Investigating INR and APTRs: What can YOU do?

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SESSION AIMs

01. CLOTTING 101

Revision of clotting and it's processes.

02. ABNORMAL INRs

Reasons for abnormal INRs and how they can be identified.

03. ABNORMAL APTRs

Reasons for abnormal APTRs and how they can be identified.

04. WHAT CAN YOU DO?

What tools do you have to investigate abnormal results?

WHY DO WE CLOT?

01. LIFE SAVING

Efficient clotting minimises blood loss after an injury.

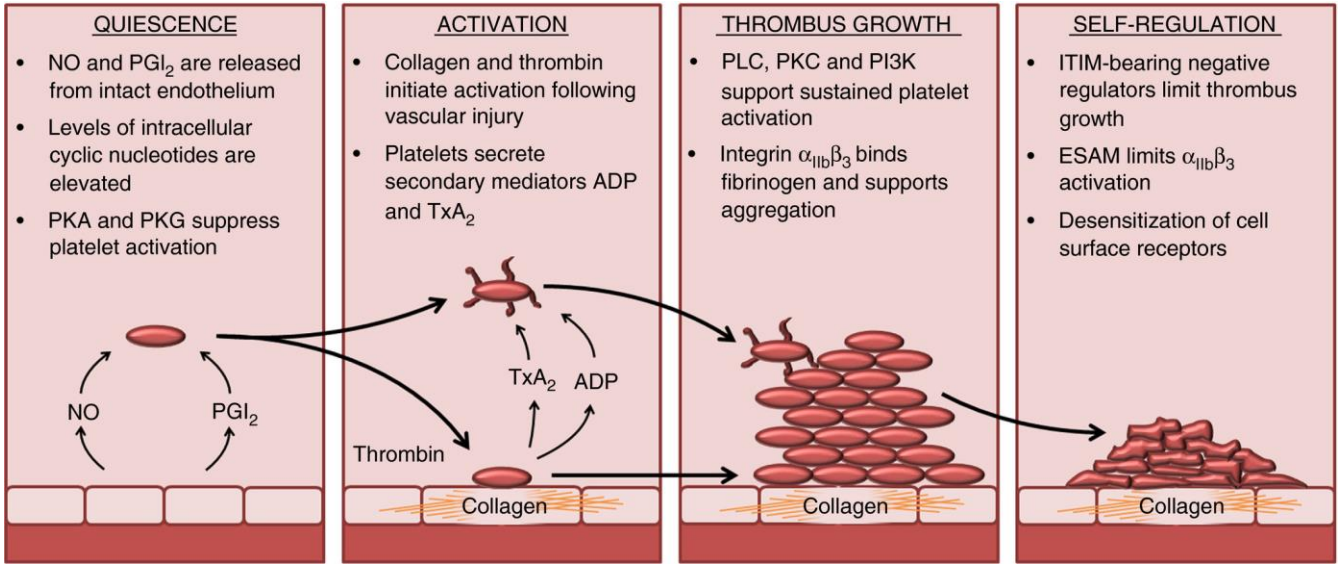
02. INFECTION PREVENTION

By blocking the wound, the clot prevents pathogenic entry.

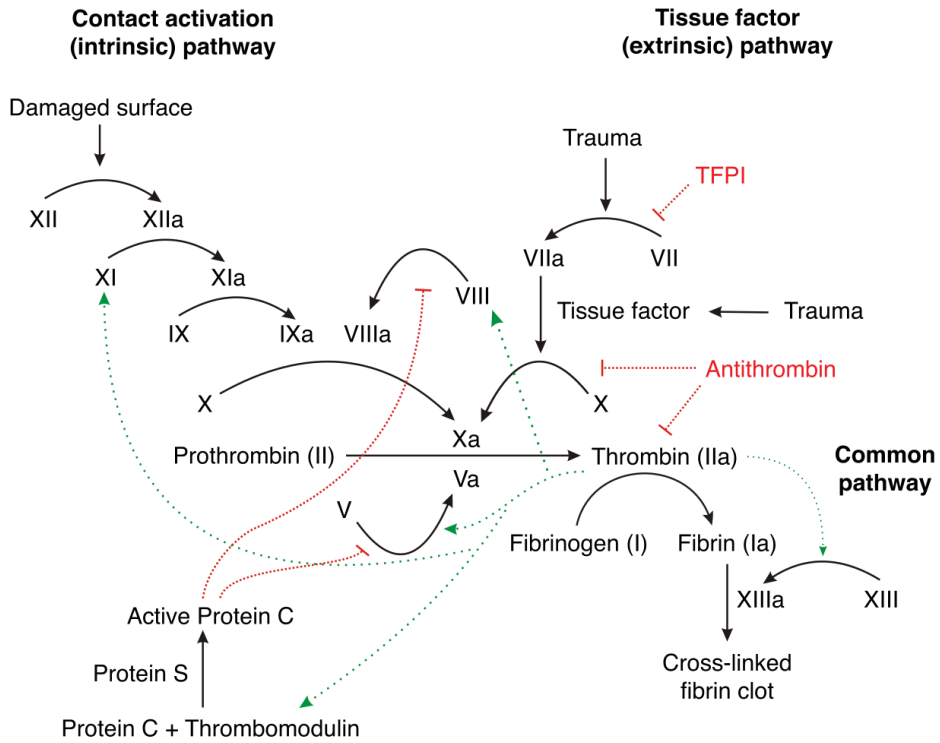
03. PROMOTES HEALING

By-products of clotting recruit immune cells and promote collagen and tissue development.

PRIMARY CLOTTING



SECONDARY CLOTTING



SECONDARY CLOTTING vs LAB TESTING

01. HOLISTIC

Secondary clotting happens in tandem with primary clotting.

02. NOT ONE OR THE OTHER.

Both intrinsic and extrinsic pathways are activated during the clotting cascade.

03. PLATELETS

Platelets are difficult to measure in laboratories but play a significant role in secondary clotting.

INTERNATIONAL NORMALISED RATIO: KEY FACTS

PROTHROMBIN TIME

Using reagent tissue factor, FVII is activated and triggers the common pathway.

INTERNATIONAL SENSITIVITY INDEX.

The ISI standardises all prothrombin reagents, which corrects for any biological variables.

$$INR = \left(\frac{PT_{patient}}{PT_{meannormal}} \right)^{ISI}$$

CLINICAL RELEVANCE?

Measures the **extrinsic** and **common** pathways. Used to monitor Vitamin K antagonists e.g. warfarin.

FACTORS ASSESSED

- FVII
- FX
- FV
- FXIII
- Prothromin/Thrombin
- Fibrinogen/Fibrin

INR: ABNORMALITIES

PROLONGED

DRUGS

- Vit-K antagonists.
- CYP antagonists
- Warfarin
- Apixaban (DOAC)
- Edoxaban (DOAC)

BIOLOGY

- Inflammation
- Liver Disease
- FVII deficiency
- FVII inhibitor
- Malnutrition

SHORT

PREANALYTICAL

Can be shorted by preactivation during a blood draw.

BIOLOGICAL

Can be shorted by hyperfibrinogenaemia

These are uncommon.

INR: DIFFERENTIAL DIAGNOSIS.

		APTR	Other Tests
Drugs	Vitamin K antagonist	↑ (mild) or normal	None.
	DOACS	↑	Specific levels can be tested.
Inflammation	Acute Phase Response	↑ (mild) or normal	CRP, bacterial cultures etc.
	Sepsis/DIC.	↑ or ↑↑ in later stages.	D-dimer, Fibrinogen. As above.
Liver Insufficiency	Liver Disease	↑ or ↑↑ in later stages.	ALT , AST, GGT, Bilirubin, Albumin
	Malnutrition	↑ in later stages.	Liver function may be deranged, vitamin levels will be reduced.
Deficiency or Inhibitor		Normal if FVII, ↑ if common	Factor levels and inhibitor screening.

ACTIVATED PARTIAL THROMBOPLASTIN RATIO: KEY FACTS

APT TIME

Plasma is incubated with a “foreign” substance and then calcium is added.

APT RATIO

There is no official conversion for APTR. However, to avoid changing reference ranges, a ratio is used.

$$APTR = (APTR^{patient} / APTR^{normal})$$

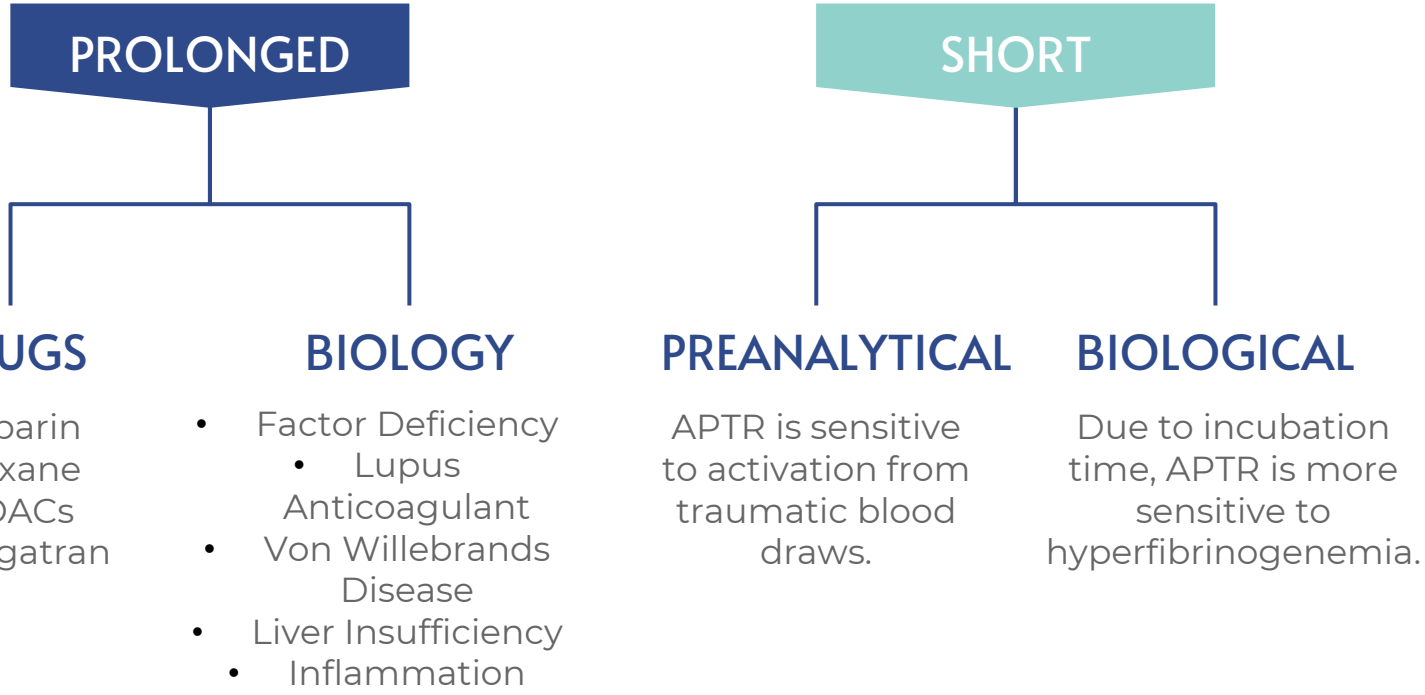
CLINICAL RELEVANCE?

Measures the **Intrinsic** and **common** pathways. Used to assess a wider range of clotting factors.

FACTORS ASSESSED

- FVIII
- FIX
- FXI
- FXII
- FX, FV, Prothrombin, Fibrinogen

APTR: ABNORMALITIES



APTR: DIFFERENTIAL DIAGNOSIS.

		INR	Other Tests
Drugs	Heparin/Clexane	Normal or mild ↑	Anti-Xa levels
	DOACS	↑	Specific levels can be tested.
Deficiency or Inhibitor		Normal (unless common)	Specific factor levels and inhibitor screens.
Lupus Anticoagulant		Normal	Dilute Russel Viper Venom Time etc.
Von Willebrand's Disease		Normal	FVIII levels, vWF antigen and activity
Liver Insufficiency	Liver Disease	↑↑	ALT , AST, GGT, Bilirubin, Albumin
	Malnutrition	↑↑	Liver function may be deranged, vitamin levels will be reduced.
Inflammation		↑ or ↑↑ in cases of sepsis or DIC	CRP, bacterial cultures etc. D-dimer, Fibrinogen. As above.


WHAT CAN
YOU DO?

THE IMPORTANCE OF HISTORY

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Clinical Info:
?TB. CLEX  \
Specimen No : HQ823269C
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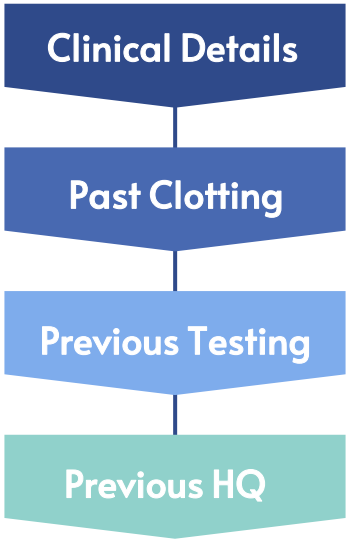
CLINICAL DETAILS

Drug names are contained in the current clinical details. Also, check locations e.g. ACEM or C5 for further clues!

PAST TESTING

Have they had specialist coagulation testing done? What were the results? Have they ever been under haematology?



PAST CLOTTING

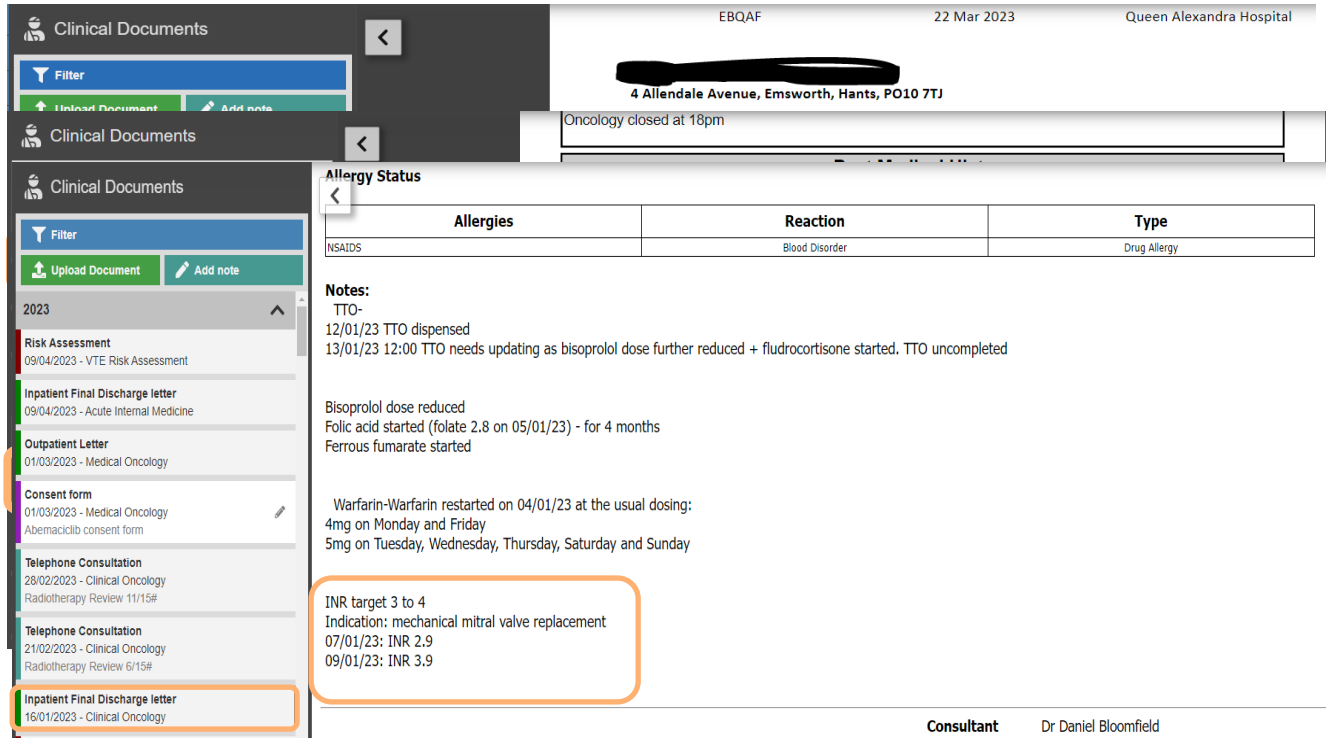
Previous, and recent clotting may have the drug name. It also illustrates the trend of results.

PREVIOUS HQ

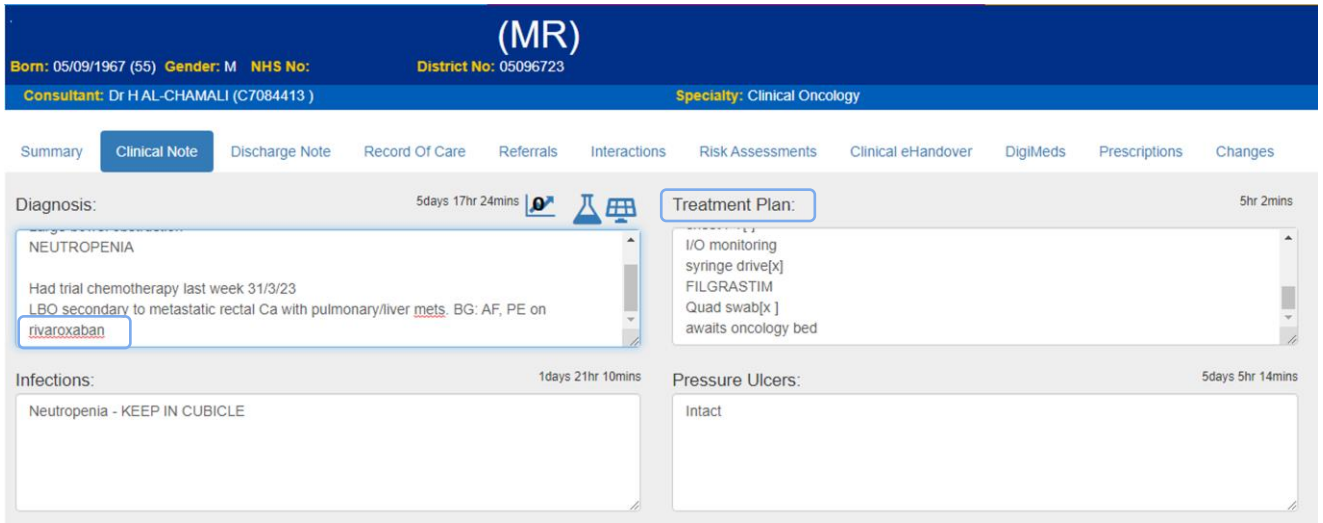
Has a doctor (or me!) done your work for you?

WHAT PROGRAMMES DO WE HAVE?

MINESTRONE


Clinical Documents
Filter
Upload Document
Add note
2023
Risk Assessment
09/04/2023 - VTE Risk Assessment
Inpatient Final Discharge letter
09/04/2023 - Acute Internal Medicine
Outpatient Letter
01/03/2023 - Medical Oncology
Consent form
01/03/2023 - Medical Oncology
Abemaciclib consent form
Telephone Consultation
28/02/2023 - Clinical Oncology
Radiotherapy Review 11/15#
Telephone Consultation
21/02/2023 - Clinical Oncology
Radiotherapy Review 6/15#
Inpatient Final Discharge letter
16/01/2023 - Clinical Oncology
EBQAF
22 Mar 2023
Queen Alexandra Hospital
[redacted]
4 Allendale Avenue, Emsworth, Hants, PO10 7TJ
Oncology closed at 18pm
Allergy Status
Allergies
Reaction
Type
NSAIDS
Blood Disorder
Drug Allergy
Notes:
TTO-
12/01/23 TTO dispensed
13/01/23 12:00 TTO needs updating as bisoprolol dose further reduced + fludrocortisone started. TTO uncompleted
Bisoprolol dose reduced
Folic acid started (folate 2.8 on 05/01/23) - for 4 months
Ferrous fumarate started
Warfarin-Warfarin restarted on 04/01/23 at the usual dosing:
4mg on Monday and Friday
5mg on Tuesday, Wednesday, Thursday, Saturday and Sunday
INR target 3 to 4
Indication: mechanical mitral valve replacement
07/01/23: INR 2.9
09/01/23: INR 3.9
Consultant
Dr Daniel Bloomfield

BEDVIEW


(MR)
Born: 05/09/1967 (55) Gender: M NHS No:
District No: 05096723
Consultant: Dr H AL-CHAMALI (C7084413)
Specialty: Clinical Oncology
Summary
Clinical Note
Discharge Note
Record Of Care
Referrals
Interactions
Risk Assessments
Clinical eHandover
DigiMeds
Prescriptions
Changes
Diagnosis:
5days 17hr 24mins
NEUTROPENIA
Had trial chemotherapy last week 31/3/23
LBO secondary to metastatic rectal Ca with pulmonary/liver mets. BG: AF, PE on
rivaroxaban
Treatment Plan:
5hr 2mins
I/O monitoring
syringe drive[x]
FILGRASTIM
Quad swab[x]
awaits oncology bed
Infections:
1days 21hr 10mins
Neutropenia - KEEP IN CUBICLE
Pressure Ulcers:
5days 5hr 14mins
Intact

50:50 MIX

INR

CORRECTS

- Suggests a lack of FVIII which may be congenital or aquired.

DOESN'T CORRECT

- FVII Inhibitor
- Drug inhibition

APTR

CORRECTS

- Possible lack of many clotting factors, which may be congenitasl or aquired.

DOESN'T CORRECT

- Factor Inhibitor
- Drug inhibition
- Lupus Anticoagulation

WHEN TO ACTION

HIGH INR

INR >6.0 for warfarin patients should be phoned.

50:50 MIX

Should be done if INR/APTR >1.4 with no cause.

HIGH APTR

>4.0 for any reason require phoning. Place on HQ if no cause.

DIC

Abnormal clotting with clinical details e.g. sepsis, may suggest DIC.

THANKS!

Do you have any questions?

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