

Case Studies in Clinical Hemostasis

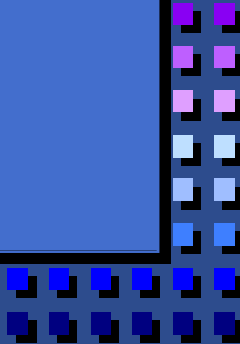


Case #3

The Case of the 3 Year-
Old Child with Tonsillitis
and an Elevated aPTT



Patient L.S.

- **Child with history of tonsillitis**
 - **Recurrent abdominal distress and vomiting**
 - **Normal birth and development, no other medical problems**
 - **No personal history of bleeding or bruising**
 - **No family history of bleeding disorder**
 - **Abnormal preoperative aPTT (34 sec) and bleeding time (14.5 min)**
 - **Referred to pediatric hematologist**
- 

Patient L.S.

- **What is the bleeding time? How is it performed? How could the discrepant bleeding time results be explained?**
- **What are common causes for an elevated aPTT?**
- **What further laboratory studies should be performed?**
- **What is the cause of the elevated aPTT in L.S.?**
- **Should the tonsillectomy be performed? What further therapy is indicated?**

**The Bleeding
Time -
Pot of Gold At
The
End Of The
Rainbow ?**



Bleeding Time

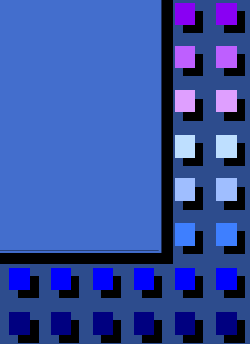
**“ The time between the
infliction of a small
incision and the moment
bleeding stops ! ”**

O'Brien, J.R.
Am. J. Clin. Pathol.
4:272-285, 1951



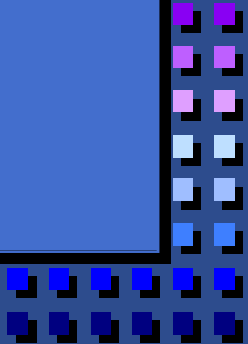
What Determines The Bleeding Time ?

In vivo test of hemostatic function

- Platelet function
 - Von Willebrand's factor
 - Endothelial function
 - Coagulation factors
 - Circulating cellular elements
- 



Bleeding Time Procedure

- Clean site with alcohol
 - Take medication history
 - Inflate blood pressure cuff to 40 mm
 - Make incision with template
 - Begin stopwatch
 - Blot incision at 30 second intervals
 - Red → Pink → Straw → Endpoint
 - Report in minutes up to 15 minutes
- 

Bleeding Time Reference Range

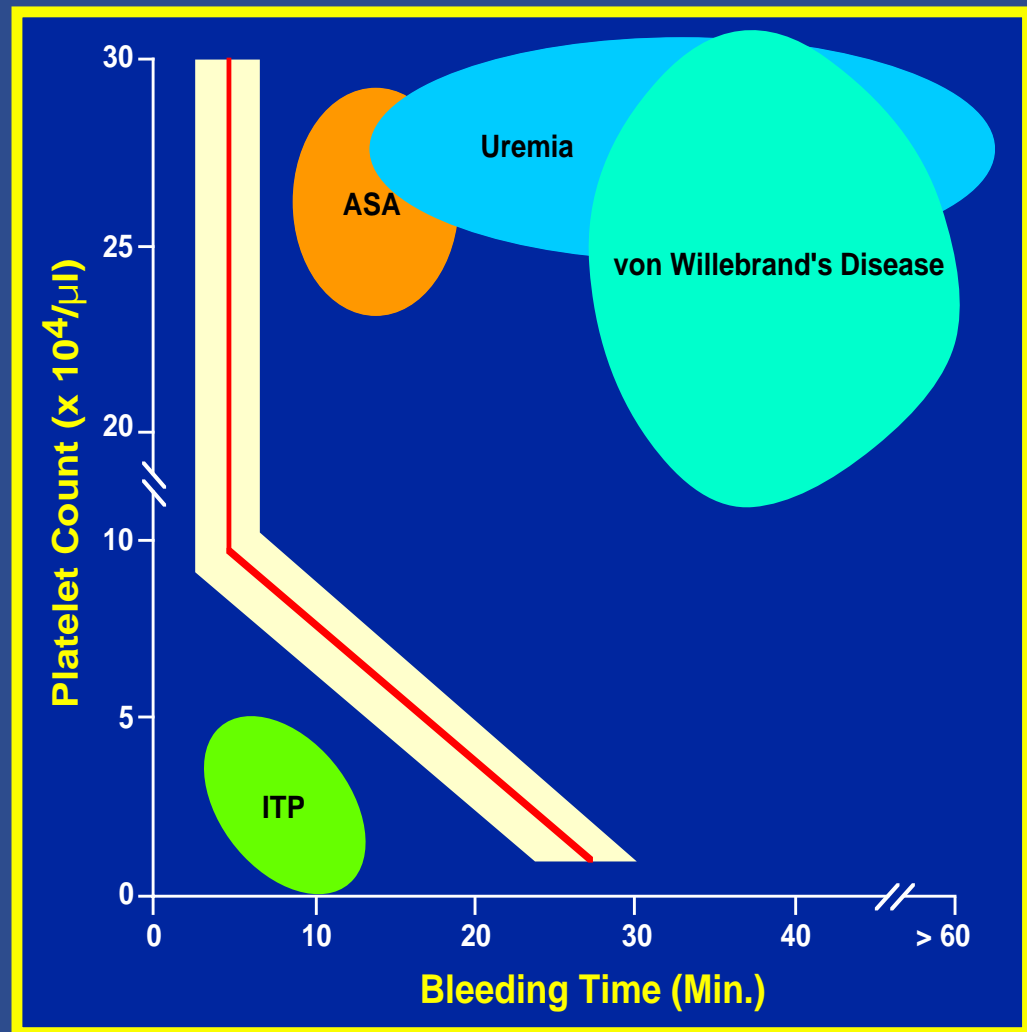
- 2.5 - 10 min - Blood 34:204-215,1969
- 2.3 - 7.0 min - AJCP 70:406-408,1978
- 2.5 - 6.5 min - Pediatrics 66:951-955,1980

Variability Of BT

- Location & direction of incision
- Size and depth of incision
- Skin characteristics
- Venous pressure
- Preparation of site
- Patient cooperation
- Blotting technique
- Endpoint variation



Effect Of Platelet Count On Bleeding Time



Harker, L.A. and Slichter, S.J.
NEJM 287:155, 1972

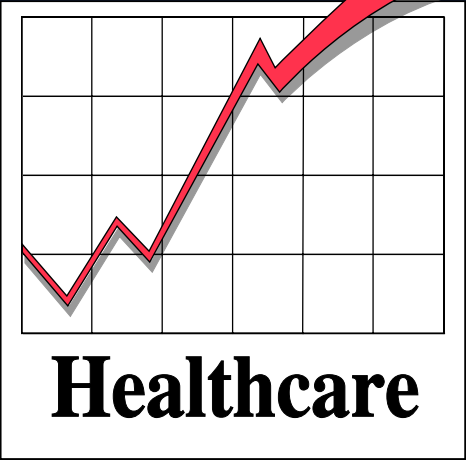
Clinical Applications Of Bleeding Time

- Diagnostic test for bleeding disorders
- Predict risk of perioperative hemorrhage
- Therapeutic decision-making for drugs and blood products

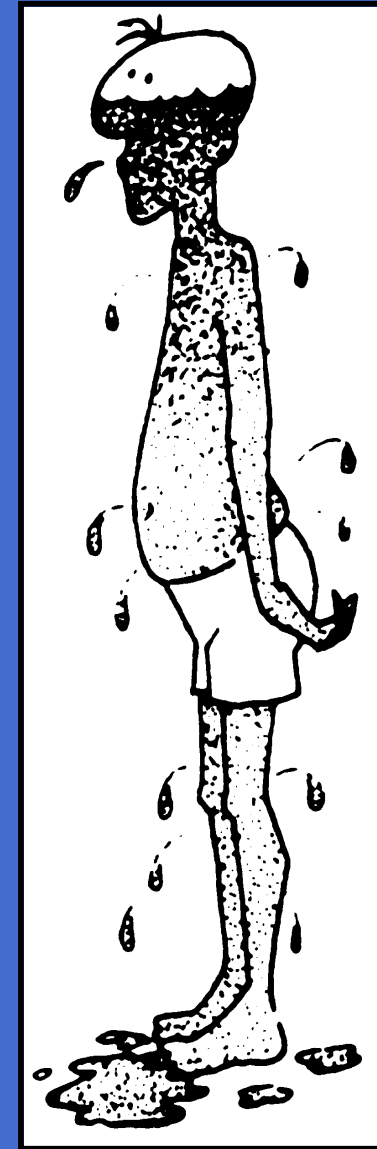




U.S. Bleeding Times -
1,000,000/Year
~ \$35,000,000/Year

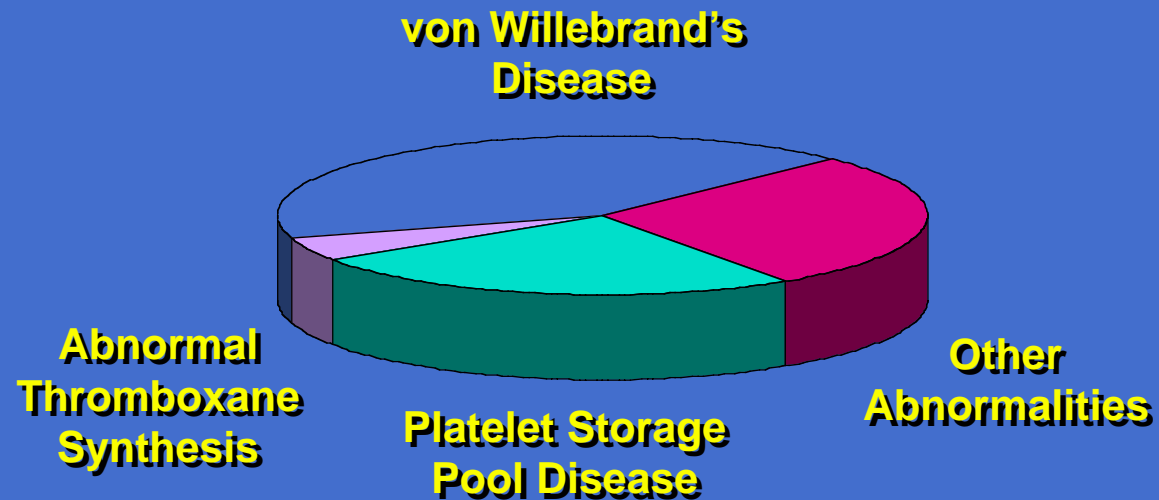


**The Bleeding
Time As A
Diagnostic Tool
In
The Bleeding
Patient**

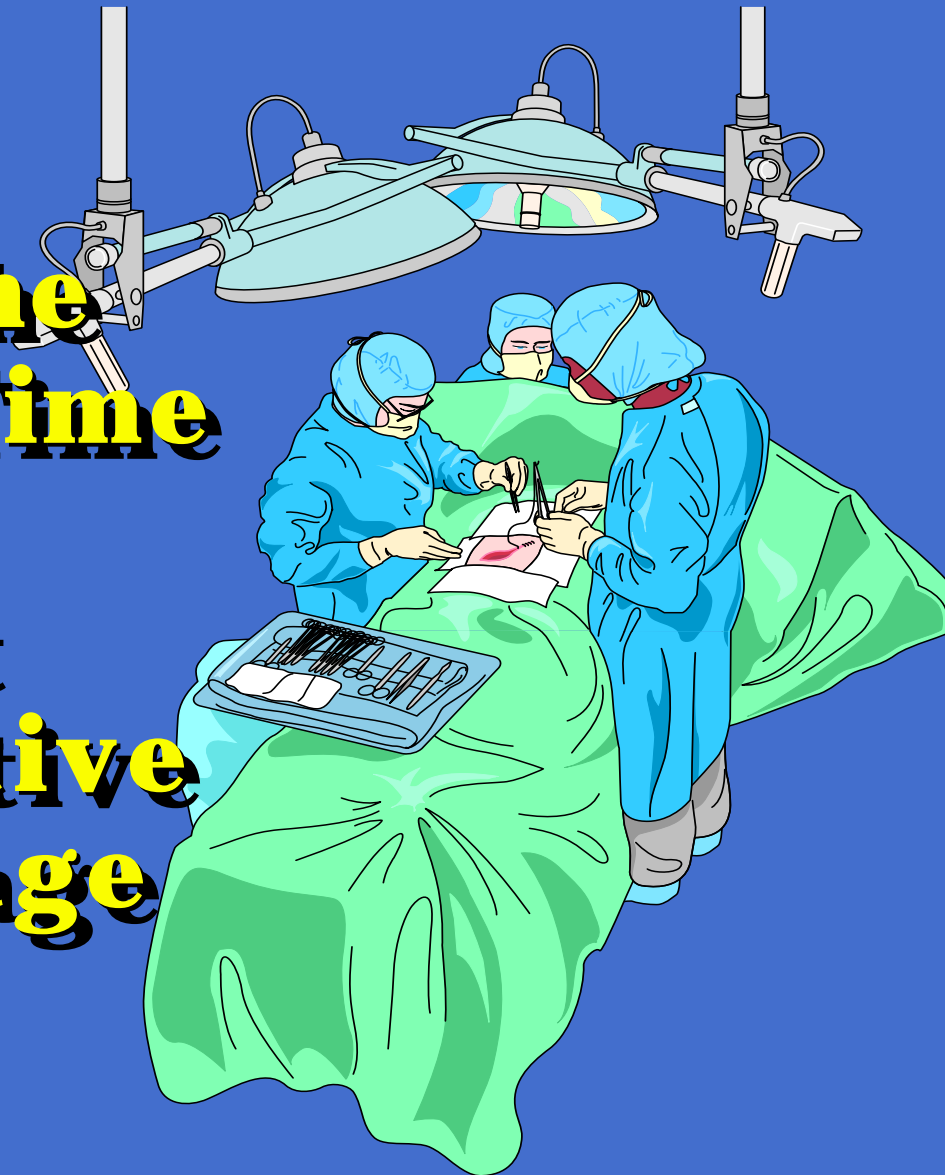


Bleeding Time As Diagnostic Tool

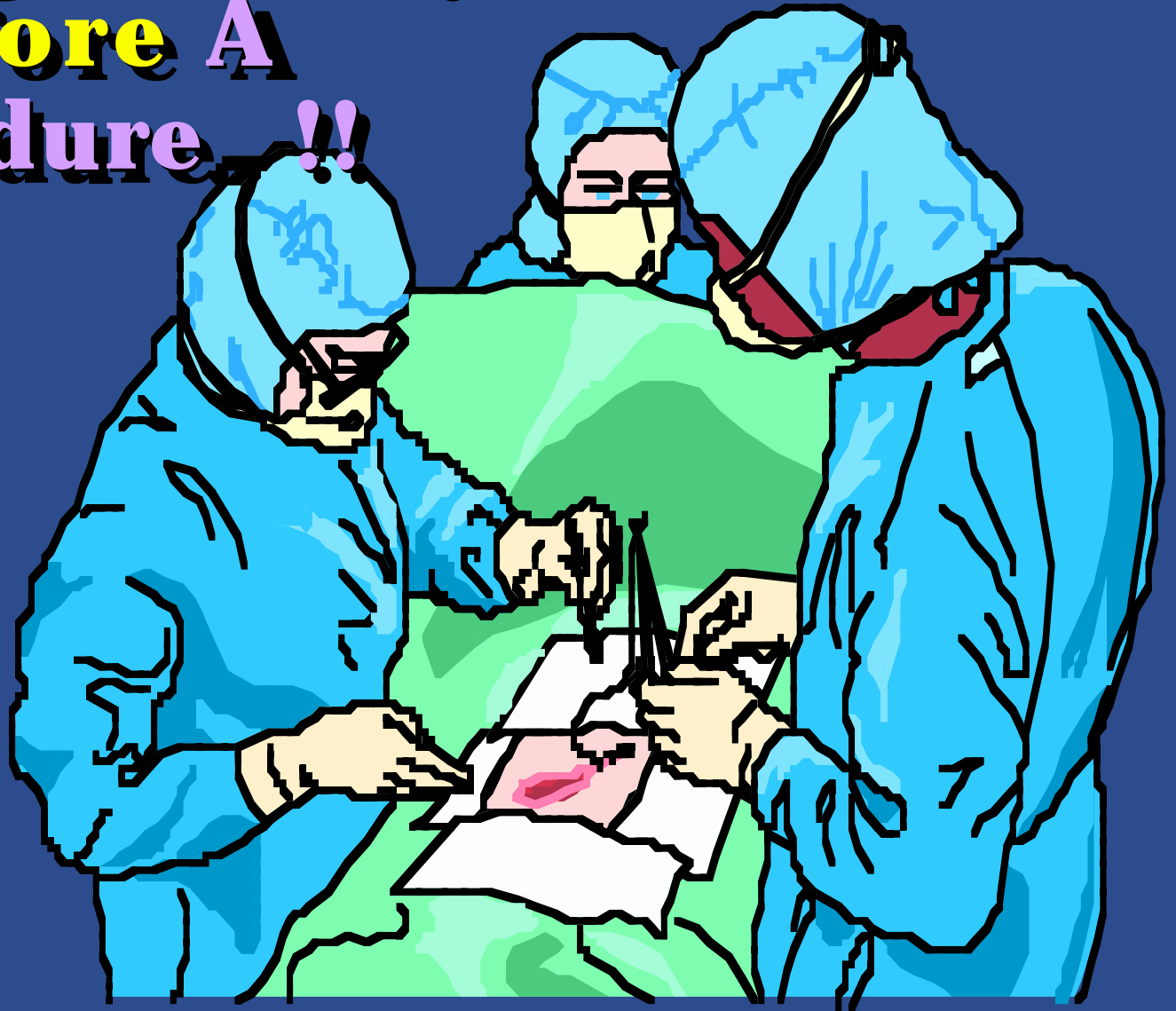
- Nieuwenhuis, Akkerman, and Sixma. Blood 70:620, 1987
- Detailed evaluation of 145 patients with history of bleeding disorder, prolonged bleeding time, and normal platelet count



**Use of the
Bleeding Time
to
Predict
Perioperative
Hemorrhage**



**Always Get A
Bleeding History
Before A
Procedure !!**




Preoperative Coagulation Testing

- Rohrer, Michelotti, and Nahrwold. Ann. Surg. 208, 554, 1988
- Efficacy of screening tests compared to efficacy of tests indicated by history and/or physical examination
- 1119 tests (BT, PT, PTT, PC) in 282 patients
- 514 screening tests in 282 patients, 4.1% abnormal, none clinically significant
- 605 indicated tests, 7.4% abnormal
- 44% of PT and PTTs, 59% of PCs, and 38% of BTs could be safely eliminated, saving \$370,000/year



Bleeding Time As A Preoperative Screening Test

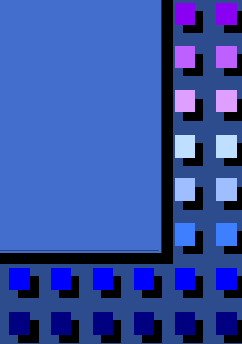
- Barber et al. Am. J. Med. 78:761, 1985
 - Reviewed 1,941 bleeding times performed as part of routine preoperative screen during a six-month period
 - Prolonged bleeding times (> 10 min.) found in 110 patients (5.6%)
 - Bleeding risk factors identified in 83/110 patients (75%)
 - Only 2/27 patients without risk factors severely prolonged bleeding times (> 20 min.)
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**Applications
of Bleeding
Time In
Planning Drug
Therapy And
The Use Of
Blood
Products**





Bleeding Time As A Therapeutic Guide

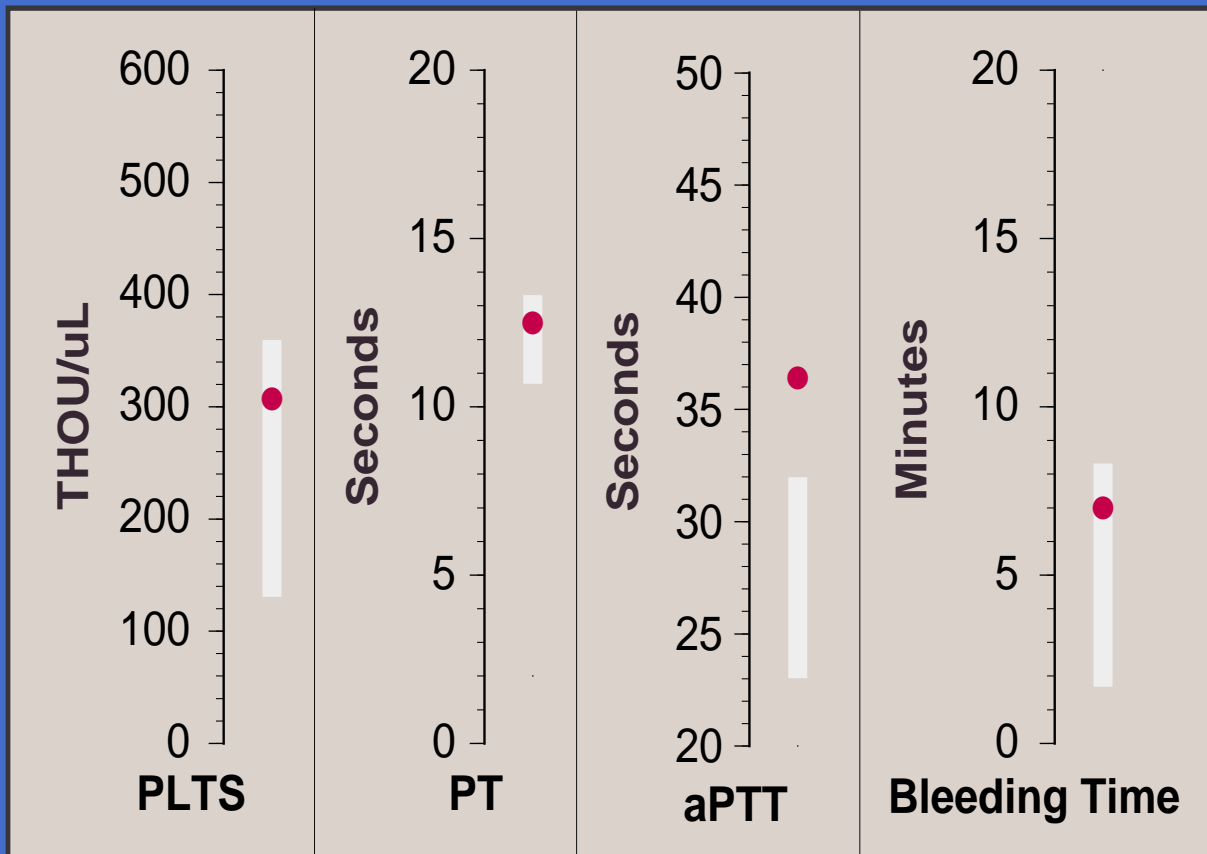
- **Post-operative cardiopulmonary bypass - Platelet dysfunction versus mechanical problem**
 - **VWD - Resposne to DDAVP**
 - **Bleeding associated with medications affecting platelet function**
 - **Bleeding associated with uremia - Response to DDAVP, estrogens, cryoglobulin, or dialysis**
 - **Bleeding in patients with acute alcohol intoxication**
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The Bleeding Time - Neither Pariah Nor Panacea

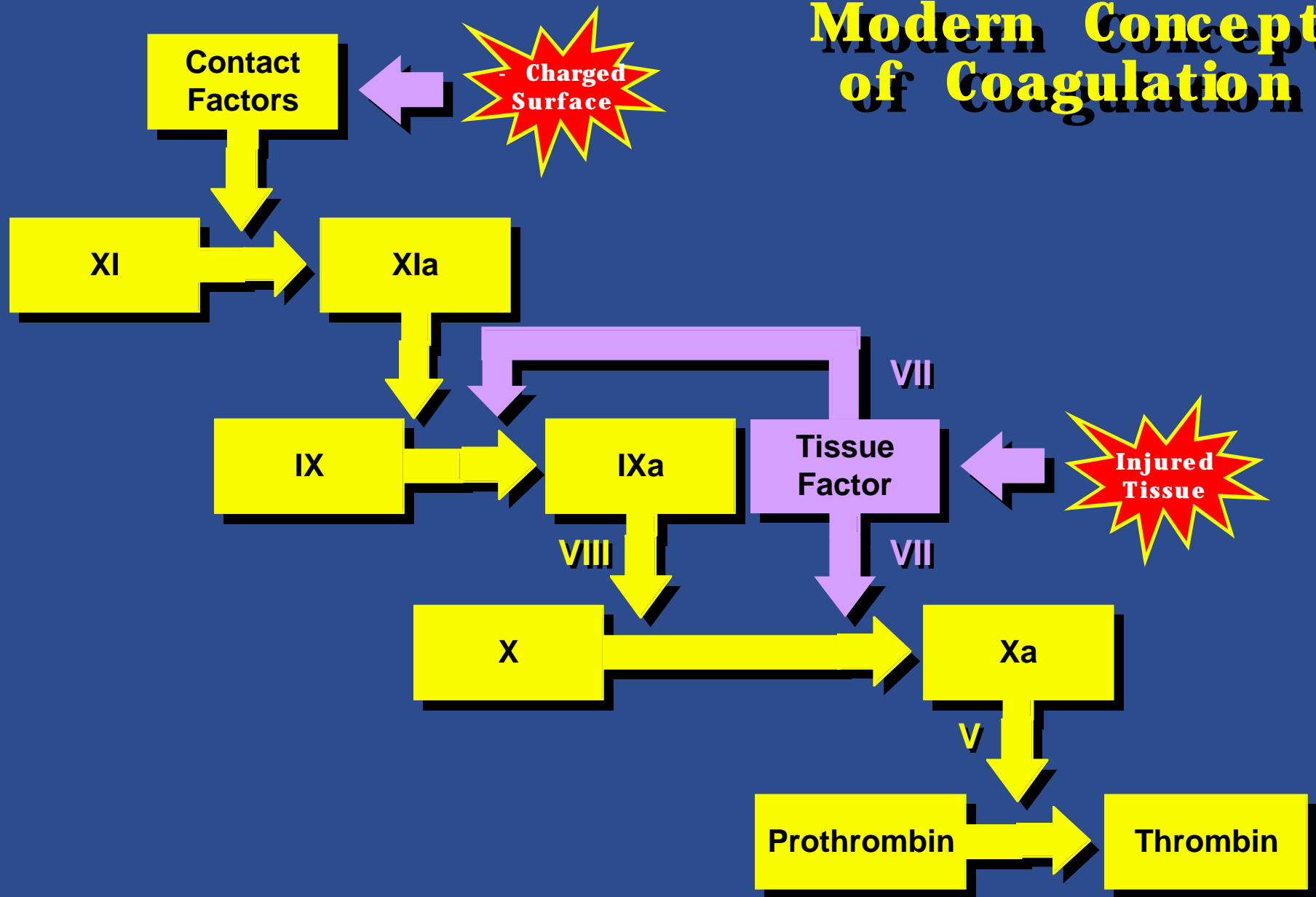
Douglas Triplett, M.D.



Patient L.S. Repeated Studies



Modern Concept of Coagulation



Causes of Elevated aPTT

- **Heparin administration**
- **Factor deficiency**
II, V, VIII, IX, XI, XII
- **Hypofibrinogenemia (< 100 mg/dL)**
- **Specific inhibitors**
- **Non-specific inhibitors**
- **Antithrombotic substances (FDPs)**
- **Disseminated intravascular coagulation**
- **Vitamin K deficiency**

aPTT Inhibitor Screen

 Normal Plasma

 Patient Plasma

1:1



**Perform
Prothrombin
Time**

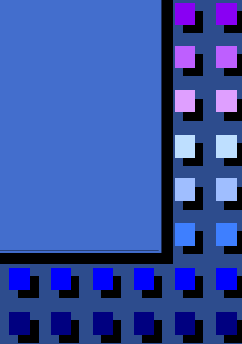
**Factor Deficiency - PT Corrected
Factor Inhibitor - PT Uncorrected**

aPTT Inhibitor Screen

Mixture	Unincubated	INTR	Incubated	INTR
Normal Plasma	23.6 sec	-	24.7 sec	-
Patient Plasma	36.4 sec	-	45.5 sec	-
1 Normal:1 Patient	28.5 sec	CRCT	35.6 sec	NCRCT
1 Normal:4 Patient	32.9 sec	NCRCT	44.8 sec	NCRCT
4 Normal: 1 Patient	26.0 sec	CRCT	34.0 sec	CRCT



Non-Specific Coagulation Inhibitor

- **Common in children with recurrent URI treated with repeated courses of antibiotics**
 - **Rarely associated with clinical bleeding**
 - **Usually resolve with time**
 - **Exclusion of lupus anticoagulant, vWD, and congenital factor deficiencies essential**
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Case Studies in Clinical Hemostasis



Case #3
The End