



# ESPEN Congress Glasgow 2002

**Nurses' Educational Session: Getting Started in  
TPN**

**Vascular Anatomy**  
***Robert L. Schelper***



State University of New York  
Upstate Medical University

# Vascular Anatomy

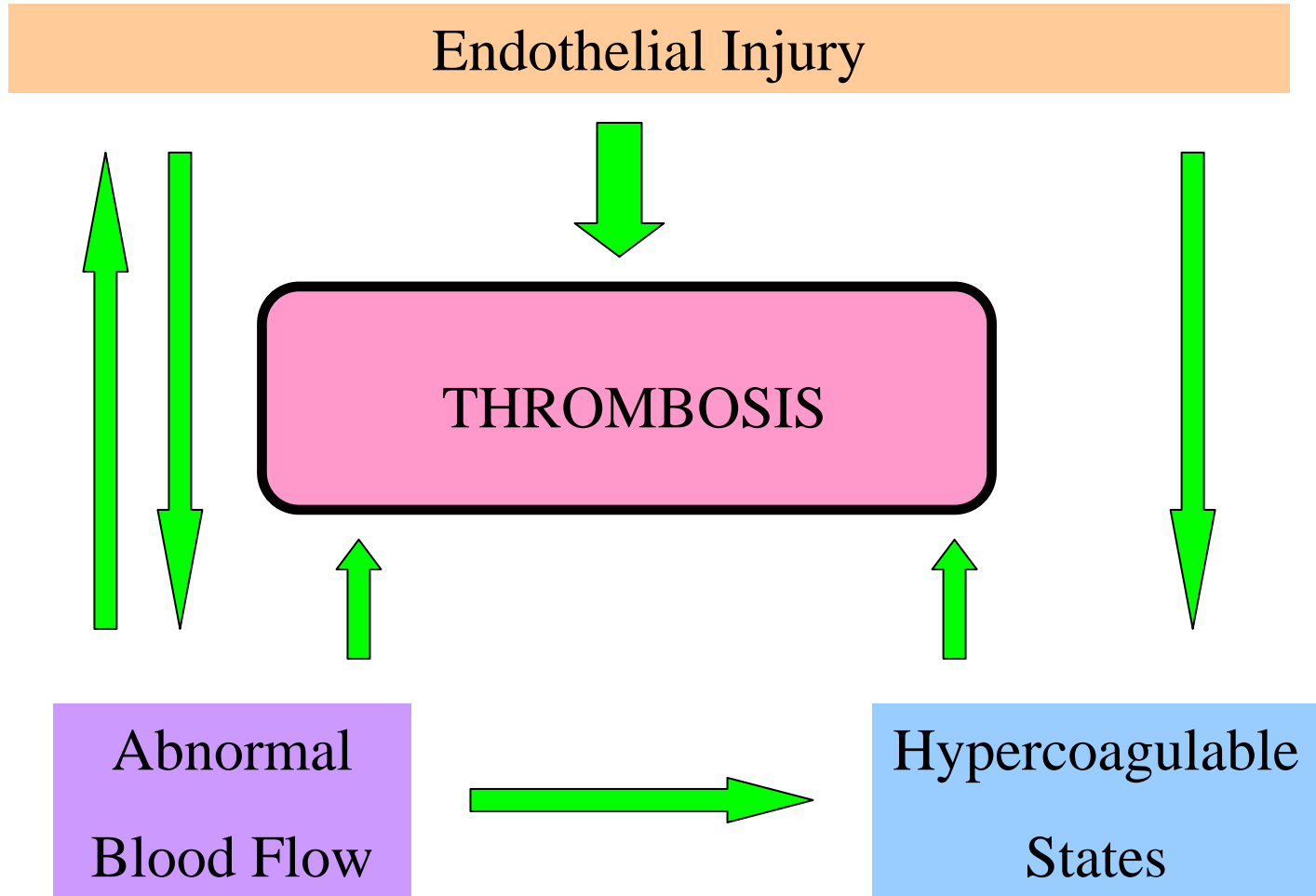
Robert L. Schelper, M.D., Ph.D.

Director, Anatomic Pathology

Department of Pathology

Venous thrombosis - vascular injury - fibrin

# Virchow's Triad



# Steps in Injury Clot Formation

## Primary Hemostasis

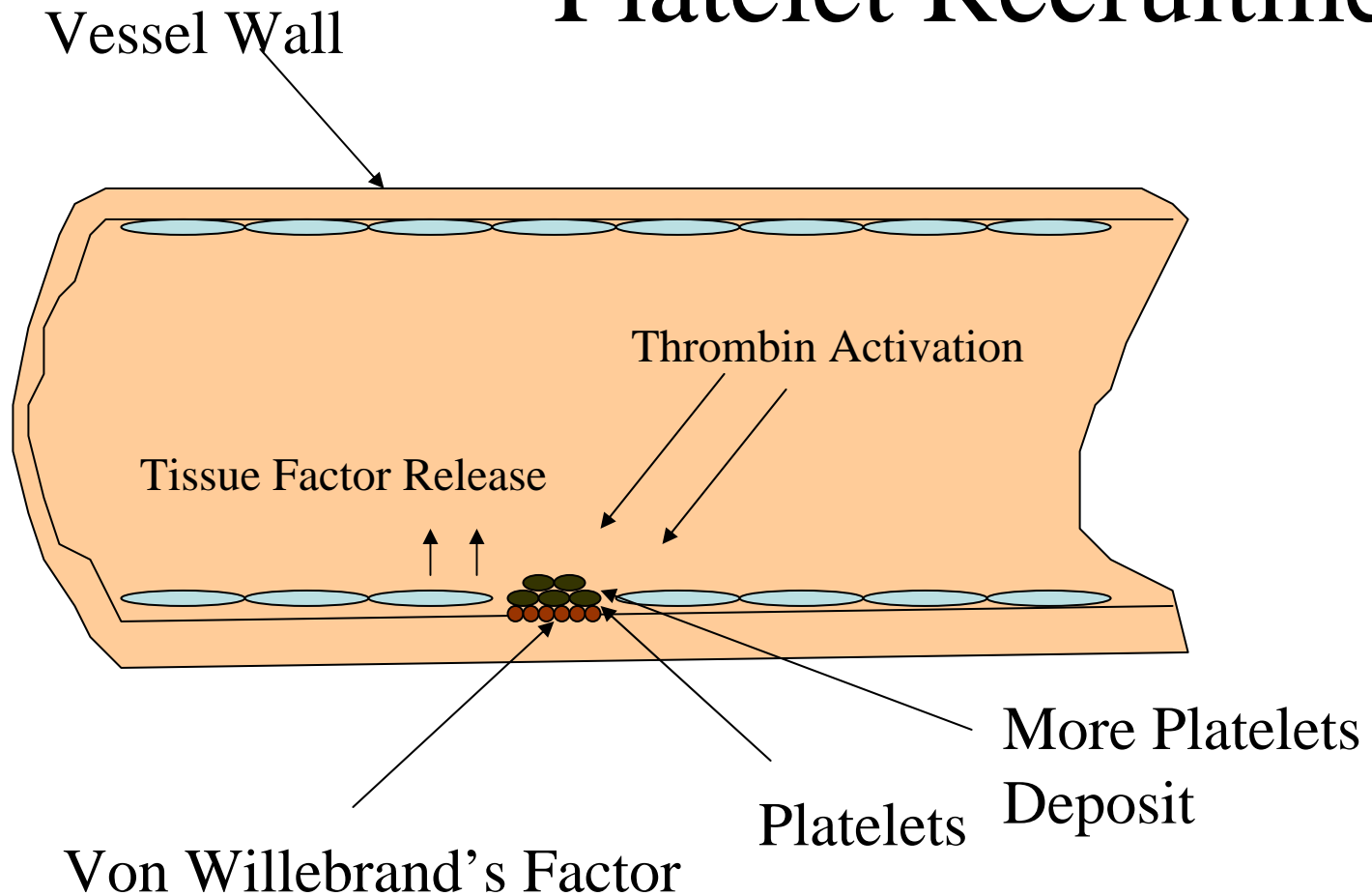
- Vasoconstriction with endothelial loss
- Platelet adhesion to von Willebrand's factor on the subendothelial thrombogenic matrix
- Platelet shape change
- Platelet granule release
- Platelet recruitment
- Platelet aggregation, (Hemostatic plug)

# Steps in Clot Formation

## Secondary Hemostasis

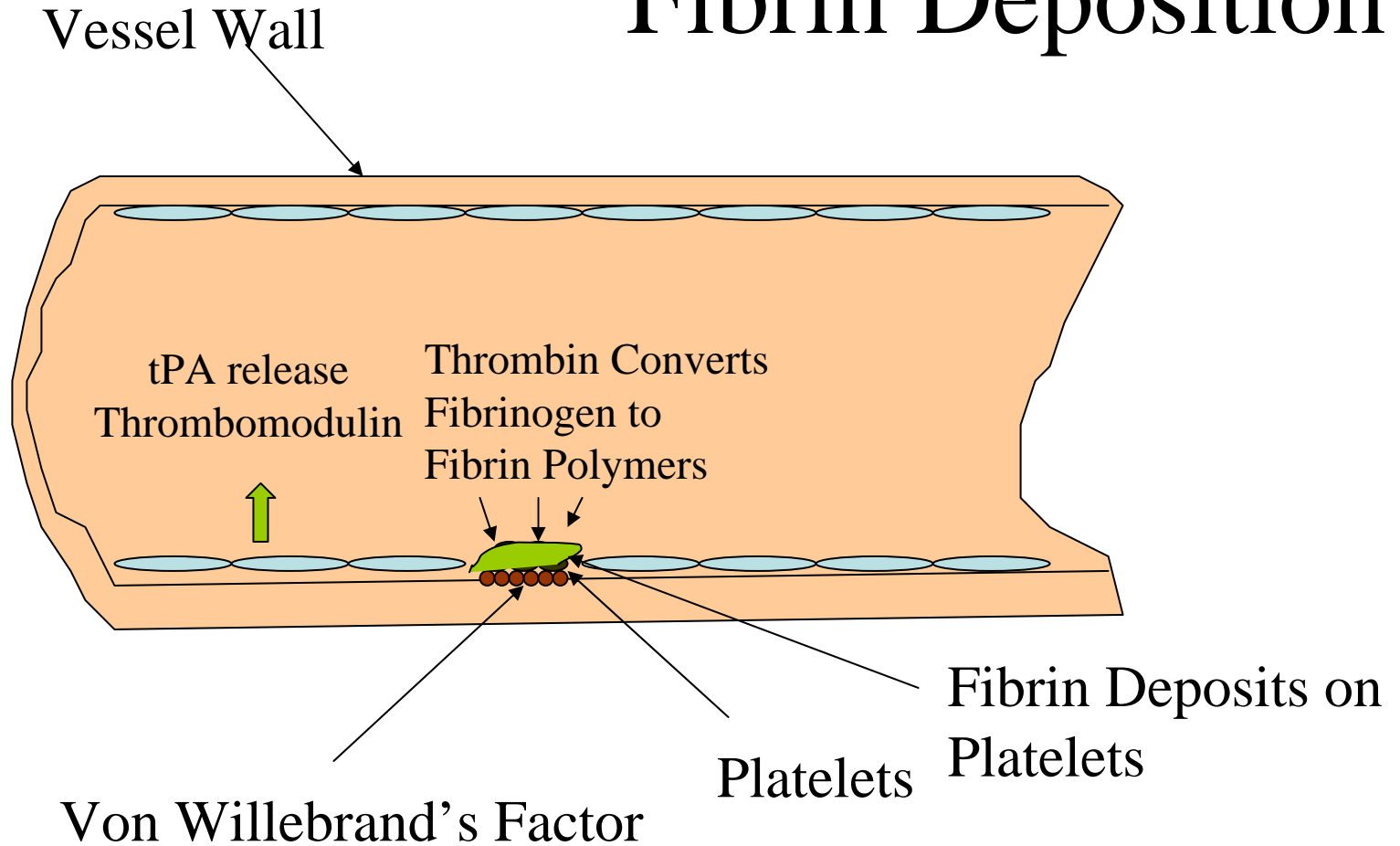
- Tissue factor release
- Phospholipid complex expression on platelets
- Thrombin activation - activated thrombin converts fibrinogen to fibrin
- Fibrin polymerization (fibrin cross-linking)

# Platelet Recruitment

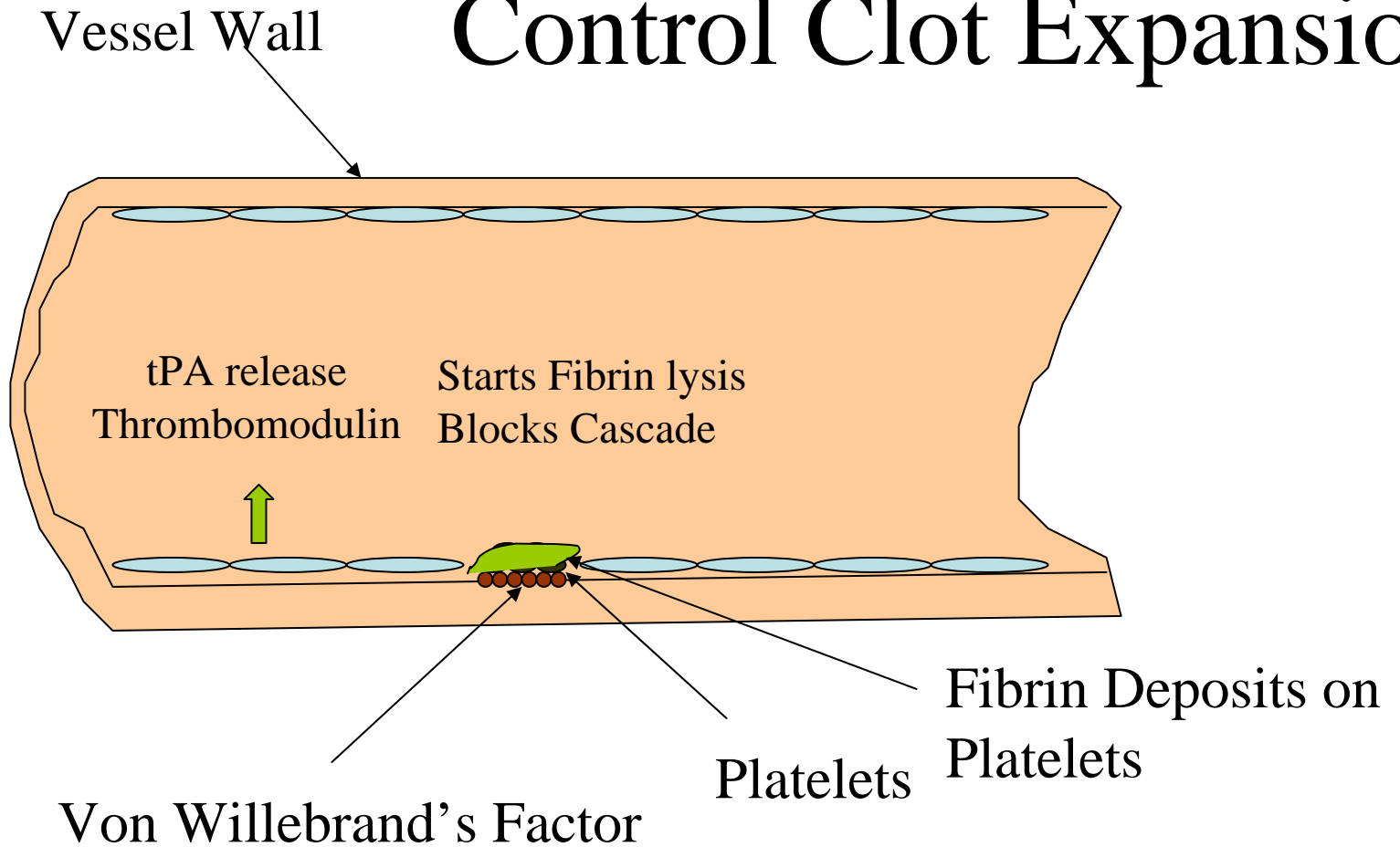


Primary Hemostasis Ends as Secondary Hemostasis Starts

# Fibrin Deposition



# Control Clot Expansion



# Limiting the Clotting Cycle

- Heparin & heparin-like molecules join with Antithrombin III, making a complex that inactivates thrombin
- Thrombomodulin binds thrombin to prevent its procoagulant effects
- These actions turn off thrombin so that it cannot convert fibrinogen to fibrin

# Factors That Increase Injury

- Osmolarity of infused fluid
  - Hyperosmolar TPN
- pH of infused fluid
  - Dilantin - pH 12
  - Dopamine - pH 2
- Irritants
- Vesicants

**No references provided by the author(s)**