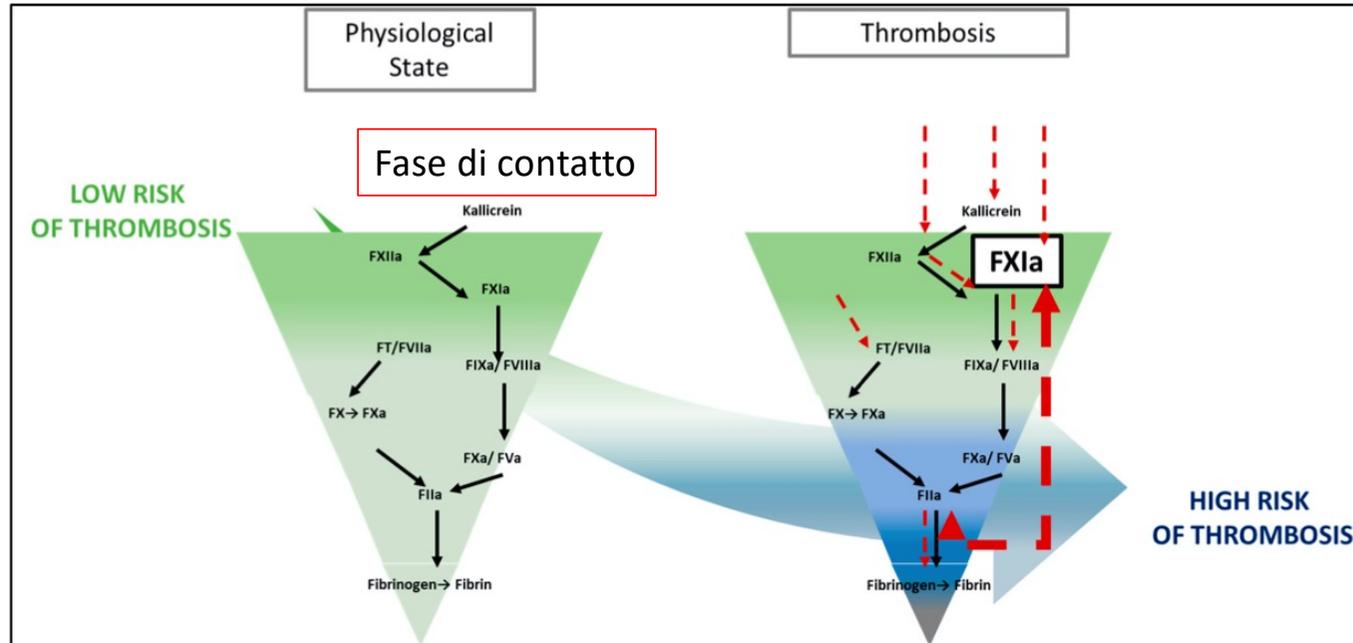


Il viaggio della terapia anticoagulante nella CAT



FXI and FXII inhibitors

1. Oligonucleotidi antisenso (anti-sense oligonucleotides, ASOs): riducono la sintesi epatica di FXI (IONIS-FXIIrx e fesomersen).
2. Anticorpi monoclonali (monoclonal antibodies, mAbs): si legano al FXI o FXII bloccandone l'attivazione o l'attività (osocimab, **abelacimab**, xisomab 3G3 e MK-2060)
3. Piccole molecole: legano reversibilmente il FXII bloccandone l'attività (milvexian, asundexian ed EP-7041)



Nei pazienti oncologici, il tumore attiva il FXI (normalmente poco attico nelle trombosi non neoplastiche)



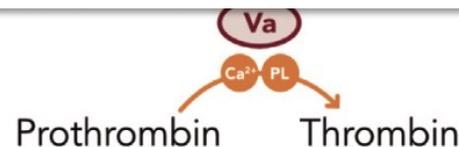
Ruolo del FXI nella genesi della trombosi e sua inibizione

Tissue Factor-Initiated
Thrombin Generation

Contact Activation-Initiated
Thrombin Generation

VI $\xrightarrow{\text{II}}$ VIIa $\xrightarrow{\text{X}}$ X $\xrightarrow{\text{V}}$ Va

The **contact pathway of coagulation** is an attractive target for the development of anticoagulants with an **enhanced safety profile because**, due to its nature, inhibition is less likely to promote bleeding compared with anticoagulants that target multiple coagulation factors or the TF-FVIIa or the common pathways





Characteristics, mechanism of action, and pharmacologic properties of FXI and FXII inhibitors (II)

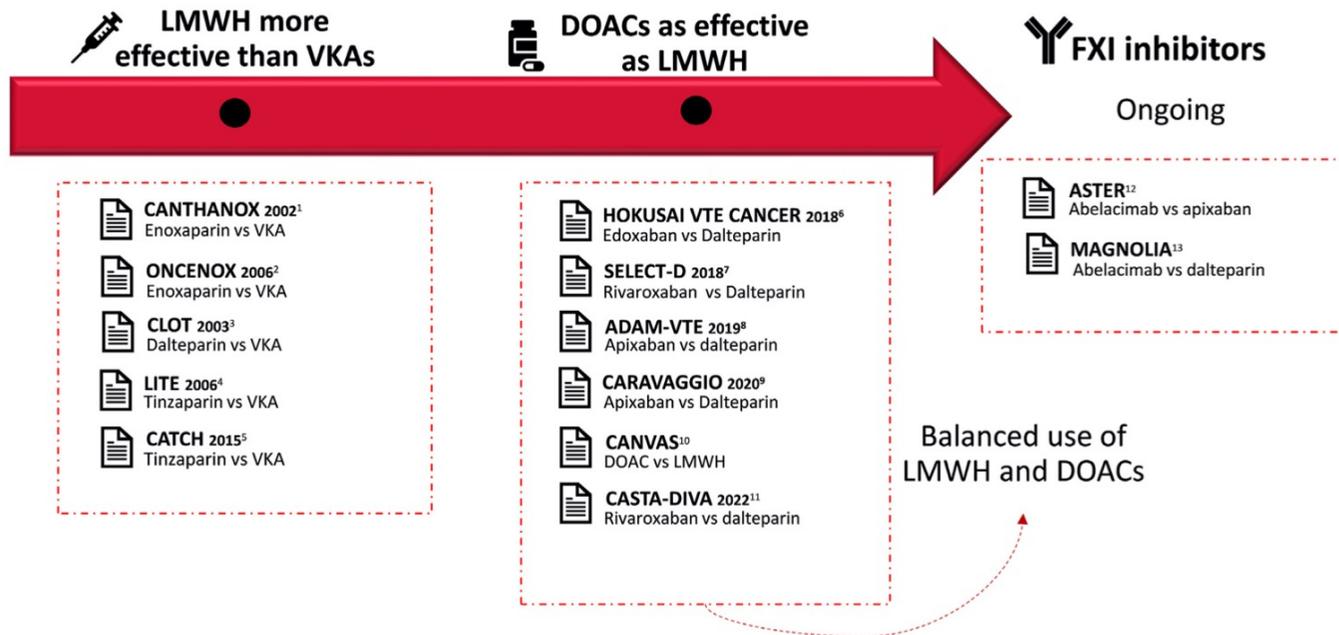
	Mechanism of action	Route of administration	Onset of action	Half-life	Administration frequency	Renal excretion	Metabolism by CYP	Potential for food and drug interactions
Antibodies								
Abelacimab (MAA868)	Binds to the catalytic domain of FXI and locks it in the inactive zymogen conformation, preventing its activation by FXII/thrombin	IV or SC	Rapid (hours)	Long (weeks)	Once monthly	No	No	No
Osocimab (BAY 1213790)	Binds next to the active site of FXIa and inhibits the activation of factor IX	IV or SC	Rapid (hours)	Long (30–44 days)	Once monthly	No	No	No
Xisomab (AB023)	Inhibits FXIIa-mediated activation of FXI but not FXI activation by thrombin	IV	Rapid (hours)	Days to weeks, half-life increases with high doses	Once monthly	No	No	No
Garadacimab (CSL312)	Binds to the catalytic domain of FXIIa and inhibits its protease activity	IV or SC	Rapid (hours)	Long (weeks)	Once monthly	No	No	No



Ongoing clinical trials with FXI and FXII inhibitors

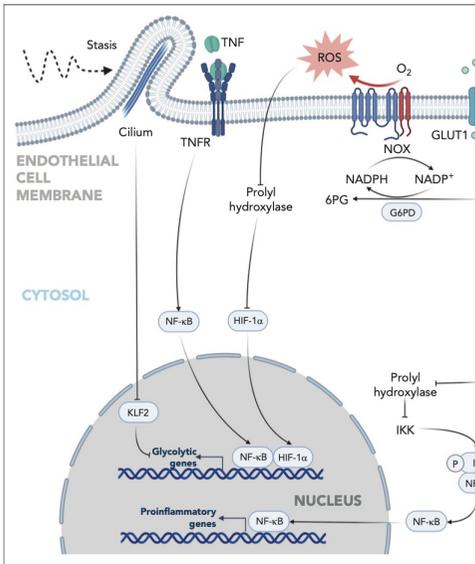


Agent	Registry number (name)	Clinical trial phase and indication	No. of patients	Comparator	Additional therapies	Efficacy outcome	Safety outcomes	Study recruitment status*
IONIS FXI-Rx (ISIS 416858)	NCT03358030 (EMERALD)	Phase 2 Patients with ESRD on hemodialysis	315	Placebo	NA	PK, PD	Major bleeding or CRNMB, treatment-emergent AEs	Completed, awaiting results
Fesomersen (IONIS-FXI-LRx and BAY2976217)	NCT03582462	Phase 1 Healthy volunteers	66	Placebo	NA	PK, PD	Treatment-emergent AEs	Completed, awaiting results
	NCT04534114 (RE-THINC ESRD)	Phase 2 Prevention of cardiovascular events in patients with ESRD	307	Placebo	NA	PK, PD	Major bleeding or CRNMB, treatment-emergent AEs	Active, not recruiting
Antibodies								
Abelacimab (MAA868)	NCT04213807	Phase 2 Atrial fibrillation	28	Placebo	NA	Dose-range finding study—PK, PD	Safety, tolerability, and immunogenicity	Completed, awaiting results
	NCT04755283 (AZALEA-TIMI 71)	Phase 2 Atrial fibrillation	Estimated enrollment 1200	Rivaroxaban 15 mg and 20 mg OD	NA	NA	Safety and tolerability, major bleeding, and CRNMB	Active, not recruiting
	NCT05171049 (ASTER)	Phase 3 Treatment of cancer-associated VTE	Estimated enrollment 1655	Apixaban 10 mg BID followed by 5 mg BID	NA	Centrally adjudicated VTE recurrence	Major bleeding or CRNMB	Active, recruiting
	NCT05171075 (MAGNOLIA)	Phase 3 Treatment of GI and GU cancer-associated VTE	Estimated enrollment 1020	Dalteparin 200 IU/kg/d followed by 150 IU/kg/d	NA	Centrally adjudicated VTE recurrence	Major bleeding or CRNMB	Active, recruiting
Osocimab (BAY 1213790)	NCT03787368	Phase 1 Safety in patients with ESRD	55	Placebo	NA	PK, PD	Major bleeding or CRNMB	Completed, awaiting results
	NCT04523220 (CONVERT)	Phase 2 Safety in patients with ESRD	686	Placebo	NA	PK, PD	Major bleeding or CRNMB	Active, not recruiting
Xisomab (AB023)	NCT04465760	Phase 2 Prevention of CAT in patients with cancer receiving chemotherapy	Estimated enrollment 50	None	NA	Incidence of CAT	Major bleeding or CRNMB	Active, recruiting





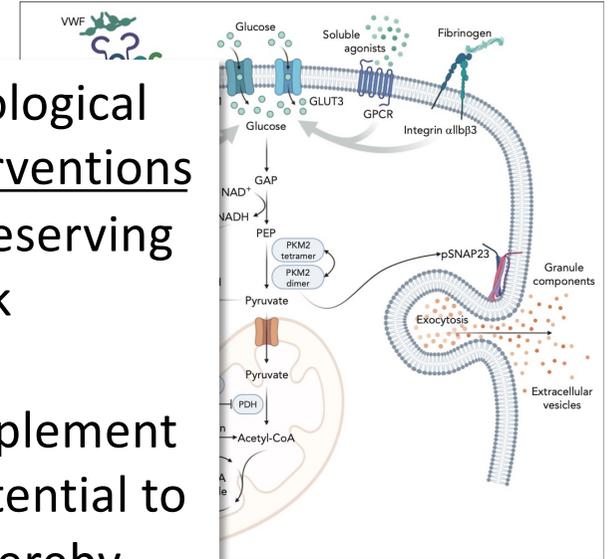
Metabolic pathways in DVT: a new frontier for therapeutic intervention



Metabolic reprogramming in activated ECs

Early preclinical evidence and epidemiological observations suggest that metabolic interventions could reduce thrombus burden while preserving hemostasis and lowering DVT risk

In the future, such approaches may complement standard-of-care treatments with the potential to reduce exposure to anticoagulants, thereby decreasing bleeding risk and improving overall treatment efficacy



Metabolic reprogramming in activated Platelets



Conclusions

- It is estimated that 20% of all VTE are related to cancer and anticoagulant treatment in these vulnerable patients is often challenging
- Cancer patients with VTE are at increased risk of developing recurrent VTE compared to non-cancer patients, but also have a higher risk of major bleeding
- LMWH/DOACs are currently recommended over VKA for treatment of cancer-associated VTE
- Need for individual parameters to help in the choice of the optimal duration of anticoagulants
- New anticoagulants targeting contact pathway of anticoagulation became an attractive treatment for the CAT since the low risk for bleeding

