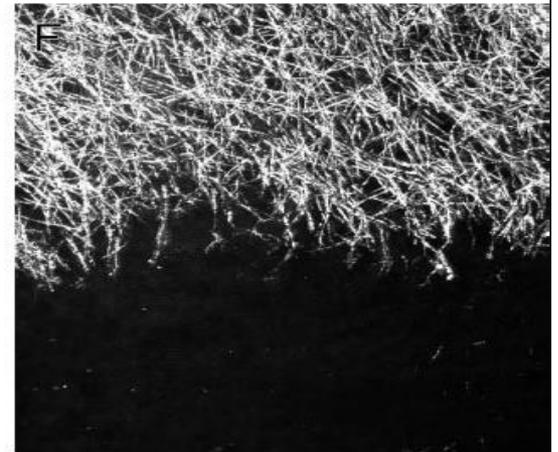
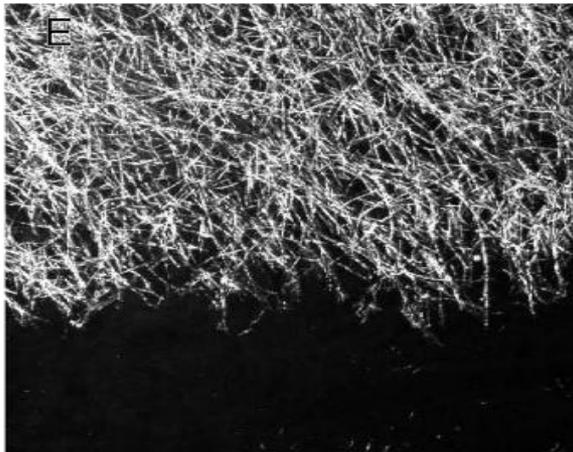
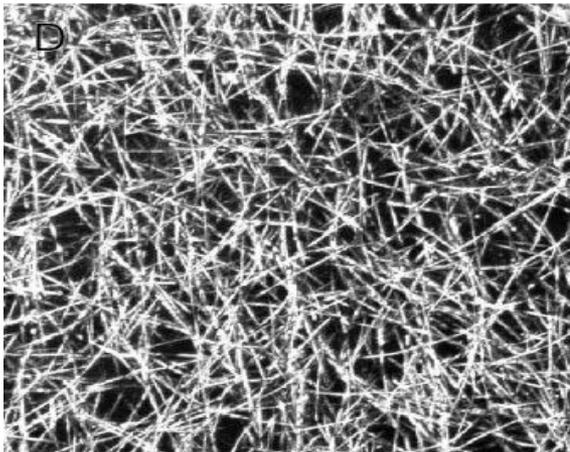
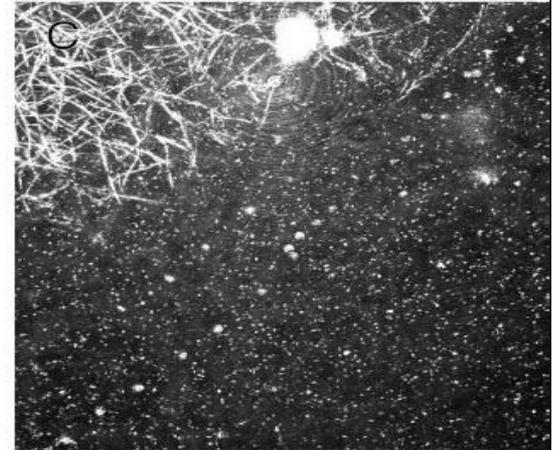
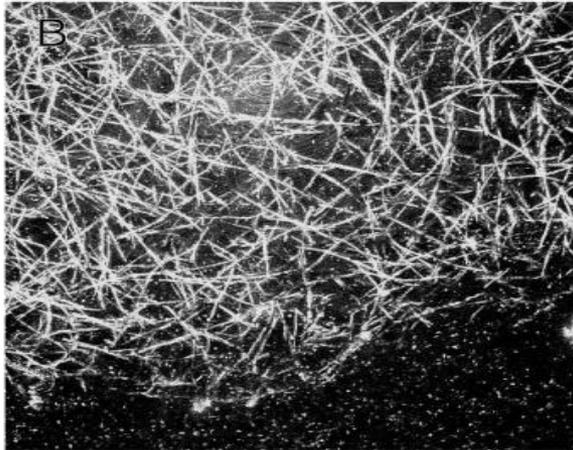
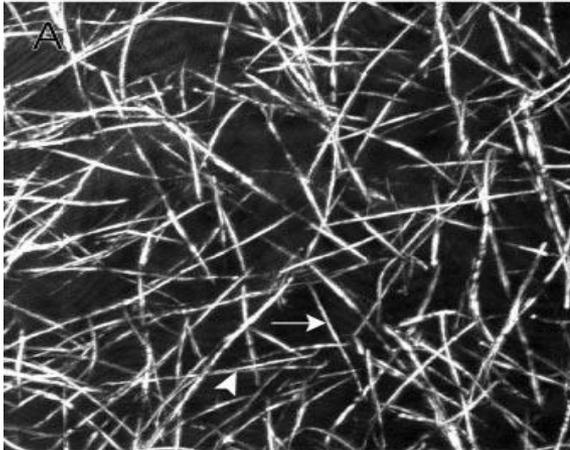


HEMOSTAS
vid
akut leversjukdom

Margareta Hellgren
Obstetrikenheten
Sahlgrenska universitetssjukhuset

Fibrinnätverk och fibrinolys

coarse plasma fibrin network



tight plasma fibrin network

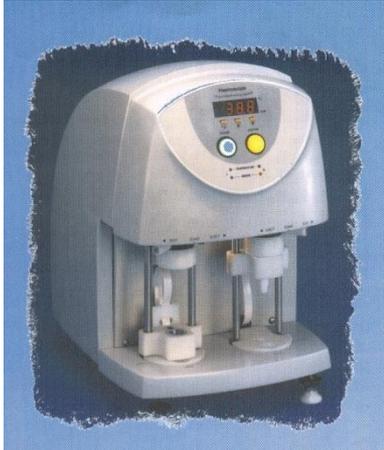
Vanliga laboratorieanalyser

	Tredje trimester	Icke-gravid
APTT, s	normal/förkortad	normal
PK, INR	< 0.9-1.0	<1.2
PT, %*	100-160	70-130
Trombocytantal, x 10 ⁹ /L	> 100	>150
Fibrinogen, g/L	> 3.0-6.0 g/l	< 2.0-4.0
D-dimer, mg/L	< 2.0 mg/L	< 0.5
<i>Antitrombin, kIE/L</i>	<i>> 0.80</i>	<i>> 0.80</i>
<i>Rotem/TEG (viskoelastiska metoder)</i>	<i>hypercoagulabilitet</i>	<i>normal</i>

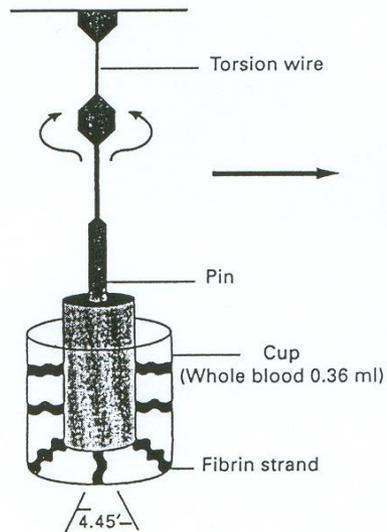
M Hellgren

* K Bremme

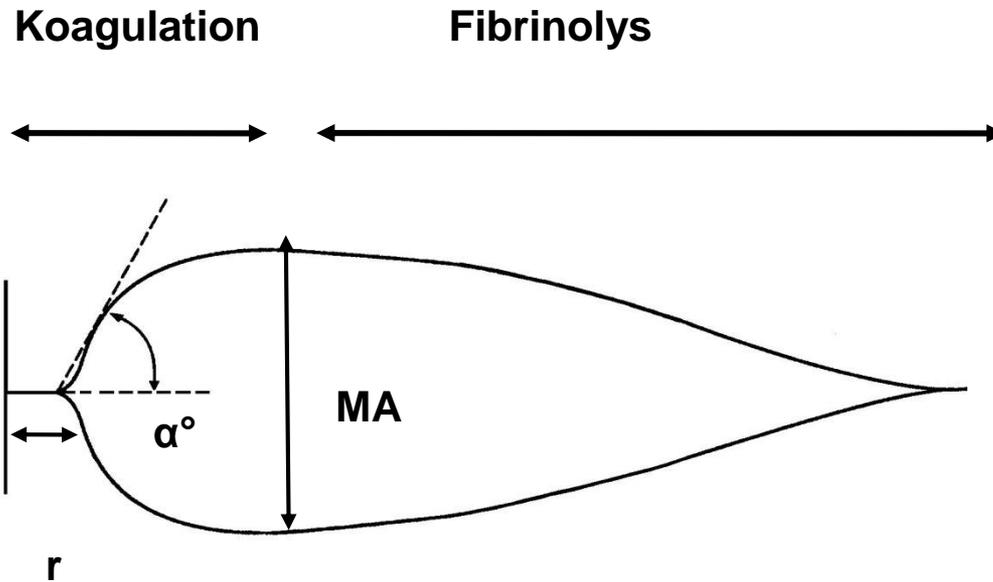
Viskoelastiska metoder



TEG/Rotem



TEG



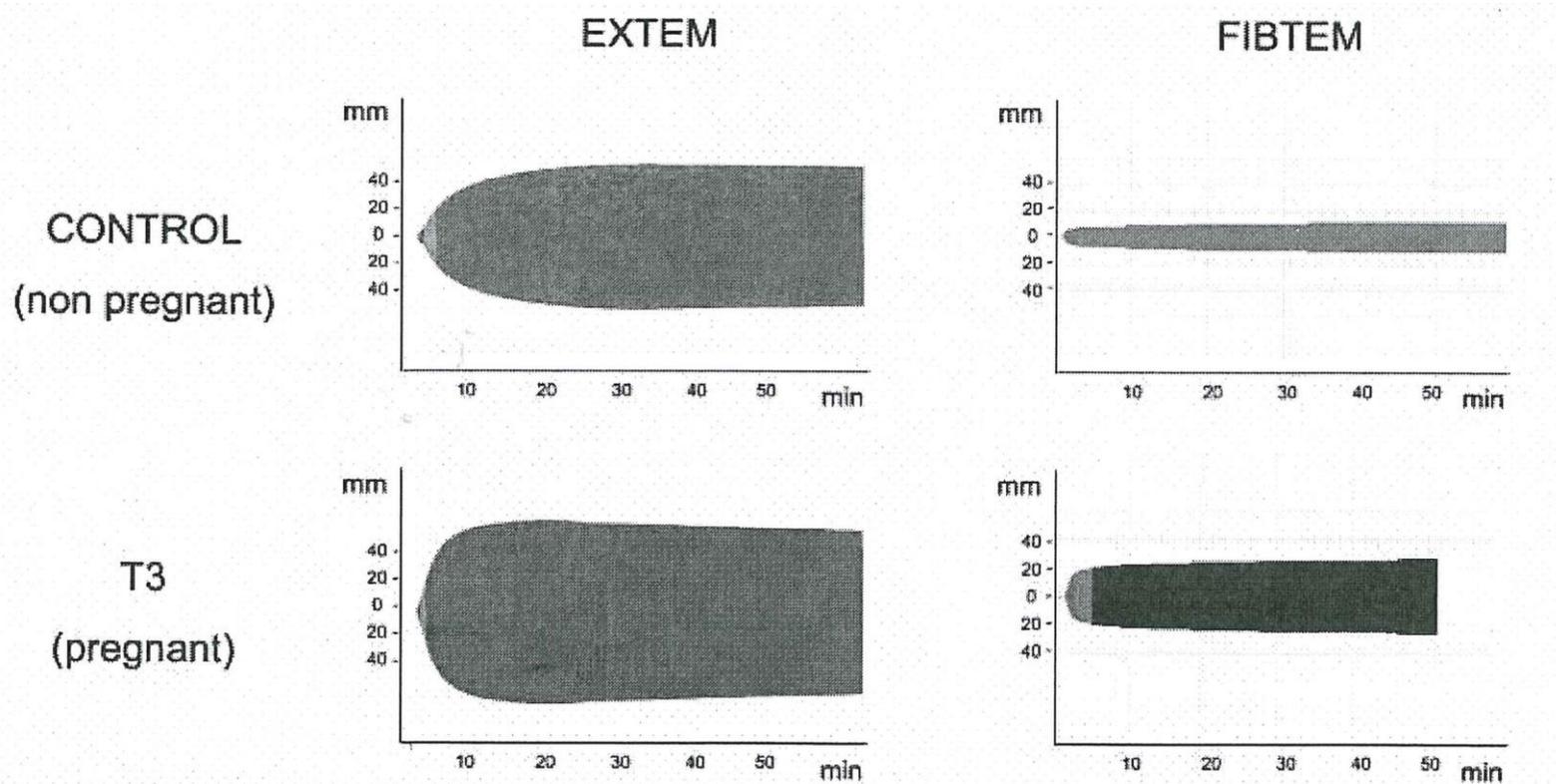
Normalvärden

r = reaktionstid 6-9 min

MA = maximal amplitud 50-70 mm

α° = koagelbildningshastighet $> 50^\circ$

Rotem - Extem och fibtem



INR och PK

Icke-gravid

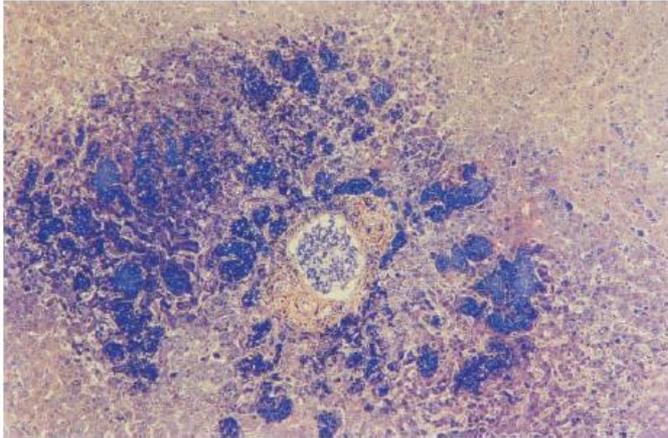
PK(INR)	PK %
<0.9	??
1.0	100
1.8	30
2.1	25
3.0	15
4.1	10
6.5	6.5

Tredje trimestern

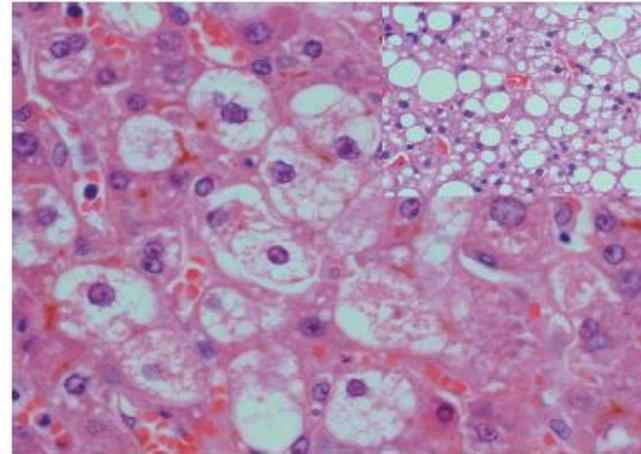
PK(INR)	PK %
<0.9-1.0	70 -200

Hur ser det ut?

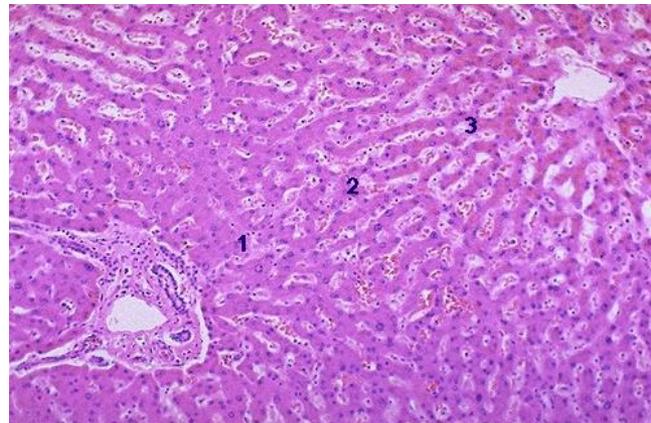
HELLP



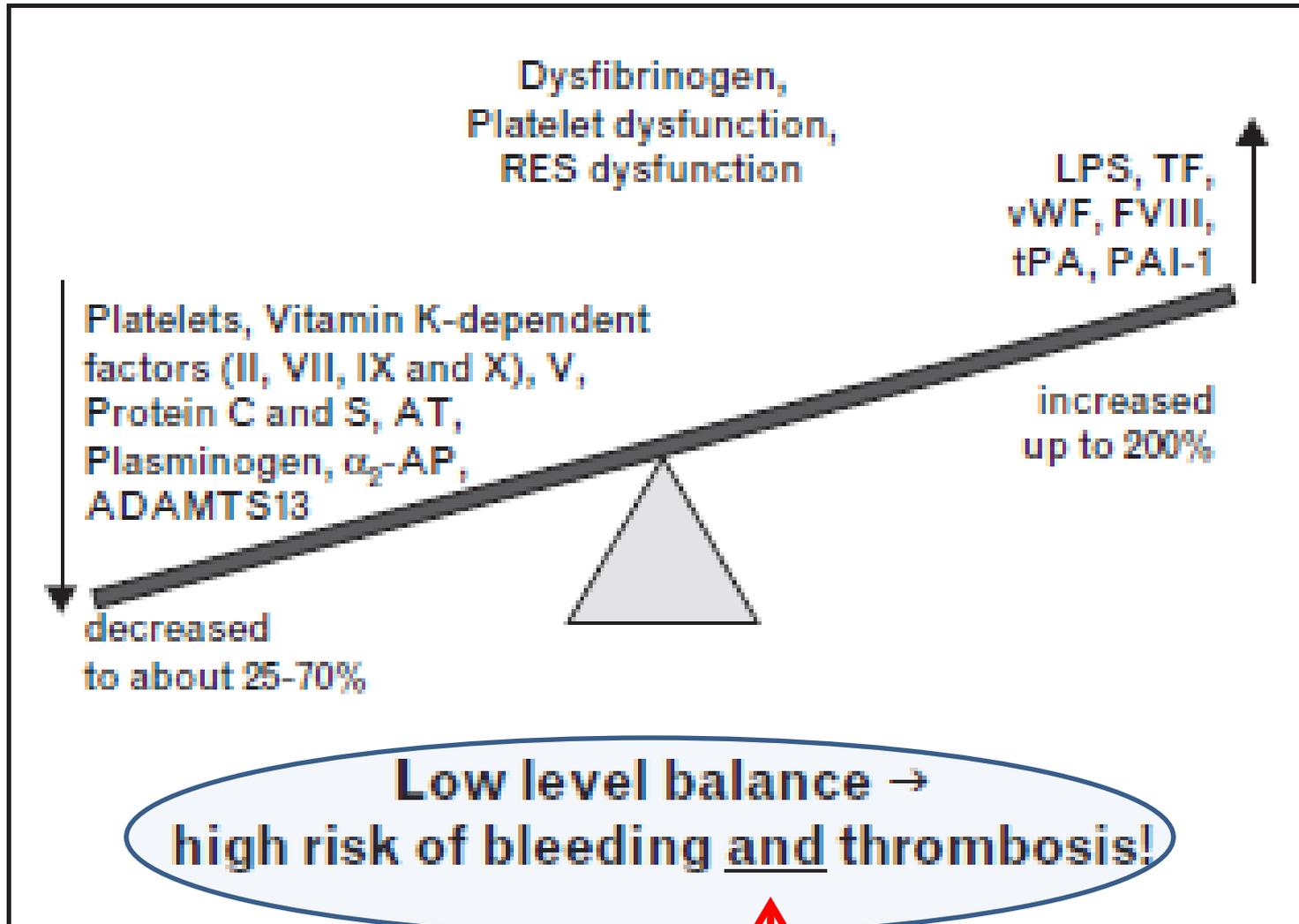
Akut fettlever



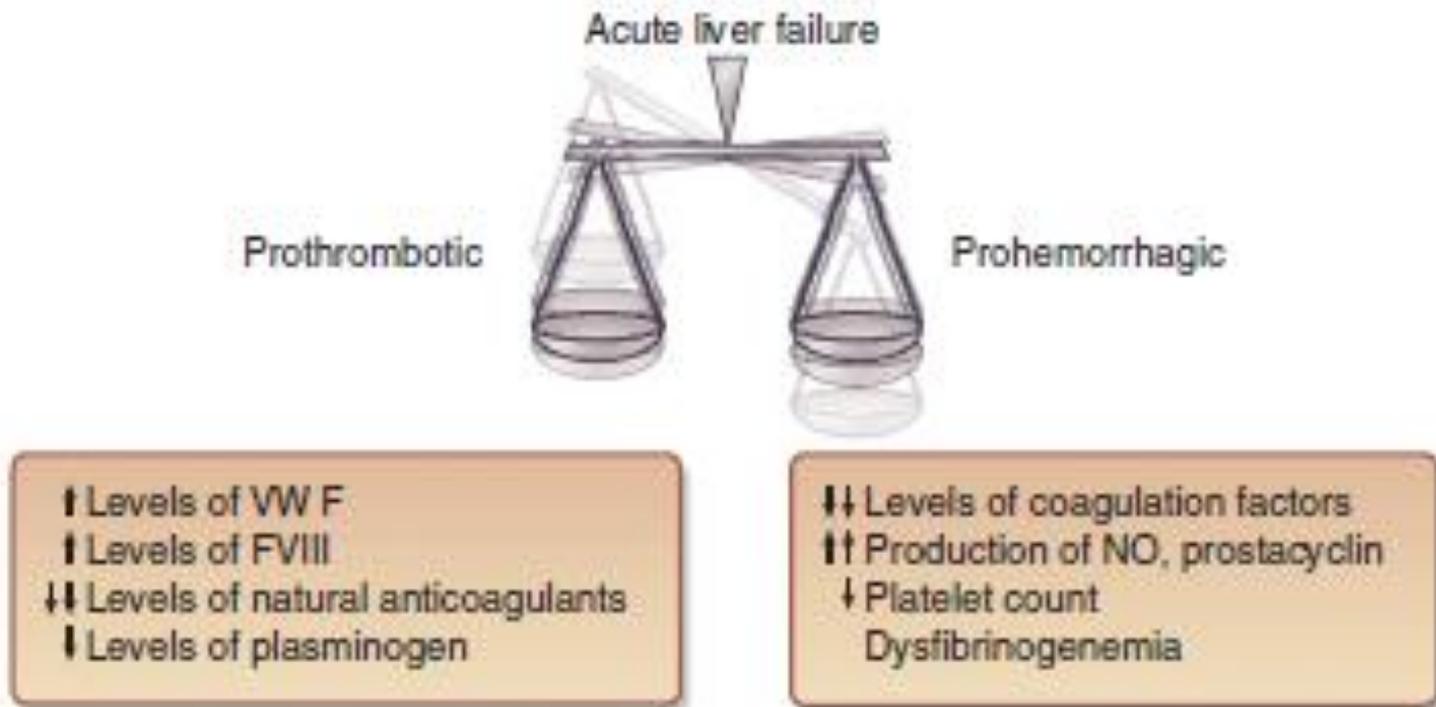
Normal lever



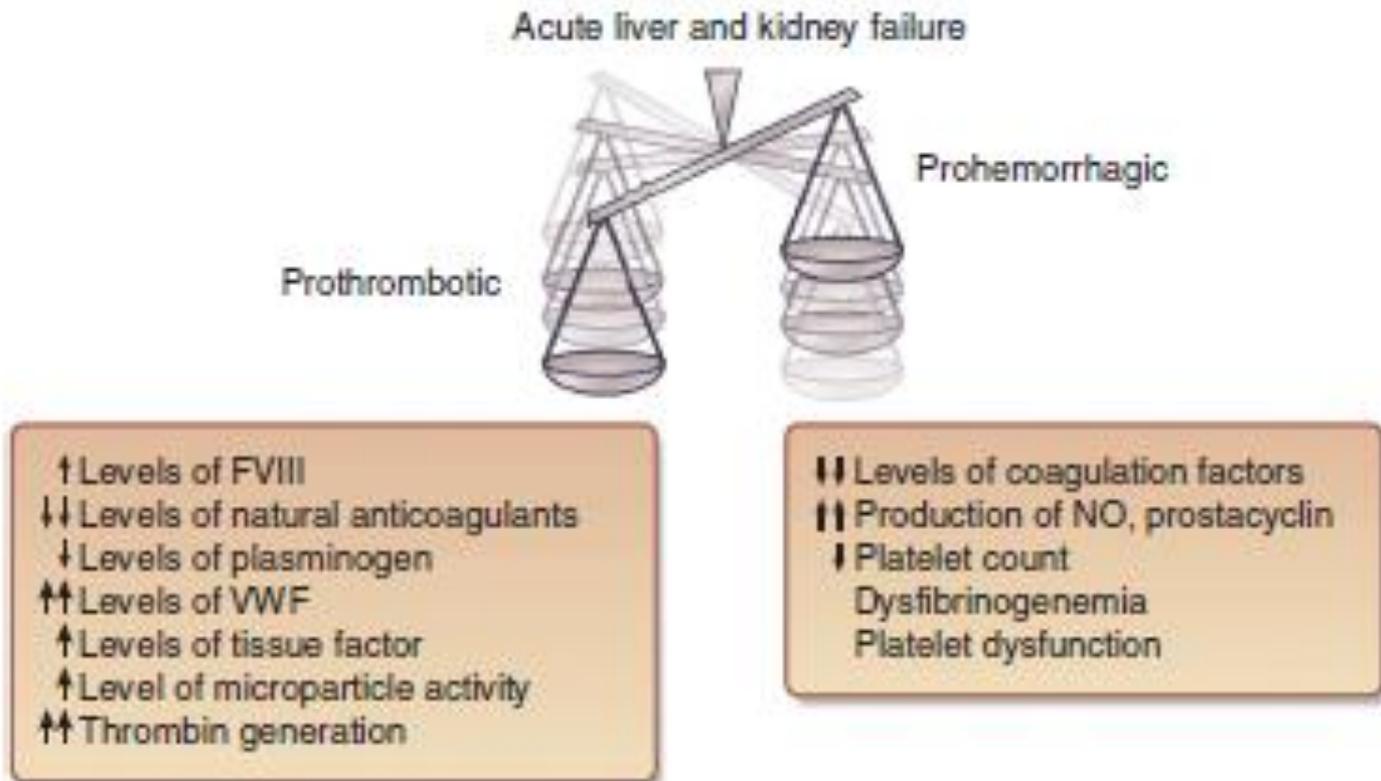
Obalans i hemostas



Kompenserad hemostas akut lever insufficiens

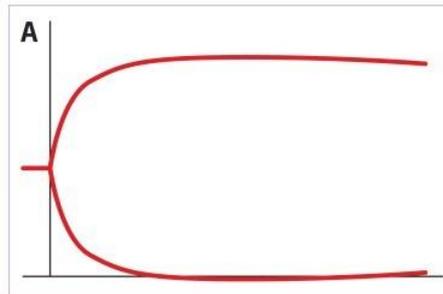


Hemostas akut lever insufficiens vid samtidig njursvikt



TEG vid leversvikt cirrhos

4 olika patienter



INR	Fib	TPK	MA
1.1	4.0	137	60.4



1.3	1.74	21	36.8
-----	------	----	------

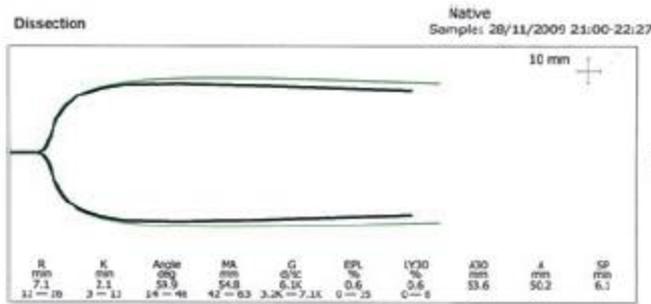


1.8	1.18	36	25.2
-----	------	----	------



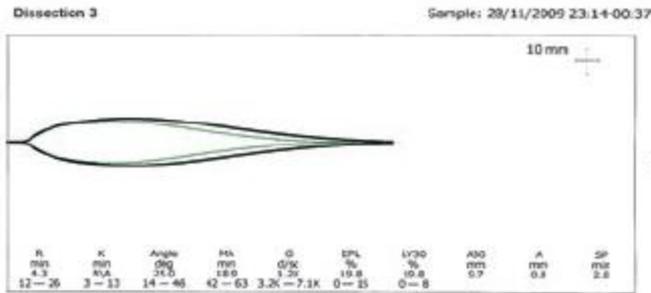
1.9	0.9	8	16.3
-----	-----	---	------

Levertransplantation

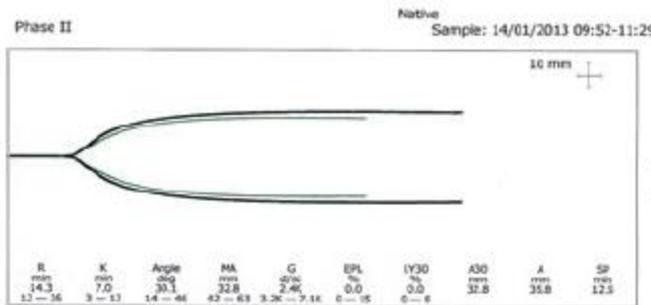


Normal trace

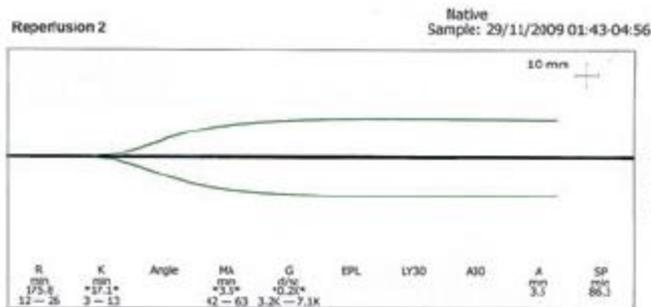
Olika faser



Fibrinolysis



Thrombocytopenia or low fibrinogen



Heparin effect reversed by Heparinase (green trace)

TABLE 1

ISTH criteria for predicting an overt DIC



Variable	Reference ranges	Points
★ PT/INR	PT normal	0
	PT prolonged 3–6 sec	1
	PT prolonged >6 sec	2
Platelet count	>100/nL	0
	50–100/nL	1
	<50/nL	2
★ D-dimer	Normal	0
	Slightly elevated	2
	Strongly elevated	3
★ Fibrinogen	>1 g/L	0
	<1 g/L	1

DIC, disseminated intravascular coagulation; *INR*, international normalized ratio; *ISTH*, International Society of Thrombosis and Haemostasis; *PT*, prothrombin time.

Windsperger. The fibrinogen/CRP ratio as a new parameter for the diagnosis of DIC. Am J Obstet Gynecol 2013.



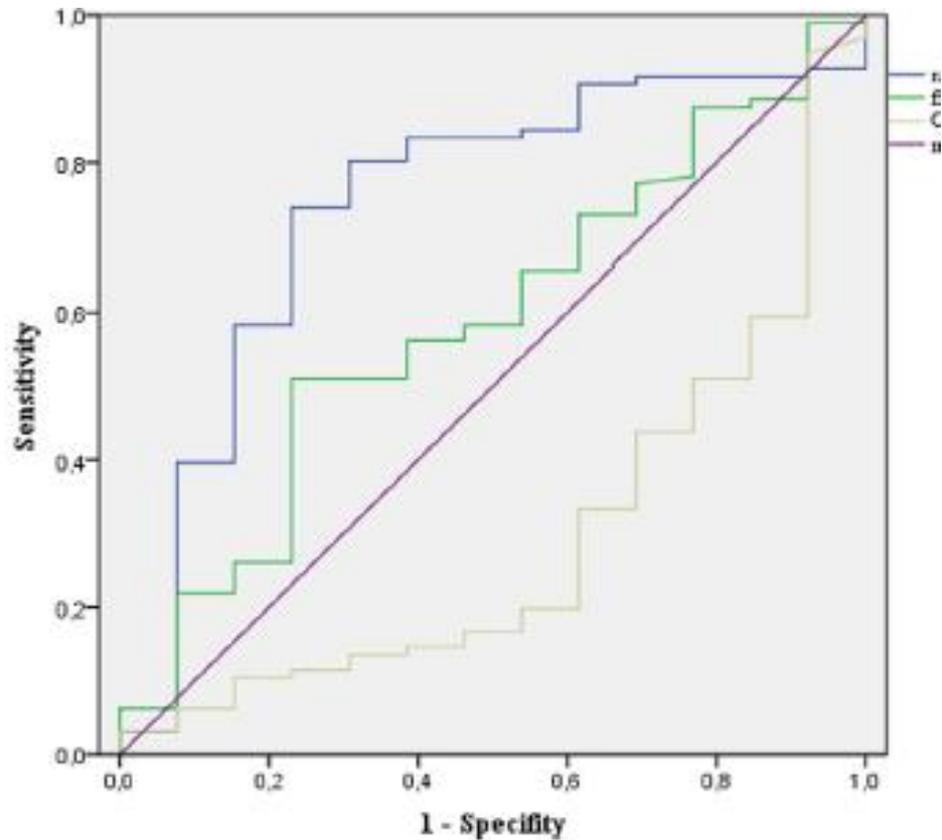
Inte användbar under **graviditet**

DIC diagnos vid leversjukdom
mycket svår men allvarlig

Upprepad provtagning

Organdysfunktion mer uttalad
och njursvikt

Fibrinogen/CRP ratio prediktor DIC vid HELLP



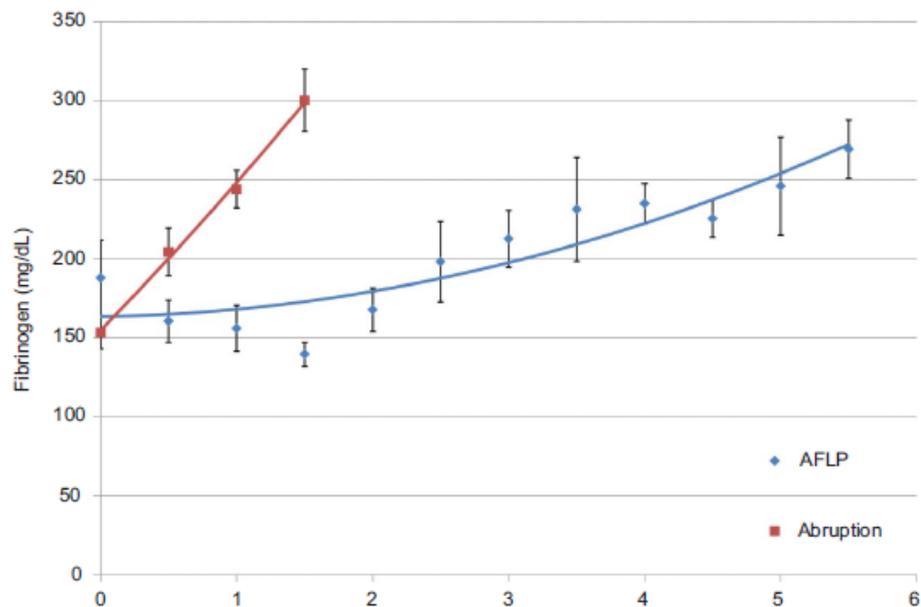
Ratio fibrinogen/CRP

Fibrinogen

CRP

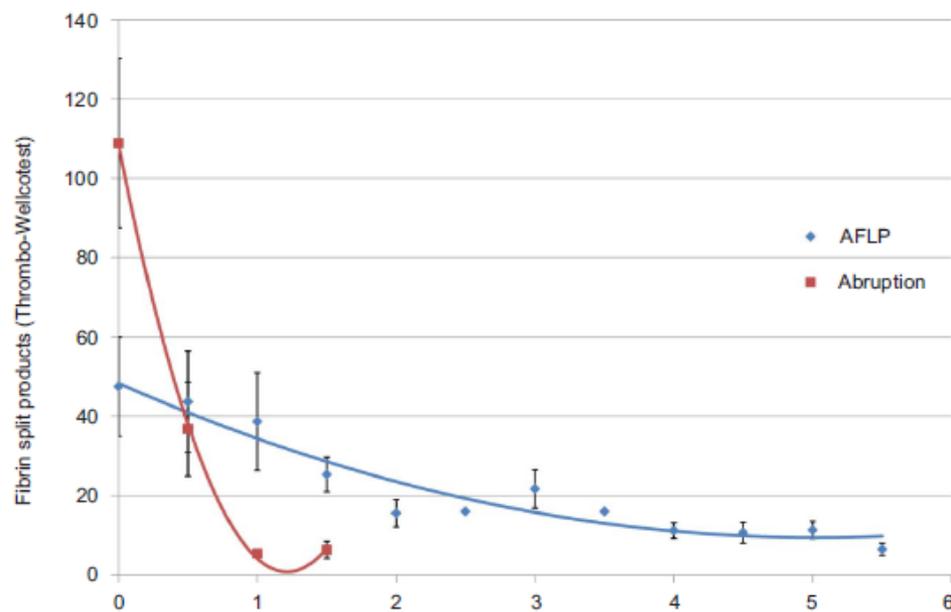
Jämförelse ablatio placentae och AFL

Fibrinogen



Dagar efter partus

FDP ~ D-dimer



Dagar efter partus

Inkomstprover

		HELLP	AFLP	Hepatit A
Hb	g/L	106/92	138	105
TPK	x10 ⁹ /L	53/45	132	226
PK	INR	1,4	1,2	1,9
APTT	s	29	45	36
fibrinogen	g/L	4	2,8	3
AT	kIE/L	0,69	0,24	0,52
D-dimer	mg/L	5,3	12	17
bilirubin	ukat/l	10	51	36
ALAT	ukt/L	4,3	6,8	36
krea	mmol/L	82	168	39

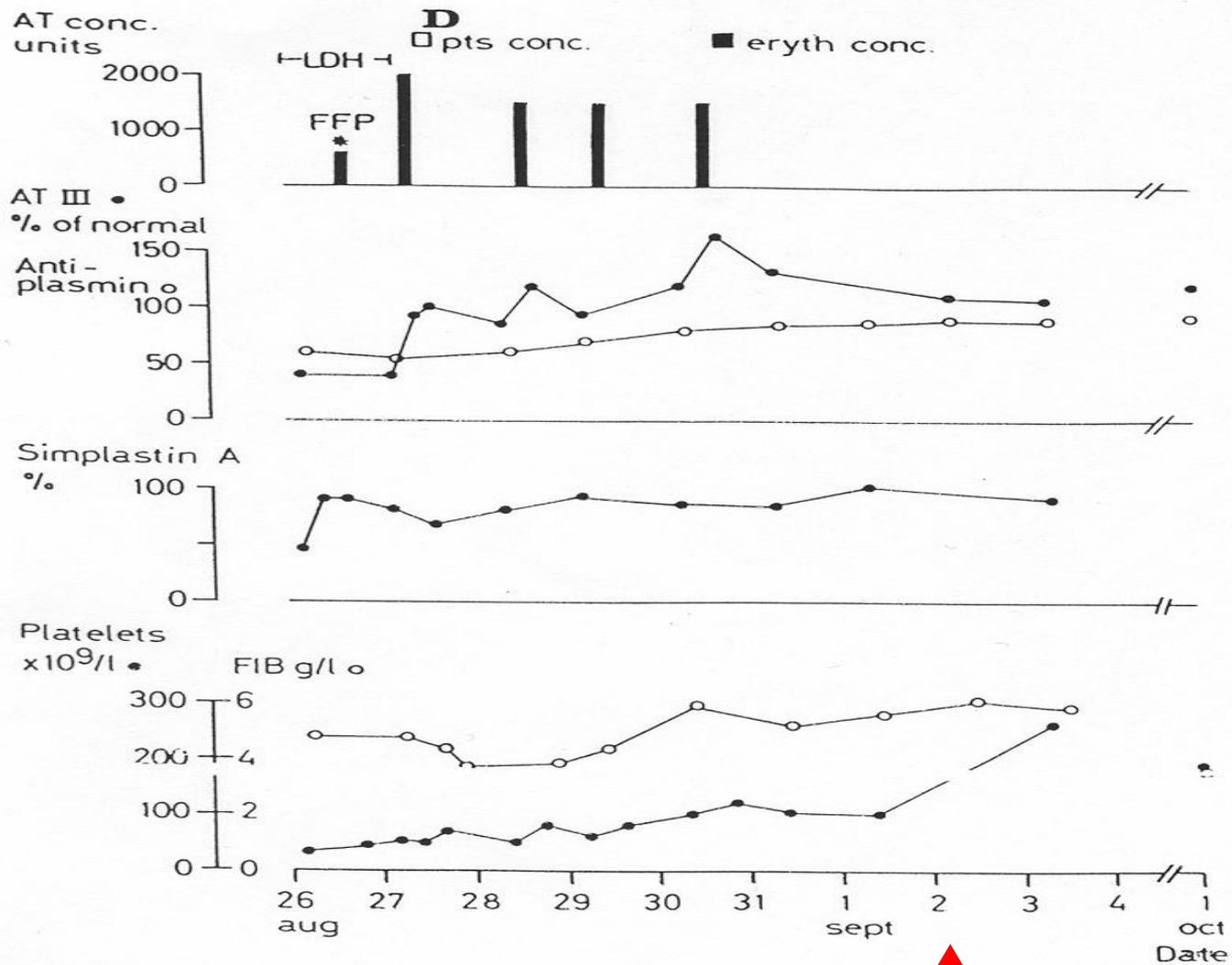
HELLP endotelskada

Olika delar av glykocalyx

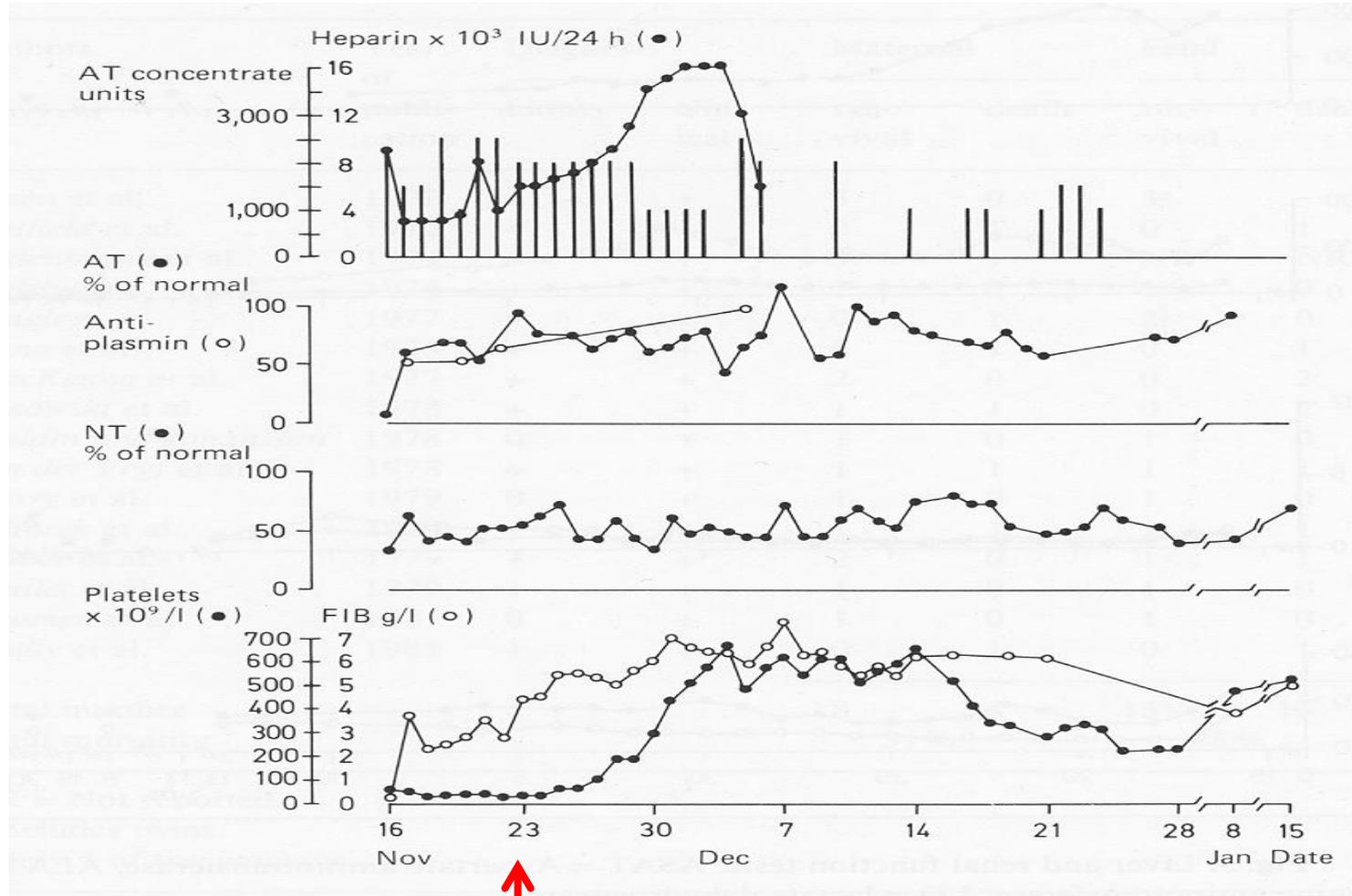
	HG, n = 15	NP week 30 \pm 3, n = 15	CG, n = 10	P Values	
				HG vs NP	HG vs CG
Syndecan I, ng/mL	12 252 (7369/16 595)	5943 (2637/10 292)	66.4 (50.7/69.7)	.02	<.01
Heparan sulfate, μ g/mL	15.8 (9.3/25.0)	4.9 (4.2/8.0)	6.2 (5.4/8.9)	<.01	.01
Hyaluronic acid, ng/mL	624 (395/1314)	131 (111/168)	86.0 (82.1/93.6)	<.01	<.01

HG= HELLP, NP= normal graviditet, CG= kontroll icke gravid

Patient med HELLP



Patient med akut fettlever



Behandling av koagulationsrubbing

- Förlös efter stabilisering
- Specifik behandling av hemostas endast vid blödning, stor risk för blödning (inför partus) och tromboembolism
- Trombosprofylax med kompressionsstrumpor och ev lågmolekylärt heparin (anti-Fxa aktivitet)

Specifik behandling

- E-koncentrat - förbättrar TPK funktion
- Fibrinogen, faktorkoncentrat (trombosrisk PCC)
- Hämmarkoncentrat (antitrombin eller protein C)
- Trombocytkoncentrat(TPK $<50 \times 10^9/L$)
- plasma, desmopressin?
- **Hepatolog och Koagulationskonsult**

Take home message!

Misstänk tidigt !

Tidig och upprepad provtagning (TPK, PK, antitrombin)



Trombos profylax!

Samarbeta med anesthesiolog/IVA, hepatolog , och koagulationist