Direct Oral Anticoagulants in Chronic Liver Disease: Stirring the Clotroversy

A Presentation for HealthTrust Members
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Objectives

1. Recall the pathophysiology of chronic liver disease and its relationship to both elevated risk of thromboembolic events and bleeding.

2. Identify the pharmacokinetics of key direct oral anticoagulants (DOACs) and their relation to the effects of chronic liver disease.

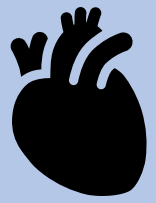
3. Recognize which subgroups of patients with chronic liver disease have data for the safe and efficacious use of direct oral anticoagulants in thromboembolic conditions.

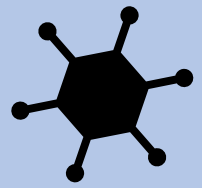
Chronic Liver Disease (CLD)

Deterioration of liver function for >6 months

Etiology


Alcoholic Liver Disease


Non-alcoholic liver disease


Chronic Viral Hepatitis


Genetic


Autoimmune

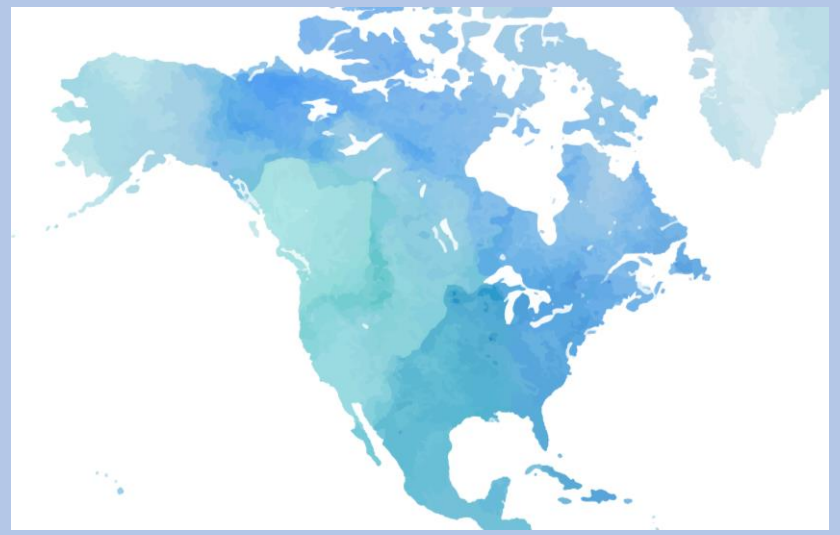
Cause is not addressed → continued death of hepatocytes → hepatic fibrosis → cirrhosis

Source: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan

Epidemiology

2018 Centers for Disease Control Health Statistics

4.5 million adults diagnosed with liver disease
(1.8% of the population)

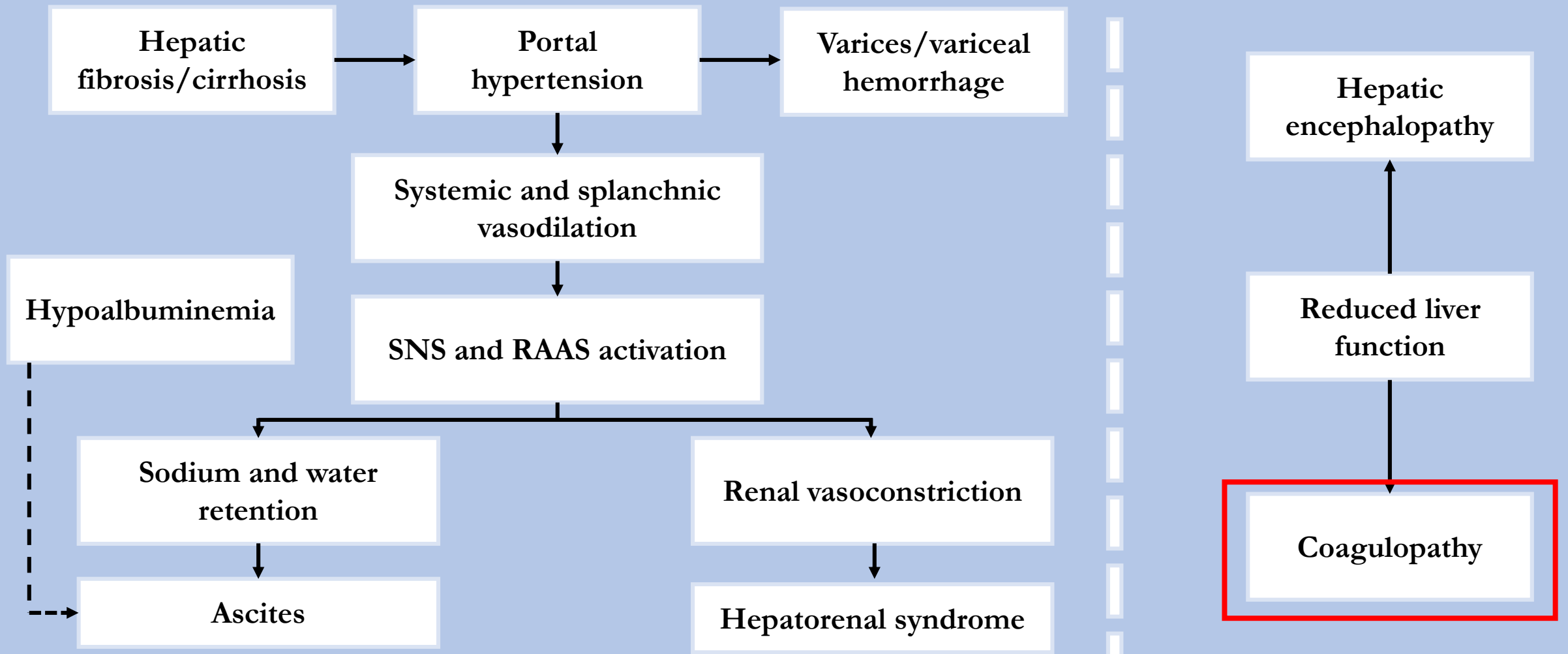


Associated with >56,000 deaths/year
(9th leading cause of death in the U.S.)

Mean increase of ~$9,500/year for every patient with chronic liver disease

Source: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan
J Hepatol. 2023 Aug;79(2):516-537.

Complications of CLD



Sources: DiPiro's Pharmacotherapy: A Pathophysiologic Approach, 12th Edition. McGraw Hill; 2023.
Clin Gastroenterol Hepatol. 2023 Jul;21(8):2110-2123.

SNS: sympathetic nervous system
RAAS: renin angiotensin aldosterone system

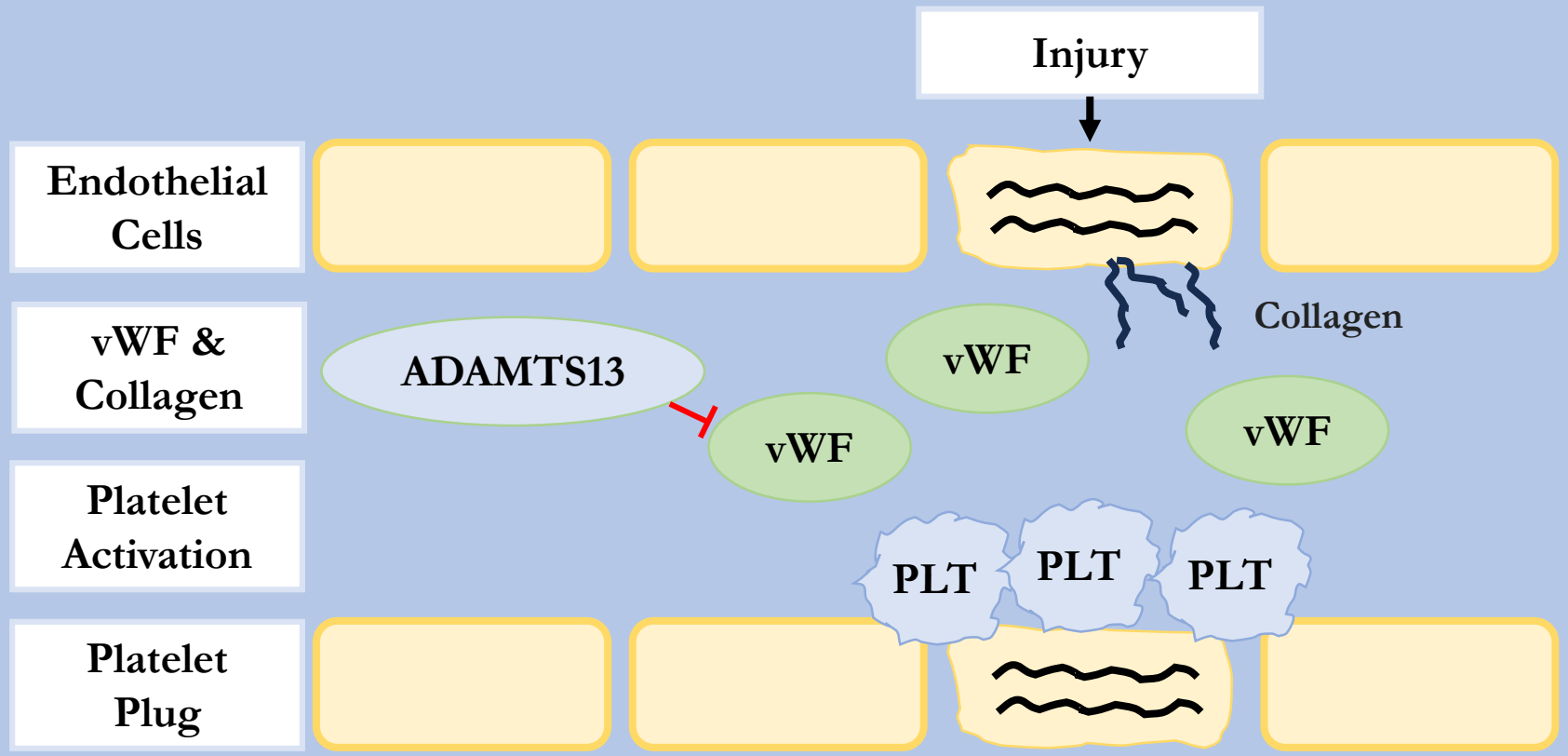
Coagulopathy of CLD

Hemostasis Overview

1. **Endothelial injury**
2. **Platelet plug**
3. **Coagulation cascade**
4. **Fibrinolysis**

Sources: DiPiro's Pharmacotherapy: A Pathophysiologic Approach, 12th Edition. McGraw Hill; 2023.
Clin Gastroenterol Hepatol. 2023 Jul;21(8):2110-2123.

Endothelial Injury → Platelet Plug



Liver Disease

↓Platelets

↑Nitric oxide → PLT dysfunction

↑Bleed risk

Chronic inflammation

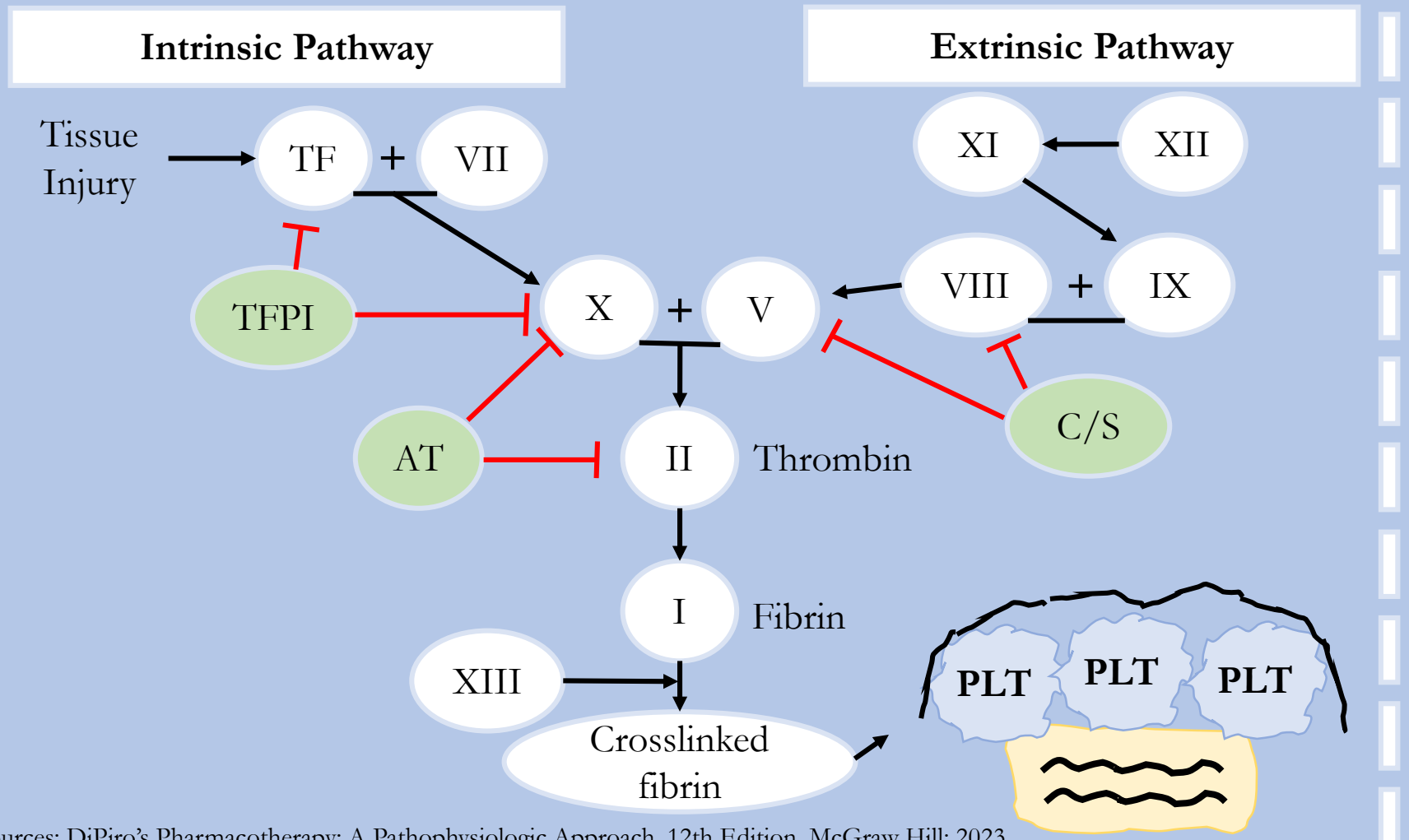
↑vWF/↓ADAMTS13

↑Clot risk

Sources: DiPiro's Pharmacotherapy: A Pathophysiologic Approach, 12th Edition. McGraw Hill; 2023.
Clin Gastroenterol Hepatol. 2023 Jul;21(8):2110-2123.

vWF: Von Willebrand Factor
PLT: platelet

Coagulation Cascade



Liver Disease

↓ Coagulation factors

↑Bleed risk

↓ C/S, ↓TFPI, ↓AT

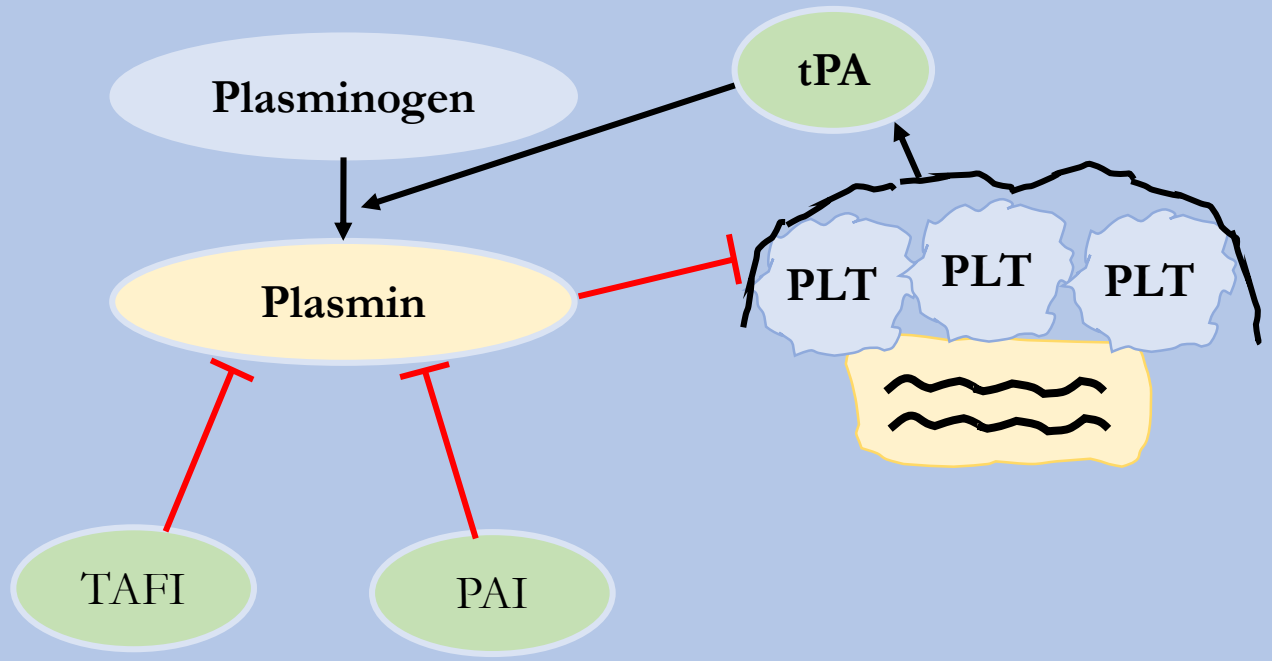
↑ Clot risk

C/S: protein C/S
AT: antithrombin
TFPI: tissue factor pathway inhibitor
INR: international normalized ratio
aPTT: activated partial thromboplastin time

Sources: DiPiro's Pharmacotherapy: A Pathophysiologic Approach, 12th Edition. McGraw Hill; 2023.
Clin Gastroenterol Hepatol. 2023 Jul;21(8):2110-2123.

Fibrinolysis

Fibrin Breakdown



Liver Disease

↓ TAFI/PAI

↑ tPA

↑ Bleed risk

↓ Plasminogen

↑ Clot risk

tPA: tissue plasminogen activator
TAFI: Thrombin-activatable fibrinolysis inhibitor
PAI: plasminogen activator inhibitor

Sources: DiPiro's Pharmacotherapy: A Pathophysiologic Approach, 12th Edition. McGraw Hill; 2023.
Clin Gastroenterol Hepatol. 2023 Jul;21(8):2110-2123.

Pathophysiology Takeaway

	Thrombosis Risk	Bleed Risk
Platelets	↑ vWF/↓ ADAMTS13 activity	↓ Platelets/function
Coagulation	↓ Endogenous anticoagulants	↓ Coagulation factors
Fibrinolysis	↓ Plasminogen	↑ tPA activity

Individualized Risk

Thromboembolic risk  **Bleed risk**

Source: Clin Gastroenterol Hepatol. 2023 Jul;21(8):2110-2123.

Clinical Evidence of Clot vs. Bleed

"Auto-anticoagulation" in cirrhosis		
	Atrial fibrillation	2.5 times higher risk of ischemic stroke
	Venous thromboembolism	2 times higher risk of venous thromboembolism

Retrospective cohort of 1,238 patients with liver disease and atrial fibrillation		Findings
	Anticoagulation	Higher rates of stroke in no anticoagulation group
	Vs.	Rates of bleeding increased in patients with more advanced liver disease regardless of anticoagulation status
	No anticoagulation	

Source: J Am Coll Cardiol. 2018 May, 71 (19) 2162–2175
Clin Res Hepatol Gastroenterol. 2022 Oct;46(8):101952.

Assessment Question #1

TRUE or FALSE. JJ is a 55-year-old male with HTN, atrial fibrillation, cirrhosis (Child-Pugh B), and alcoholism. His INR is found to be 2.1. He is at an elevated bleed risk but not an elevated clot risk.

Assessment Question #1: Correct Response

TRUE or FALSE. JJ is a 55-year-old male with HTN, atrial fibrillation, cirrhosis (Child-Pugh B), and alcoholism. His INR is found to be 2.1. He is at an elevated bleed risk but not an elevated clot risk.

FALSE

Assessment Question #2

Which of the following statements are true regarding the pathophysiology of coagulopathy in chronic liver disease?

a. **vWF production is decreased resulting in decreased platelet plug formation**
b. **Chronic inflammation leads to decreased production of ADAMTS13 increasing clot risk**
c. **Protein C/S production is decreased resulting in an decreased clot risk**
d. **Platelets are dysfunctional causing an increased propensity for platelet plug formation**

Assessment Question #2: Correct Response

Which of the following statements are true regarding the pathophysiology of coagulopathy in chronic liver disease?

a. vWF production is decreased resulting in decreased platelet plug formation
b. Chronic inflammation leads to decreased production of ADAMTS13 increasing clot risk
c. Protein C/S production is decreased resulting in an decreased clot risk
d. Platelets are dysfunctional causing an increased propensity for platelet plug formation

Anticoagulation in Chronic Liver Disease

Anticoagulation Options

Warfarin

Low molecular weight heparin (LMWH)

DOACs

Warfarin

Mechanism of Action	**Inhibits vitamin K epoxide reductase which reduces the formation of coagulation factors II, VII, IX, and X in addition to protein C/S**

Advantages	**Can be monitored**	**Longer half-life**

Clinical and operational challenges

Monitoring	**Adherence**	**Limited data in chronic liver disease**
Drug-drug interactions	**INR goal**	

Source: J Am Coll Cardiol. 2018 May, 71 (19) 2162–2175

LMWH

Mechanism of Action	**Enhances activity of antithrombin III increasing rate of proteolysis of coagulation factors Xa and IIa**

Advantages	**Consistent dose-response curve**	**Shorter half-life**	**Quick onset**

Clinical and operational challenges

Injection	**Dosing**	**Limited data in chronic liver disease**

Source: J Am Coll Cardiol. 2018 May, 71 (19) 2162–2175

Anticoagulation Options

Warfarin

LMWH

DOACs

DOACs

Mechanism of Action	▪ **Apixaban, edoxaban, rivaroxaban:** binds to and inhibits factor Xa ▪ **Dabigatran:** binds to and inhibits thrombin

Advantages	**Monitoring not required**	**Shorter half-life**	**Quick onset**

Clinical and operational challenges

Lack of data in chronic liver disease	**Expensive**	**Harder to monitor if desired**

Source: J Am Coll Cardiol. 2018 May, 71 (19) 2162–2175

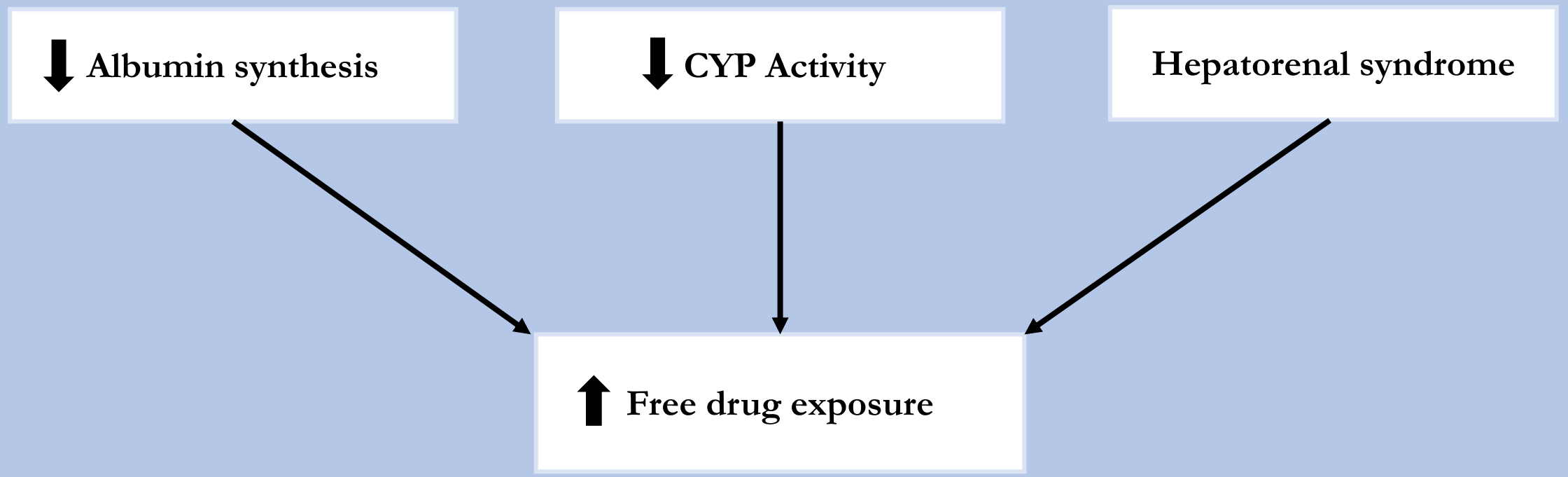
DOAC Landmark Studies

Trial	DOAC	Exclusion
ROCKET AF	Rivaroxaban	▪ Acute or chronic hepatitis ▪ Cirrhosis ▪ ALT > 3x upper limit of normal (ULN)
ARISTOTLE	Apixaban	▪ AST or ALT 2x ULN ▪ Total bilirubin > 1.5x ULN
RE-LY	Dabigatran	▪ Persistently high levels of ALT or AST ▪ Presence of hepatitis A, B, or C
ENGAGE AF-TIMI	Edoxaban	▪ ALT or AST >2x ULN ▪ Total bilirubin > 1.5x ULN

Source: J Am Coll Cardiol. 2018 May, 71 (19) 2162–2175

DOAC Pharmacokinetics and Hepatic Clearance

Liver Disease Effects on Pharmacokinetics



Source: J Am Coll Cardiol. 2018 May, 71 (19) 2162–2175

PPB: plasma protein binding

Direct Oral Anticoagulants

Drug	Apixaban	Dabigatran	Edoxaban	Rivaroxaban
Prodrug	No	Yes	No	No
Renal	25%	80%	50%	35%
Hepatic	75%	20%	50%	65%
CYP	Significant	Minimal	Minimal	Significant
PPB	87%	35%	55%	95%

Source: J Am Coll Cardiol. 2018 May, 71 (19) 2162–2175

PPB: plasma protein binding

Child-Pugh Classification

	+1	+2	+3
Encephalopathy	None	Moderate	Severe
Ascites	None	Slight	Moderate
Bilirubin (mg/dL)	<2	2.1-3	>3
Albumin (g/dL)	<2.8	2.8-3.5	>3.5
Prothrombin time (seconds > control)	0-3.9	4-6	>6

Group A: Mild
5-6
Group B: Moderate
7-9
Group C: Severe
10-15

Source: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-.

Assessment Question #3

Which DOAC has the highest percentage clearance by the liver?

a. **Apixaban**
b. **Rivaroxaban**
c. **Dabigatran**
d. **Edoxaban**

Assessment Question #3: Correct Response

Which DOAC has the highest percentage clearance by the liver?

a. **Apixaban**
b. **Rivaroxaban**
c. **Dabigatran**
d. **Edoxaban**

Assessment Question #4

Based on the presented pharmacokinetics, which DOAC would be expected to be least affected by chronic liver disease

a. **Apixaban**
b. **Rivaroxaban**
c. **Dabigatran**
d. **Edoxaban**

Assessment Question #4: Correct Response

Based on the presented pharmacokinetics, which DOAC would be expected to be least affected by chronic liver disease

a. Apixaban
b. Rivaroxaban
c. Dabigatran
d. Edoxaban

Use of DOACs in Chronic Liver Disease

PPB: plasma protein binding

Meta-analysis

Direct Oral Anticoagulants versus Warfarin in Patients with Atrial Fibrillation and Liver Disease

Source: J Am Heart Assoc. 2019 Jul 16;8(14).

Methods

Abided by PRISMA guidelines

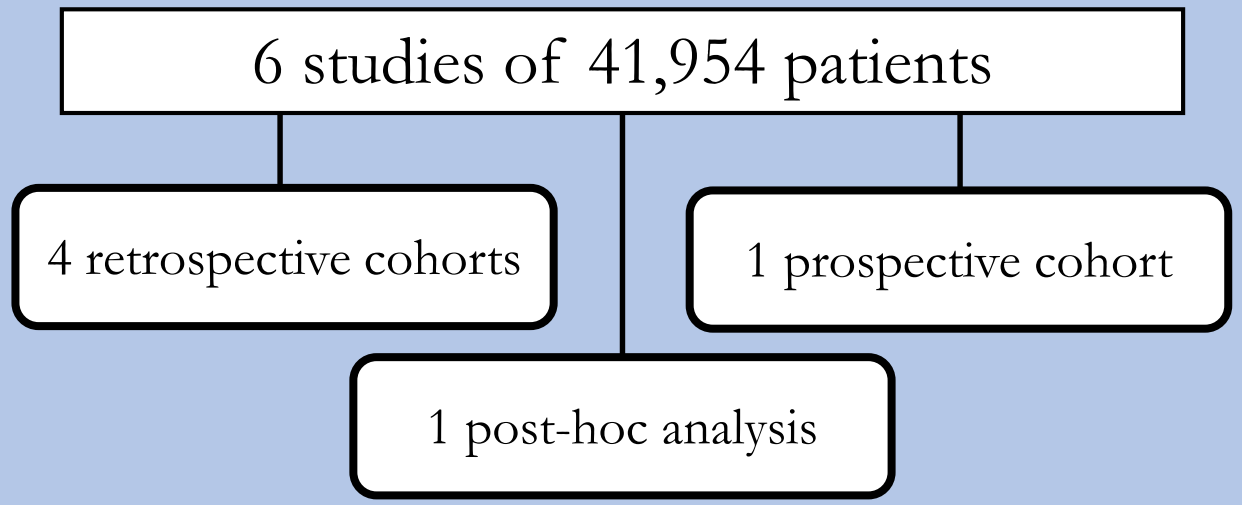
Patients	▪ Liver disease with concomitant nonvalvular atrial fibrillation ▪ Receiving warfarin or DOAC
Outcomes	▪ Efficacy: ischemic stroke/systemic embolism ▪ Safety: all-cause mortality, major bleeding*, intracranial hemorrhage, major GI bleed *inconsistent definitions of GI bleeds between studies
Study types	▪ Post-hoc analyses of randomized controlled trials, retrospective or prospective studies

Source: Am J Cardiovasc Drugs. 2020; 20:139–147.

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Meta-analysis: DOACs vs. Warfarin

Results



Liver disease definition	▪ 4 based off ICD codes ▪ 2 based off AST/ALT elevations (>2x ULN)
Locations	▪ United States: 1 ▪ Italy: 1 ▪ East Asia: 3 ▪ International: 1

Source: Am J Cardiovasc Drugs. 2020; 20:139–147.

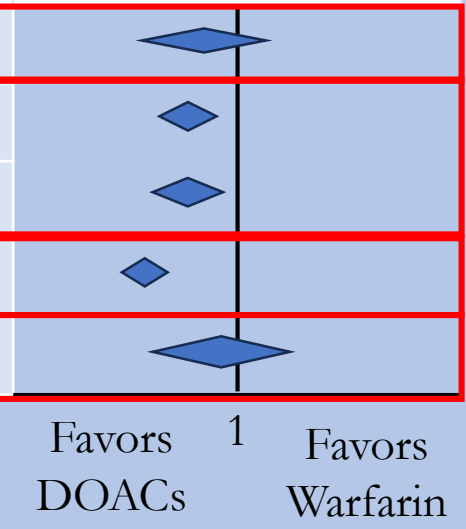
ICD: international classification of diseases
ULN: upper limit normal

Meta-analysis: DOACs vs. Warfarin

Primary Analysis

Outcome	RR (95% CI)	I^2	Risk Ratio
Ischemic stroke/systemic embolism	0.80 (0.57 to 1.12)	71%	
All-cause mortality	0.78 (0.66 to 0.83)	73%	
Major bleeding	0.68 (0.53 to 0.88)	38%	
Intracranial hemorrhage	0.49 (0.41 to 0.59)	0%	
GI bleed	0.90 (0.61 to 1.34)	61%	

*inconsistent between studies



Source: Am J Cardiovasc Drugs. 2020; 20:139–147.

Meta-analysis: Conclusion

Author's Conclusion

Bases upon current observations, the use of DOACs is at least non-inferior to warfarin in patients with atrial fibrillation and chronic liver disease

Limitations

- Definition of chronic liver disease
- Majority East Asian patients
- Time in therapeutic range not charted in 5 studies
- Mostly observational studies

Source: Am J Cardiovasc Drugs. 2020; 20:139–147.

Retrospective Cohort

Comparative Effectiveness and Safety of DOACs and Warfarin in Patients With Atrial Fibrillation and Chronic Liver Disease: A Nationwide Cohort Study

Source: Circulation. 2023 Mar;10(7):782-794.

Methods

Study type	▪ Retrospective cohort of a large US-based administrative database
Inclusion	▪ Chronic liver disease with concomitant atrial fibrillation ▪ Patients ≥18 years of age ▪ Warfarin or DOAC
Exclusion	▪ Stroke, embolism, or major bleeding within 4 weeks of initial anticoagulant ▪ Patients with valvular atrial fibrillation ▪ Alternative indications for anticoagulation besides atrial fibrillation
Outcomes	▪ Efficacy: ischemic stroke/systemic embolism ▪ Safety: major bleeding, major GI bleed, all-cause mortality

Source: Circulation. 2023 Mar;10(7):782-794.

Results

10,209 patients included	
Warfarin	4,421
Apixaban	2,721
Rivaroxaban	2,211
Dabigatran	851
Edoxaban	5

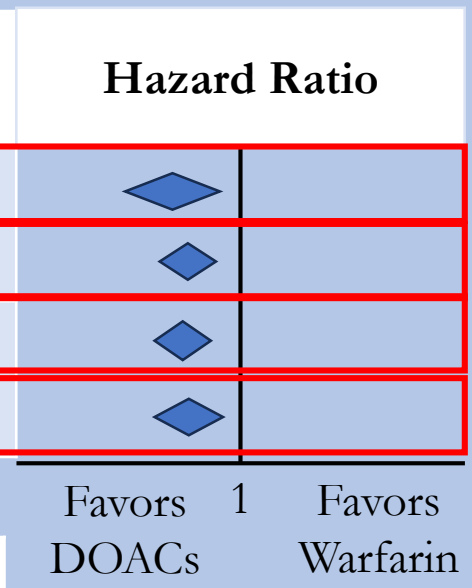
Baseline characteristic	DOACs (N=5,788)	Warfarin (N=4,421)
Mean age±SD, y	70.3±10.6	72.2±10
NAFLD/NASH, n (%)	1942 (33.6)	1188 (26.9)
Alcoholic liver disease, n (%)	640 (11.1)	595 (13.5)
Viral hepatitis, n (%)	689 (11.9)	428 (9.7)
Cirrhosis, n (%)	1399 (24.2)	1541 (34.9)
Chronic kidney disease, n (%)	1429 (24.7)	1389 (31.4)
Mean HAS-BLED, ±SD	4.0±1.3	4.2±1.2
Mean CHA_2DS_2-VASc, ±SD	3.9±1.8	4.3±1.8

Source: Circulation. 2023 Mar;10(7):782-794.

Results

Primary Analysis

Outcome, n (%)	DOACs (N=5,788)	Warfarin (N=4,421)	IPTW HR (95% CI)
Stroke/embolism	74 (1.3)	115 (2.6)	0.64 (0.46–0.90)
All-cause mortality	503 (8.7)	702 (1.6)	0.76 (0.67–0.87)
Major bleeding	263 (4.5)	383 (8.7)	0.69 (0.58–0.82)
GI bleed	179 (3.1)	248 (5.6)	0.73 (0.59–0.91)



Outcome, n (%)	Apixaban (N=2,721)	Rivaroxaban (N=2,211)	IPTW HR (95% CI)
Major bleeding	98 (3.6)	119 (5.4)	1.59 (1.18–2.14)
GI bleed	60 (2.2)	86 (3.9)	2.12 (1.52–2.98)

Source: Circulation. 2023 Mar;10(7):782-794.

IPTW: inverse probability treatment weighting

Conclusion

Author's Conclusion

Among patients with AF and chronic liver disease, DOACs as a class were associated with lower risks of hospitalization for ischemic stroke/systemic embolism and major bleeding versus warfarin

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The incidence of clinical outcomes varied between individual DOACs

Limitations

- ICD claim codes for outcome measures
- Unable to collect Child-Pugh scores
- Retrospective cohort
- Unable to measure TTR

Source: Circulation. 2023 Mar;10(7):782-794.

ICD: international classification of disease
TTR: time in therapeutic range

Chronic Liver Disease Summary

DOACs appear to be at least as effective and safe as warfarin

Cause of CLD does not appear to affect clinical outcomes with DOACs

Data is limited to retrospective cohorts

DOACs appear to be a reasonable option for anticoagulation in patients with chronic liver disease

Does severity of liver disease affect outcomes with DOACs?

Use of DOACs in Cirrhosis

PPB: plasma protein binding

Meta-analysis

Direct Oral Anticoagulants versus Warfarin in Cirrhotic Patients with Atrial Fibrillation

Source: Am J Cardiovasc Drugs. 2023 Nov;23(6):683-694.

Methods

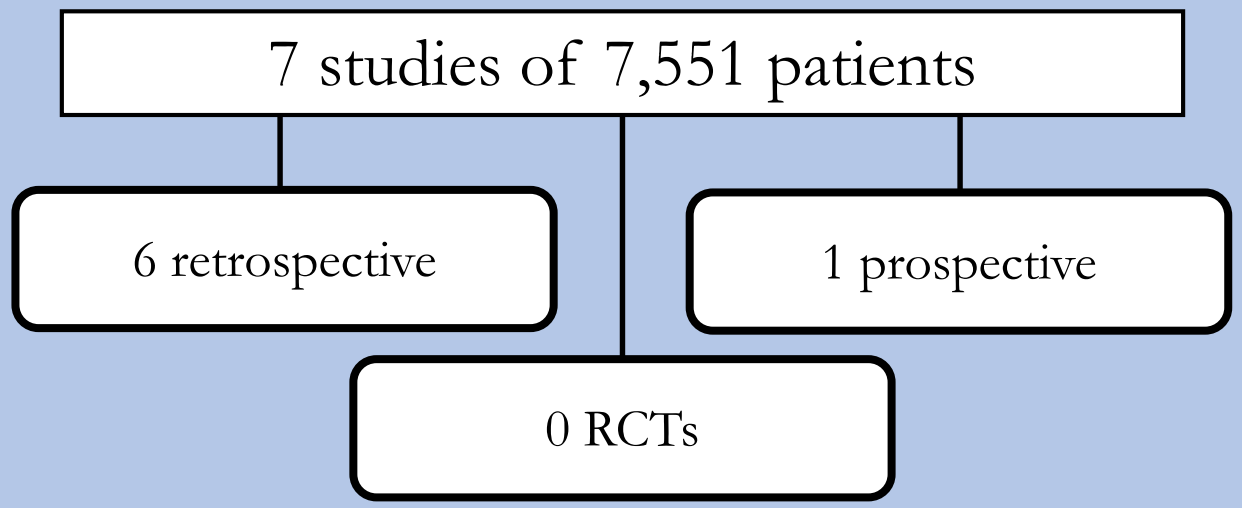
Abided by PRISMA guidelines

Patients	▪ Liver cirrhosis with concomitant atrial fibrillation ▪ Receiving warfarin or DOAC
Outcomes	▪ Efficacy: ischemic stroke/systemic embolism ▪ Safety: all-cause mortality, major bleeding, intracranial hemorrhage, major GI bleed
Study types	▪ Randomized controlled trials, retrospective or prospective studies

Source: Am J Cardiovasc Drugs. 2023 Nov;23(6):683-694.

Meta-analysis: DOACs vs. Warfarin

Results



Child-Pugh Classification	▪ Charted in 3 studies ▪ Majority class A/B ▪ 21 patients class C
DOAC	▪ Charted in 5 studies ▪ Apixaban: 220 patients ▪ Rivaroxaban: 810 patients ▪ Dabigatran: 587 patients

Source: Am J Cardiovasc Drugs. 2023 Nov;23(6):683-694.

RCT: randomized controlled trial

Meta-analysis: DOACs vs. Warfarin

Primary Analysis			
Outcome	**HR (95% CI)**	**P-value**	**I^2**
Ischemic stroke/systemic embolism	0.79 (0.59 to 1.06)	0.12	0%
All-cause mortality	0.94 (0.69 to 1.28)	0.07	63%
Major bleeding*	0.61 (0.5 to 0.75)	<0.00001	38%
Intracranial hemorrhage	0.55 (0.31 to 0.98)	0.04	0%
Major GI bleed	0.66 (0.51 to 0.85)	0.001	0%

*inconsistent between studies

Subgroup Analysis: Advanced Cirrhosis			
Outcome	**HR (95% CI)**	**P-value**	**I^2**
Ischemic stroke/systemic embolism	1.38 (0.75 to 2.55)	0.31	0%
Major bleeding*	0.59 (0.39 to 0.89)	0.01	0%
Major GI bleed	0.65 (0.41 to 1.04)	0.08	0%

Source: Am J Cardiovasc Drugs. 2023 Nov;23(6):683-694.

Meta-analysis: Conclusion

Author's Conclusion			
DOACs are associated with more favorable safety outcomes when compared to warfarin in patients with liver cirrhosis and concomitant atrial fibrillation. Randomized, prospective studies are needed to validate these observations			
Limitations	Majority of data came from 2 studies (5,368/7,551 patients)	DOAC use not consistently charted	Majority of patients has uncharted Child-Pugh classification

Source: Am J Cardiovasc Drugs. 2023 Nov;23(6):683-694.

Lawal et al and Lee et al

	Lawal et al	Lee et al
Study type & population	Retrospective cohort of AF and CLD patients	Retrospective cohort of AF and CLD patients
Methods	Identified diagnoses via administrative claims	Identified diagnoses via administrative claims
Intervention	DOACs vs. Warfarin	DOACs vs. Warfarin
Subgroup	Advanced liver cirrhosis defined as decompensated claim	Advanced liver cirrhosis defined as claim for ascites, HE, SBP, or varices
Conclusion	DOACs > warfarin for embolism and major bleeds	DOACs = warfarin for embolism DOACs > warfarin for major bleeds
	Both studies unable to collect Child-Pugh classification	

Sources: Circulation. 2023 Mar 7;147(10):782-794.
J Am Coll Cardiol. 2019 Jul, 73 (25) 3295–3308.

AF: atrial fibrillation
CLD: chronic liver disease
HE: hepatic encephalopathy
SBP: spontaneous bacterial peritonitis

Does cirrhosis severity affect clinical outcomes with DOACs?

Retrospective Studies of Child-Pugh Scores

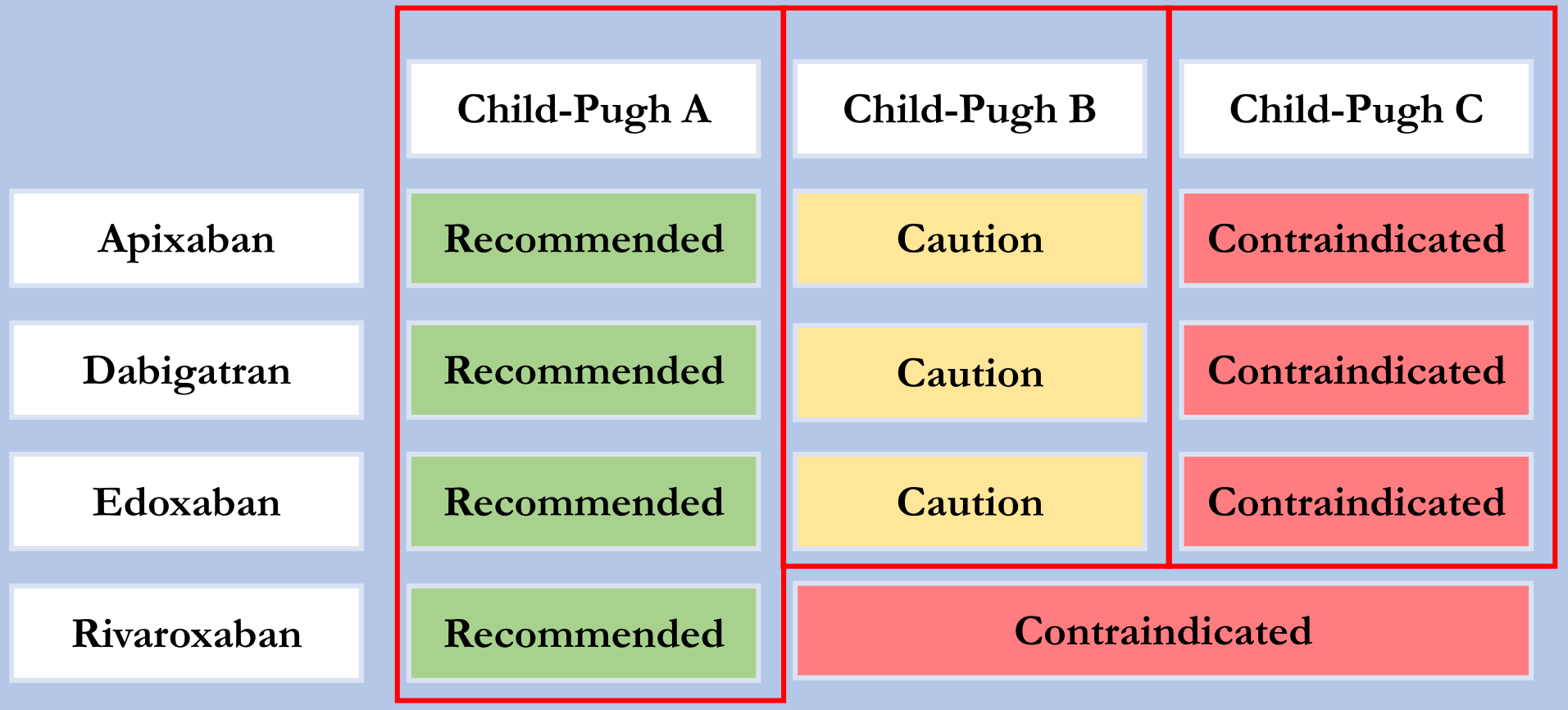
Author	Indication	Anticoagulant	DOAC CTP-Class, n (%)	Other AC CTP-Class, n (%)	Efficacy	Safety
Oldham, et al	AF, VTE	DOAC: 69 Warfarin/LMWH: 32	A: 10 (14.5) B: 59 (85.5) C: 0	A: 2 (6.3) B: 30 (93.7) C: 0	-	Bleeding: similar
Yoo, et al	AF	DOAC: 128 Warfarin: 110	A: 100 (78.1) B: 28 (21.9)	79 (71.8) 31 (28.2)	-	MB: similar
Coons, et al	AF, VTE	DOAC: 44 Warfarin: 41	A: 12 (27.3) B: 24 (54.5) C: 8 (18.2)	A: 5 (12.2) B: 27 (65.9) C: 9 (21.9)	Failed efficacy: similar	Major bleeding: similar
Serper, et al	AF	DOAC: 201 Warfarin: 614	A: 429 (69.9) B: 181 (29.5) C: 4 (0.65)	A: 184 (91.5) B: 17 (8.5) C: 0	-	Bleeding: favored DOACs
Jones, et al	AF, VTE	DOAC: 42 Warfarin: 37	A: 34 (81) B: 8 (19.1) C: 0	A: 16 (43.2) B: 19 (51.4) C: 2 (5.4)	Failed efficacy: similar	Bleeding: similar

Source: Am J Cardiovasc Drugs. 2023 Nov;23(6):683-694.

CTP: child-pugh; AC: anticoagulation; MB: major bleeding

Does the choice of DOAC affect outcomes in cirrhosis?

Current Guideline Recommendations



Source: Circulation. 2024 Jan 2;149(1):e1-e156.

Rivaroxaban Pharmacokinetic Data

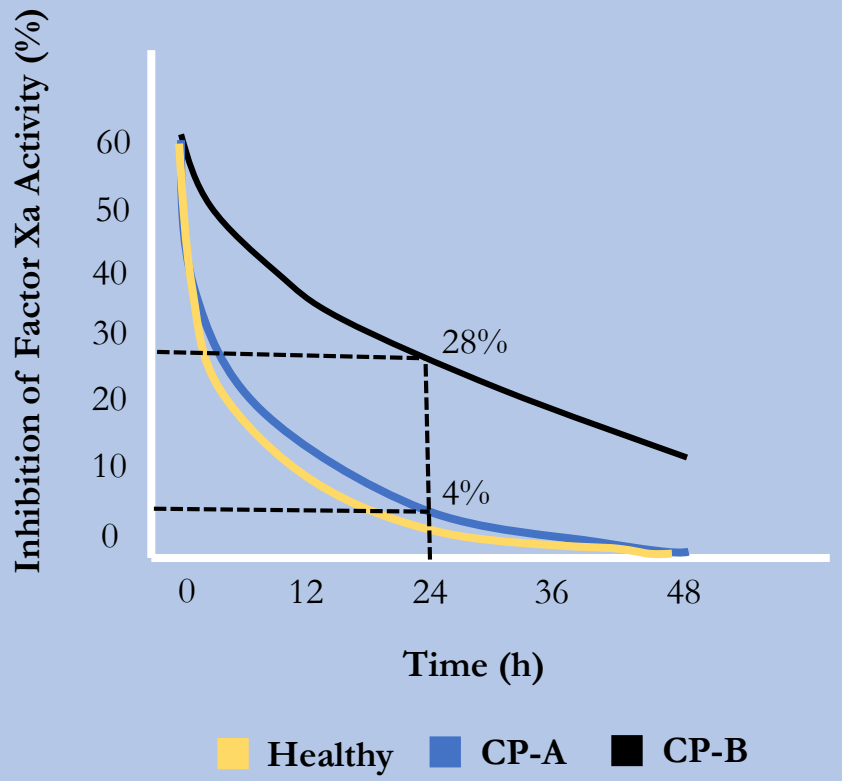
Effect of hepatic impairment on the pharmacokinetics and pharmacodynamics of a single dose of rivaroxaban, an oral, direct Factor Xa inhibitor

32 subjects enrolled

16 healthy	8 CP-A	8 CP-B

Single 10 mg dose administered to all subjects

Anti-Xa activity monitored for 48 hours



Source: Br J Clin Pharmacol. 2013 Jul;76(1):89-98.

CP-A: Child-Pugh Classification A
CP-B: Child-Pugh Classification B

Apixaban Pharmacokinetic Data

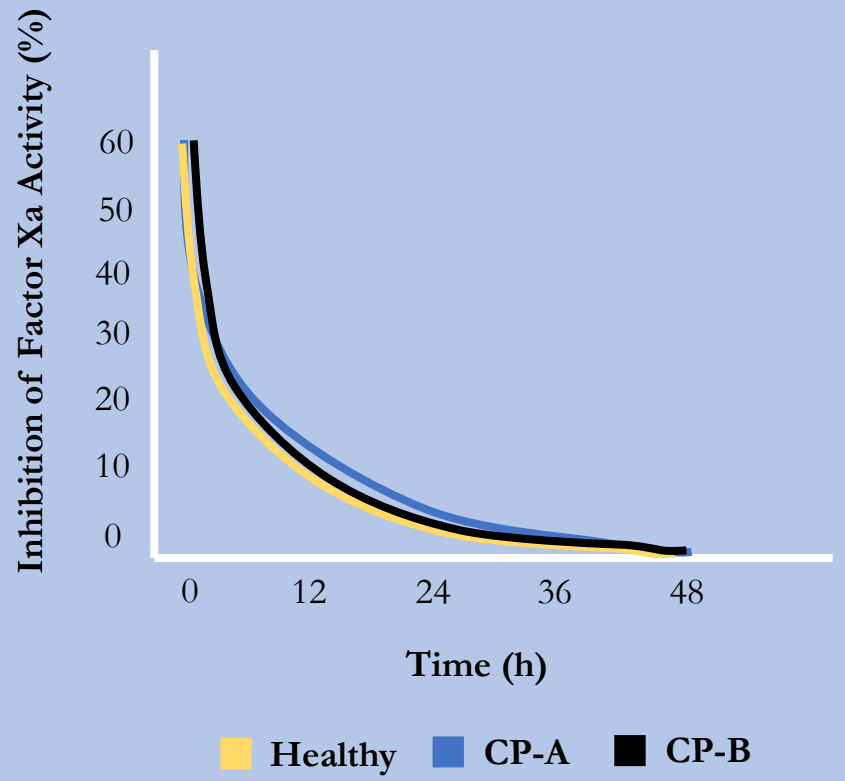
Apixaban

32 subjects enrolled

16 healthy	8 CP-A	8 CP-B

Single 5 mg dose administered to all subjects

Anti-Xa activity monitored for 48 hours



Source: Drugs R D. 2021 Dec;21(4):375-384.

CP-A: Child-Pugh Classification A
CP-B: Child-Pugh Classification B

Dabigatran and Edoxaban

Dabigatran		Edoxaban		
150 mg one time dose		15 mg one time dose		
16 healthy	12 CP-B	16 healthy	8 CP-A	9 CP-B
No statistically significant difference in plasma concentrations		No statistically significant difference in plasma concentrations		

Sources: J Clin Pharmacol. 2015 Dec;55(12):1395-405.
J Clin Pharmacol. 2008 Dec;48(12):1411-9.

CP-A: Child-Pugh Classification A
CP-B: Child-Pugh Classification B

Should patients with Child-Pugh C cirrhosis and atrial fibrillation be anticoagulated at all?

Child-Pugh C

Associated with >50% mortality risk at 1 year

Lee, et al	▪ **Patients with cirrhosis and atrial fibrillation** ▪ **Rate of stroke (warfarin vs. No warfarin):** 1.8% vs. 4.7% (P=0.01) ▪ **Annualized rate of major bleeding of Child-Pugh A vs. B/C:** 4.9% vs. 14.5% (p<0.001) ▪ **Less benefit of stroke reduction noticed in patients with Child-Pugh C cirrhosis**

Several other observational studies have contradicting results that suggest benefit of anticoagulation in patients with Child-Pugh C

Individualized risk

Venous thromboembolism	**Bleed risk (HAS-BLED)**	**CHA_2DS_2VASc**

Source: Int J Cardiol. 2015 Feb 1;180:185-91.

Overall Conclusion

DOACs appear to be associated with more favorable safety outcomes when compared to warfarin in patients with chronic liver disease

Data is limited in more advanced liver disease, especially Child-Pugh C classified cirrhosis

If anticoagulation is pursued in patients with chronic liver disease or cirrhosis, DOACs should be limited to Child-Pugh classification A and B

Assessment Question #5

Which patient would most likely benefit from anticoagulation with a DOAC?

a. A 55-year-old female with cirrhosis (Child-Pugh B) and a deep vein thrombosis offered rivaroxabn
b. A 75-year-old male with cirrhosis (Child-Pugh B), Afib (CHA2DS2VASc: 5), and peptic ulcer disease offered apixaban
c. A 45-year-old female with a pulmonary embolism, cirrhosis (Child-Pugh C), and a history of GI bleed (10 years ago) offered dabiagtran
d. A 54-year-old male with cirrhosis (Child-Pugh C), INR of 1.9, and a deep vein thrombosis offered apixaban

Assessment Question #5: Correct Response

Which patient would most likely benefit from anticoagulation with a DOAC?

a. A 55-year-old female with cirrhosis (Child-Pugh B) and a deep vein thrombosis offered rivaroxaban

b. A 75-year-old male with cirrhosis (Child-Pugh B), Afib (CHA2DS2VASc: 5), and peptic ulcer disease offered apixaban

c. A 45-year-old female with a pulmonary embolism, cirrhosis (Child-Pugh C), and a history of GI bleed (10 years ago) offered dabigatran

d. A 54-year-old male with cirrhosis (Child-Pugh C), INR of 1.9, and a deep vein thrombosis offered apixaban

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