

# A Comprehensive Web-based Program for Coagulation Training



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Medicine

UAREP Computer Demo

# Educational Purpose



- ⌘ To offer a comprehensive training experience for pathology residents on hematology rotation. The materials in this program will supplement other existing clinical and teaching activities

# Intended Audience



- ⌘ The program is designed primarily for pathology residents
- ⌘ Parts of the materials are also useful for others (residents in other clinical specialties, practicing physicians, and medical technologists)

# Key Components



- ⌘ Lessons: to cover all aspects of coagulation
- ⌘ Practicals: case studies
- ⌘ Examination

# Design Platform



- ⌘ Microsoft Windows server with Internet Information server
- ⌘ On-line teaching management software: Web Course in a Box (Madduck Co)
- ⌘ Web pages: html, JavaScript

# Demo



⌘ The current version is approximately 70% completed

⌘ Web address:

<http://129.106.169.35/wcb/schools/11/51/anguyen/4/default.htm>

⌘ Student guest account:

User name: jsmith

Password:505



# Bookmarks for

## Personal Toolbar Folder

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Enter username for 129.106.169.35 at 129.106.169.35:

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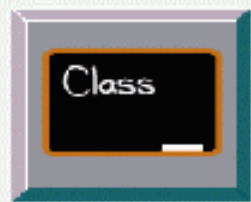
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What's Related

## COAG 5320 (section 15) -- Summer, 2001

# Coagulation

Instructor: [Andy Nguyen](#) E-mail: [nguyen@casper.med.uth.tmc.edu](mailto:nguyen@casper.med.uth.tmc.edu)



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## Summer, 2001 -- COAG 5320 -- Section 15



# Course Info

**Instructor:** Andy Nguyen    **Email address:** [nguyen@casper.med.uth.tmc.edu](mailto:nguyen@casper.med.uth.tmc.edu)

- [Goals and Objectives](#)
- [Policies and Procedures](#)
- [Required Texts](#)
- [Web Links](#)

## Goals and Objectives ▲

Extensive coverage of hemostasis and thrombosis as applied to clinical medicine.



Bookmarks Location: <http://129.106.169.35/wcb/schools/11/51/anguyen/4/announce.html>

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DATE: Thu, May 10, 6:03PM  
SUBJECT: Course prerequisites

Prospective students need to contact instructor by e-mail to ensure that prerequisites have been met.

*Page last updated Thu, May 10, 6:04PM by Andy Nguyen.*



## Summer, 2001 -- COAG 5320 -- Section 15



# Schedule

<a href="#"><u>WEEKS 1-2</u></a>	<a href="#"><u>WEEKS 3-4</u></a>	<a href="#"><u>WEEK 5</u></a>	<a href="#"><u>WEEK 6</u></a>	<a href="#"><u>WEEK 7</u></a>
<a href="#"><u>WEEK 8</u></a>	<a href="#"><u>WEEK 9</u></a>	<a href="#"><u>WEEK 10</u></a>		

### WEEKS 1-2

Covering Lesson 1 (Hereditary Disorders of Coagulation Proteins)

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### WEEKS 3-4

Covering Lesson 2 (Acquired Disorders of Coagulation Proteins)

---



Bookmarks Location: <http://129.106.169.35/wcb/schools/11/51/anguyen/4/students.html>

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# Students Directory

[Send Email to All Students in Class](#)

**Homepage**

**E-mail**

**Portfolio**

[Darlene Brown](#)

[brown@casper](mailto:brown@casper)



[Lisa Nguyen](#)

[lisa@casper.med.uth.tmc.edu](mailto:lisa@casper.med.uth.tmc.edu)



[John Smith](#)



Page last updated Thu May 11 12:12 PM

Document: Done

# Lisa Nguyen



Email: [lisa@casper.med.uth.tmc.edu](mailto:lisa@casper.med.uth.tmc.edu)

Portfolio: 

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## Biography

BS, Texas A&M University 1998

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## Special Interests

Medical technology, informatics

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## WWW Links of Interest

[American Medical Informatics Association](#)



Summer, 2001 -- COAG 5320 -- Section 15



# Help/Utilities

[Student Guide](#)

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## Web Course in a Box

### Student's Guide

#### A. Introduction

Your instructor has created a set of Web pages for your class using an authoring tool called Web Course in a Box (WCB). This WCB Student's Guide is designed to help you get started using WCB COURSE PAGES and to acquaint you with features which will let you use them more efficiently.

The World Wide Web provides a user-friendly, multimedia environment for accessing learning materials. Materials on the Web can be accessed at any time, including remotely from your home or dorm if you have a computer with an Internet connection

#### B. Internet Access

The WCB COURSE PAGES your instructor has created can be viewed with any Web browser; recommended are Netscape Navigator, version 2.0 or higher, or Microsoft Internet Explorer, version 3.0 or higher. In order to use a Web browser, you will need to have an Internet connection. Your instructor or your Computing Services can provide you with information on Internet access on campus as well as possible off-campus options.

You may use a Web browser other than those recommended (such as the text-only Lynx or the AOL Web browser



Summer, 2001 -- [COAG 5320](#) -- Section 15



## Learning Links

### Discussion Forums

#### [Forum for Coagulation Class](#)

A general discussion forum to discuss various issues in coagulopathy. Every student is welcome to post questions and answers.

### Lessons

#### [Lesson 1: Hereditary Disorders of Coagulation Proteins](#)

#### [Lesson 2: Acquired Disorders of Coagulation Proteins](#)

#### [Lesson 3: Hereditary Disorders of Platelets](#)

#### [Lesson 4: Acquired Disorders of Platelets](#)



**[Lesson 5: Findings in Anticoagulant Therapy](#)**

**[Lesson 6: Therapeutic Modalities](#)**

**[Practical 1: a 5 year-old male with marked bruising](#)**

**[Practical 2: a 35 year-old male found unconscious in a house fire](#)**

**[Practical 3: a 27 year-old female with rash](#)**

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## Exercises and Quizzes

**[Final Examination](#)**

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## Links

**[WEB COAG homepage](#)**

Decision-support system for coagulopathy

## **Coagulation profiles**

Displaying pattern of seven screening coagulation tests for each disorder (from WEB COAG)

## **Differential diagnosis**

Displaying differential diagnoses that fit the coagulation results given by the user (from WEB COAG)

## **Synopsis of coagulopathy and therapy**

Displaying essential information on coagulopathy and therapeutic modalities (from WEB COAG)

## **Coagulation cascade diagram**

Viewing the coagulation cascade and clicking on the factors in the diagram to see associated disorders (from WEB COAG)

## **Diagnostic Flowchart for prolonged aPTT**

Flowchart with diagnostic algorithms for a prolonged aPTT with a normal PT

*Page last updated Thu, May 10, 6:32PM by Andy Nguyen.*



## COAG 5320 -- Section 15 -- Summer, 2001



# Forum for Coagulation Class

[\[ Post Message \]](#) [\[ Archive \]](#)

- [Hypercoagulation risk in patients with Factor XII deficiency](#) - **Darlene Brown** 11:10:29 5/11/01 (1)
  - [Re: Hypercoagulation risk in patients with Factor XII deficiency](#) - **Lisa Nguyen** 11:44:38 5/11/01 (0)



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Location:

://129.106.169.35/wcb-bin/students/wwwboard.new.cgi?path=11/51/anguyen/4/forums/forum1



What's Related

## WCB Forum

### Post A Message!

**Subject:****Message:****Attachment:**



## COAG 5320 -- Section 15 -- Summer, 2001



# Forum for Coagulation Class

[\[ Post Message \]](#) [\[ Archive \]](#)

- [Factor II mutation and Factor II level](#) - **John Smith** 14:08:42 6/25/101 (0)
- [Hypercoagulation risk in patients with Factor XII deficiency](#) - **Darlene Brown** 11:10:29 5/11/101 (1)
  - [Re: Hypercoagulation risk in patients with Factor XII deficiency](#) - **Lisa Nguyen** 11:44:38 5/11/101 (0)



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---

**Subject:** Hypercoagulation risk in patients with Factor XII deficiency

**Posted by:** [Darlene Brown](#) on 11:10:29 5/11/101:

I have not been able to figure out why patients with Factor XII deficiency do not have bleeding problem. It is even a paradox that they have high risk for hypercoagulation. Is there anybody in this class who has the answer to this?

Thanks

Darlene Brown

---

### FollowUps:

- [Re: Hypercoagulation risk in patients with Factor XII deficiency](#) [Lisa Nguyen](#) 11:44:38 5/11/101 (0)



[\[ Read FollowUps \]](#) | [\[ Post Followup \]](#) | [\[ Message List \]](#)

**Subject:** Re: Hypercoagulation risk in patients with Factor XII deficiency

**Posted by:** [Lisa Nguyen](#) on 11:44:38 5/11/101:

**In Reply to:** [Hypercoagulation risk in patients with Factor XII deficiency](#) posted by [Darlene Brown](#) on May 11 19101 at 11:10:29:

Hi Darlene:

From what I understand, the requirement of Factor XII for normal hemostasis is poorly defined. Bleeding diatheses have not been reported in patients with Factor XII deficiency. Furthermore, it has been suggested from clinical observation that these patients predispose to thrombosis, possibly due to the decrease in surface-mediated fibrinolysis (Factor XII participates in activating fibrinolysis). However, no comprehensive study has been conducted to confirm their high risk for hypercoagulation.  
Lisa Nguyen

**FollowUps:**



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# Lesson 1: Hereditary Disorders of Coagulation Proteins

## Hereditary Disorders of Coagulation Proteins

This lesson covers basic information on various hereditary disorders of coagulation proteins: pathophysiology, diagnosis, and treatment.





## LESSON 1

Andy Nguyen, M.D. / UT-Medical School at Houston, Pathology / Last Revision on: 5/4/01

### Hereditary Disorders of Coagulation Proteins:

- [Factor XII Deficiency, Hereditary](#)
- [Prekallikrein Deficiency](#)
- [Factor XI Deficiency](#)
- [Factor IX Deficiency \(Hemophilia B\)](#)
- [Factor VIII Deficiency \(Hemophilia A\)](#)
- [Acquired Factor VIII Inhibitor in Hemophilia A](#)
- [vonWillebrand's Disease, type I](#)
- [vonWillebrand's Disease, type IIA](#)
- [vonWillebrand's Disease, type IIB](#)
- [vonWillebrand's Disease, type III](#)
- [Factor VII Deficiency](#)
- [Factor X Deficiency](#)
- [Factor V Deficiency](#)
- [Afibrinogenemia](#)
- [Hypofibrinogenemia](#)
- [Dysfibrinogenemia](#)
- [Factor XIII Deficiency](#)

## DEFICIENCY OF FACTOR XII (Hageman factor)

Andy Nguyen, M.D./ UT-Medical School at Houston, Pathology/ Last Revision on: 12/9/96

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- **Biochemical aspects:**

Factor XII is a single-chain beta-globulin with a MW of 80,000. Activated factor XII cleaves prekallikrein, factor XI, and factor VII proteolytically, converting them to their active forms.

- **Pathological Basis:**

- Mode of inheritance: autosomal recessive.
- Acquired deficiency is seen in patients with nephrotic syndrome. The pathological basis of this acquired deficiency has not been established since urinary loss of factor XII alone may not account for the reduced plasma activity of this factor.

- **Treatment:**

- No treatment necessary for hereditary type.
  - Management of nephrotic syndrome in acquired type.
- 

### Diagnostic Criteria for Hereditary F XII Deficiency

1. Negative\_bleeding\_history
2. APTT:abnormal
3. Mixing\_APTT:corrected
4. Factor\_XII\_assay:abnormal
5. No\_evidence\_of\_renal\_insufficiency\_or\_failure
6. APTT,incubated\_10\_min:not\_corrected



Bookmarks Location: <http://129.106.169.35/wcb/schools/11/51/anguyen/4/modules/page8.html>

What's Related



Summer, 2001 -- COAG 5320 -- Section 15



# Practical 1: a 5 year-old male with marked bruising

[See the case history of this patient](#)

## **PRACTICAL 1: a 5 year-old male with marked bruising**

**Andy Nguyen, M.D. / UT-Medical School at Houston, Pathology /** Last Revision on: 5/10/01

- **Clinical History:**

Patient is a 5 year-old boy referred by his pediatrician because of a marked bruising tendency of the arms and legs. The mother related that the bruising typically appeared without serious trauma.

Past medical history revealed no bleeding at the time of circumcision or in association with separation of the umbilical cord. At 20 months of age, the patient underwent corrective eye surgery for strabismus without any unusual bleeding. At 3 years of age, the patient had an episode of marked epistaxis that necessitated hospital admission and transfusion of one unit of blood.

There was a family history of bleeding on the maternal side of the family. The patient's mother, maternal grandmother and maternal great grandmother had experienced episodes of abnormal bleeding. Their bleeding was characterized by recurrent epistaxis and easy bruising together with menorrhagia. The patient's mother had required 9 units of blood at the time of his delivery.

The patient was on no medication at the time of evaluation.

- **Physical Examination:**

Physical examination revealed a number of bruises over the arms and legs.

- **Screening Coagulation Laboratory Results:**
  - PT= 12 sec (Normal 11-13)
  - aPTT= 34 sec (Normal 25-34)
  - Plt= 300,000 /uL (Normal 133,000-333,000)
  - Bleeding Time >15 min (Normal<9)

### STEPS TO FOLLOW IN THIS PRACTICAL:

- Read this case history thoroughly, then make a list of differential diagnosis based on the clinical history and screening coagulation laboratory results.
- Formulate a strategy for diagnosis (sequence of tests ordered). Put emphasis on proper utilization of laboratory tests (to prevent over-utilization) and still obtaining optimal care for patients with adequate laboratory testing.
- State different treatment plan for all possible diagnoses.
- Submit your assessment of the case to the course instructor via e-mail.
- Note: useful references for this practical can be found from reference links in the "Learning Links" page of this course. Students are also encouraged to use the "Discussion Forum" in the "Learning Links" page to exchange ideas during this exercise.

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## Final Examination



*Fill in your answer and hit the return key.  
You have just one try for each question.  
Correct answer is shown after your answer is entered.*

What's your name?

1. A 55 year-old male underwent conorary artery bypass with no complications. Patient developed sudden thrombocytopenia 6 days after surgery. The most likely etiology for his thrombocytopenia is:

- a.  Heparin-induced antibody
- b.  Thrombotic thrombocytopenic purpura (TTP)
- c.  Immune thrombocytopenic purpura (ITP)
- d.  Lupus anticoagulant
- e.  Evan's syndrome

2. Protein S is a coagulation inhibitor that potentiates activity of

- a.  Protein C



**Good, Mary, keep going!**

*Fill in your answer and hit the return key.  
You have just one try for each question.  
Correct answer is shown after your answer is entered.*

What's your name?

1. A 55 year-old male underwent conorary artery bypass with no complications. Patient developed sudden thrombocytopenia 6 days after surgery. The most likely etiology for his thrombocytopenia is:

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- c.  Immune thrombocytopenic purpura (ITP)
- d.  Lupus anticoagulant
- e.  Evan's syndrome

2. Protein S is a coagulation inhibitor that potentiates activity of

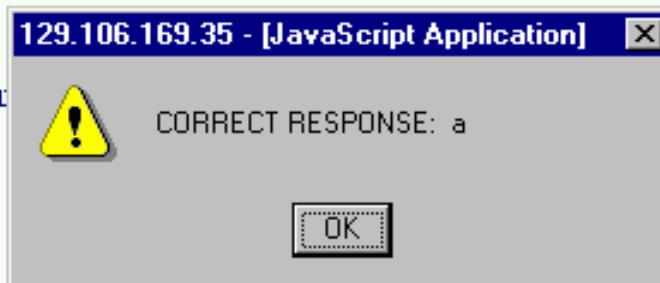
- a.  Protein C



**Good, Mary, keep going!**

2. Protein S is a coagulation inhibitor that potentiates activity of

- a.  Protein C
- b.  Alpha 2-macroglobulin
- c.  Thrombomodulin
- d.  Antithrombin III
- e.  Heparin



3. Which of the following protein is a potent fibrinolysis inhibitor:

- a.  Streptokinase
- b.  Tissue plasminogen activator (tPA)
- c.  Thrombomodulin-protein C complex
- d.  Alpha 2-antiplasmin
- e.  Urokinase

4. The reference ranges for adult and neonate are the same for which of the following tests:



Bookmarks Location: <http://129.106.169.35/wcb/schools/11/51/anguyen/4/exercises/quiz6/frame.html>

What's Related

**Good, Mary, keep going!**

4. The reference ranges for adult and neonate are the same for which of the following tests:

- a.  Platelet count
- b.  PT
- c.  aPTT
- d.  Factor VII
- e.  Factor X

5. Which factor decreases first after coumadin treatment:

- a.  Factor VII
- b.  Factor II
- c.  Factor IX
- d.  Factor X
- e.  Factor V

Click when done



Bookmarks Location: <http://129.106.169.35/wcb/schools/11/51/anguyen/4/exercises/quiz6/frame.html>

What's Related



Out of 5 questions, you got **4** right for a score of **80%**.  
**Good performance!**  
It took you **4 minutes** to complete the exercise.



**Your results have been submitted!**  
You may [re-take](#) the quiz if desired.



# WEB COAG

## Decision Support System for Coagulopathy



[Andy Nguyen, M.D.](#) / [UT-Medical School at Houston, Pathology](#) / Last Revision on: 8/20/99

WEB COAG is a WWW-based decision-support system for diagnosis of coagulopathy. Currently, there are three main features in this system:

- [Coagulation Profile](#): displays pattern of seven screening coagulation tests for each disorder. The tests include: prothrombin time (PT), activated partial thromboplastin time (PTT), fibrinogen (FIB), thrombin time (TT), fibrin split product (FSP), platelet count (PLT), and bleeding time (BT).
- [Differential Diagnosis](#): displays differential diagnoses that fit the coagulation results given by the user.
- [Synopsis of Coagulopathy and Therapy](#): displays essential information on coagulopathy and therapeutic modalities.

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## WEB COAG: SCREENING LABORATORY PROFILES OF COAGULATION DISORDERS

Andy Nguyen, M.D./ UT-Medical School at Houston, Pathology/ Last Revision on: 8/5/99

---

Select a disorder from the drop-down list to see its coagulation profile:

Hemophilia A

---

### Coagulation Profile:

TT:  Normal  Abnormal

PT:  Normal  Abnormal

FSP:  Normal  Abnormal

PTT:  Normal  Abnormal

PLT:  Normal  Abnormal

FIB:  Normal  Abnormal

BT:  Normal  Abnormal

Show Profile Now

Help

---

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WEB COAG Home Page



Document: Done



Start

WEB COAG - Netscape

2:09 PM

## WEB COAG: DIFFERENTIAL DIAGNOSIS

Andy Nguyen, M.D./ UT-Medical School at Houston, Pathology/ Last Revision on: 8/10/99

### Enter Coagulation Data:

TT:  Normal  Abnormal

PT:  Normal  Abnormal

FSP:  Normal  Abnormal

PTT:  Normal  Abnormal

PLT:  Normal  Abnormal

FIB:  Normal  Abnormal

BT:  Normal  Abnormal

Diagnose now

Start Over

Help

### LIST OF DIFFERENTIAL DIAGNOSES:

Factor VII deficiency  
Vitamin K deficiency  
Coumadin treatment

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WEB COAG - Netscape

2:13 PM

## Calculating Units of Cryoprecipitate Needed for Fibrinogen

Andy Nguyen, M.D./ UT-Medical School at Houston, Pathology/ Last Revision on: 8/9/99

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Baseline Fibrinogen Level (mg/dl):

Desired Fibrinogen Level (mg/dl):

Patient's Body Weight (Kg):

Calculate Units of Cryo Needed->

---

Start Over

Help

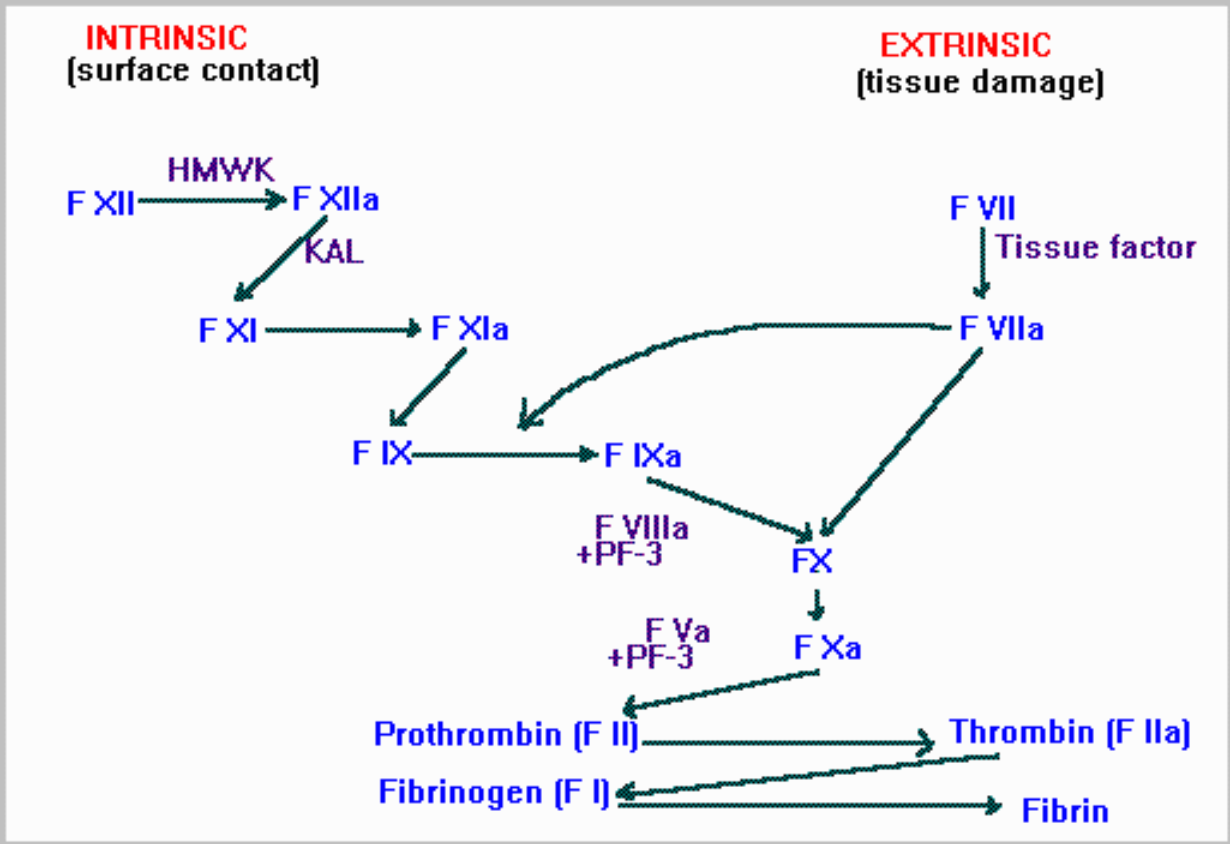
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WEB COAG Home Page

# Coagulation Cascade Diagram

Andy Nguyen, M.D. / UT-Medical School at Houston, Pathology / Last Revision on: 8/10/99

Click on the factors in the diagram below to see associated disorders



## WEB COAG: Platelet Aggregation Patterns

Andy Nguyen, M.D./ UT-Medical School at Houston, Pathology/ Last Revision on: 8/12/99

---

Select a disorder from the drop-down list to see its aggregation pattern:

Storage Pool Disease

---

### Aggregation with Reagents:

ADP:  Normal  Abnormal

EPI:  Normal  Abnormal

COL:  Normal  Abnormal

RIS:  Normal  Abnormal

Show Profile Now

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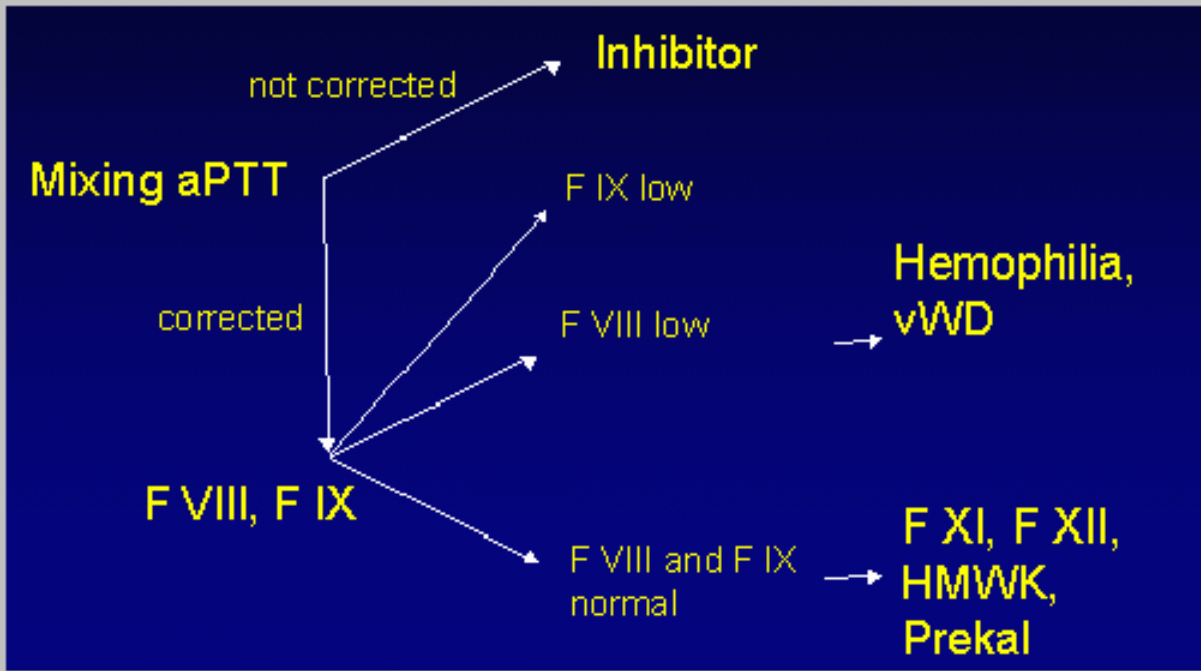
WEB COAG Home Page





## Prolonged aPTT Panel: Flow Chart 1

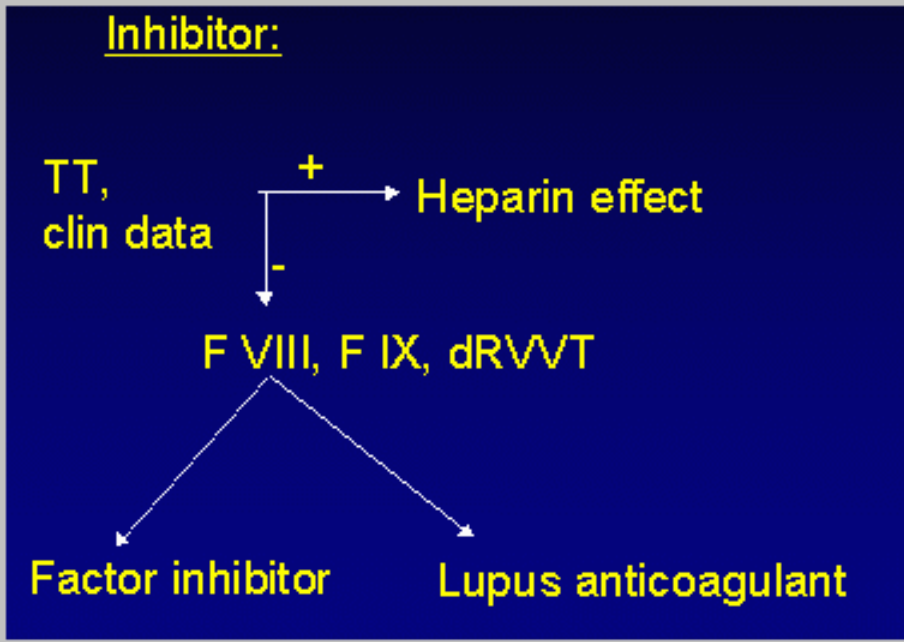
UT-Medical School at Houston, Pathology/ Last Revision on: 4/13/99





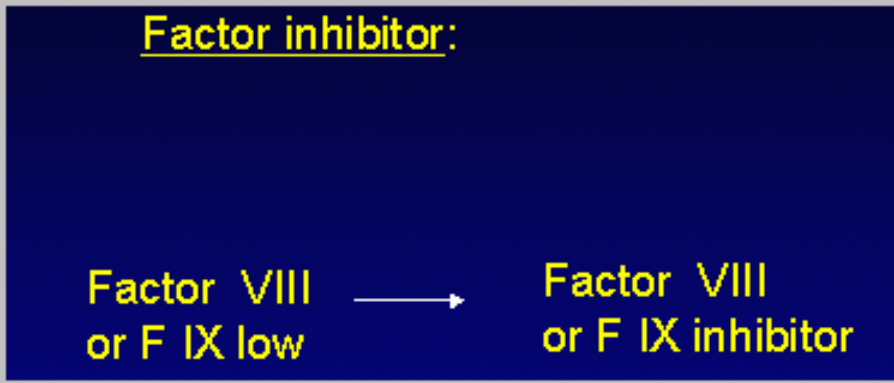
## Prolonged aPTT Panel: Flow Chart 2

UT-Medical School at Houston, Pathology/ Last Revision on: 4/13/99



### Prolonged aPTT Panel: Flow Chart 3

UT-Medical School at Houston, Pathology/ Last Revision on: 4/13/99



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## Factor VIII (or IX) Deficiency

UT-Medical School at Houston, Pathology/ Last Revision on: 3/22/99

- **Summary of Laboratory Results:** Patient's aPTT was prolonged, PT was normal. A (1:1) mixing study for aPTT was performed which showed no correction. Assays were performed for the factor VIII (or IX). Factor VIII (or IX) level was found to be low.
- **Diagnosis:** Factor VIII (or IX) Inhibitor
- **Recommendation/ Comments:** Hematology consultation is suggested to follow up this patient for clinical management if not already done. Factor VIII (or IX) inhibitor assay is suggested to determine the inhibitor level.

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# Unique Values



- ⌘ Users can access this program anywhere with a web browser
- ⌘ Updating materials is greatly simplified with centralized servers
- ⌘ The successful implementation of this program is expected to facilitate the development of other similar programs for teaching pathology

# Plan for Completion of Project



- ⌘ Add more practicals (3 to 15)
- ⌘ Add more questions (5 to 30)
- ⌘ Start a pilot program for pathology residents to take this course.  
Feedback-> (a) to assess the benefits of on-line learning; (b) for future enhancement

# E-Mail for Inquiry and Input



⌘ Nghia.D.Nguyen@uth.tmc.edu