



**Rotem,  
Does it have value in the cardiothoracic operation  
theatre?**

**M. ter Horst**

**11-11-2016**

# Conflicts of interest

- none



ADULT CARDIAC

# Impact of Blood Product Transfusion on Short and Long-Term Survival After Cardiac Surgery: More Evidence

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**Conclusions.** This study suggests that blood or blood product transfusion during or after cardiac surgery is associated with increased short-term and long-term morbidity and mortality. It reinforces the need for prospective randomized controlled studies for evaluation of restrictive transfusion triggers and objective clinical indicators for transfusion in the cardiac surgical patient population.

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(Ann Thorac Surg 2012;94:460-7)  
© 2012 by The Society of Thoracic Surgeons  
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2006; 34:1608

Anesthesiology

1998; 88:327-33

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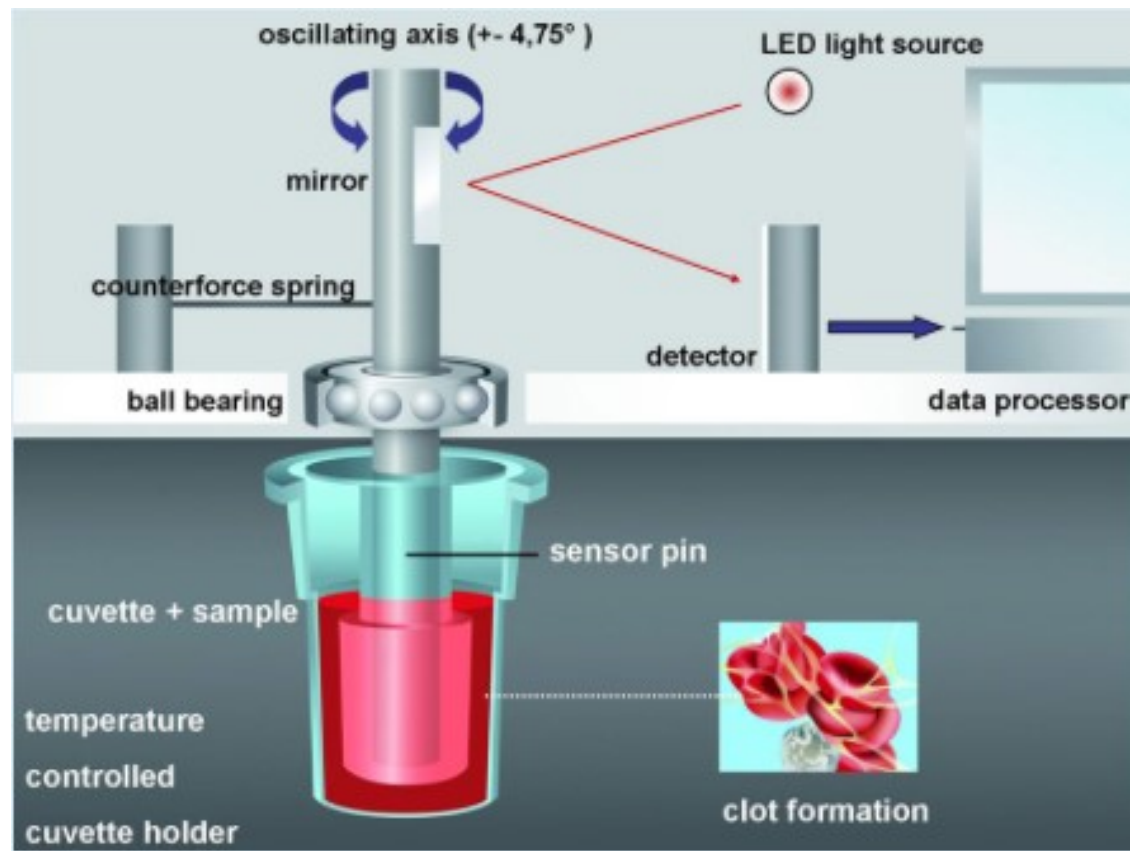
Lippincott-Raven Publishers

## ***Variability in Transfusion Practice for Coronary Artery Bypass Surgery Persists Despite National Consensus Guidelines***

*A 24-Institution Study*

***Conclusions:*** Institutions continue to vary significantly in their transfusion practices for CABG surgery. A more rational and conservative approach to transfusion practice at the institutional level is warranted. (Key words: Blood conservation;

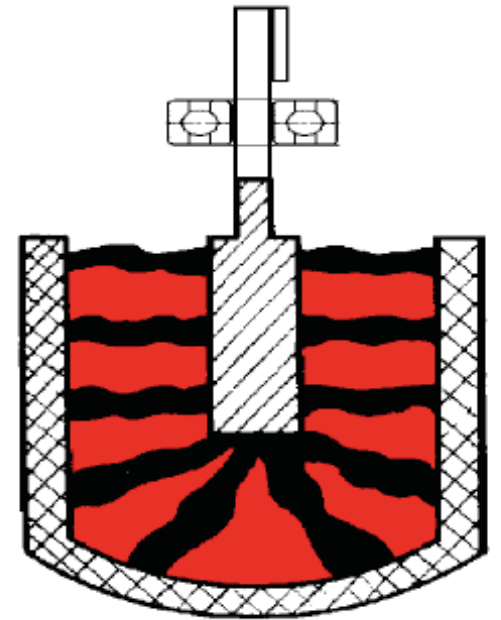
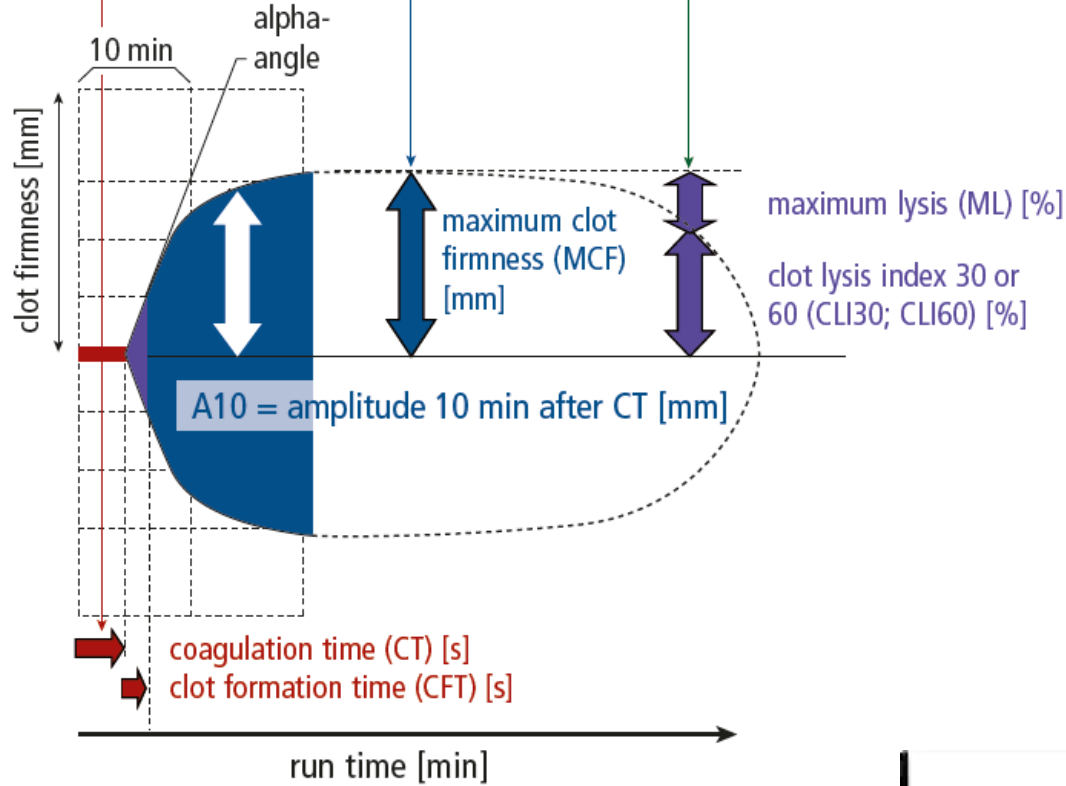
# ROTEM



coagulation factors,  
anticoagulants, FDPs,  
tissue factor expression

platelets,  
fibrinogen,  
colloids

fibrinolytic enzymes,  
fibrinolysis inhibitors,  
FXIII



## Different Rotem tests

<b>Intem</b>	<b>Mildly activates the contact phase of hemostasis, high heparin sensitivity, screening test</b>
<b>Extem</b>	<b>Mildly activates hemostasis via the physiological activator tissue factor, moderate heparin sensitivity, screening test</b>
<b>Fibtem</b>	<b>EXTEM based assay for measuring fibrinogen. Cytochalasin D inhibits platelet contribution of clot formation</b>
<b>Heptem</b>	<b>Neutralisation of heparin--&gt; measures coagulation without heparin ( comparable with Intem)</b>
<b>Aptem</b>	<b>inhibits fibrinolysis--&gt; detection of hyper fibrinolysis ( comparable with Extem)</b>

## Case Aorta dissection

### 60 year old lady

- History: hypertension
- Medication: none

Today: short collapse, chest pain and uncomfortable sensations in the left arm

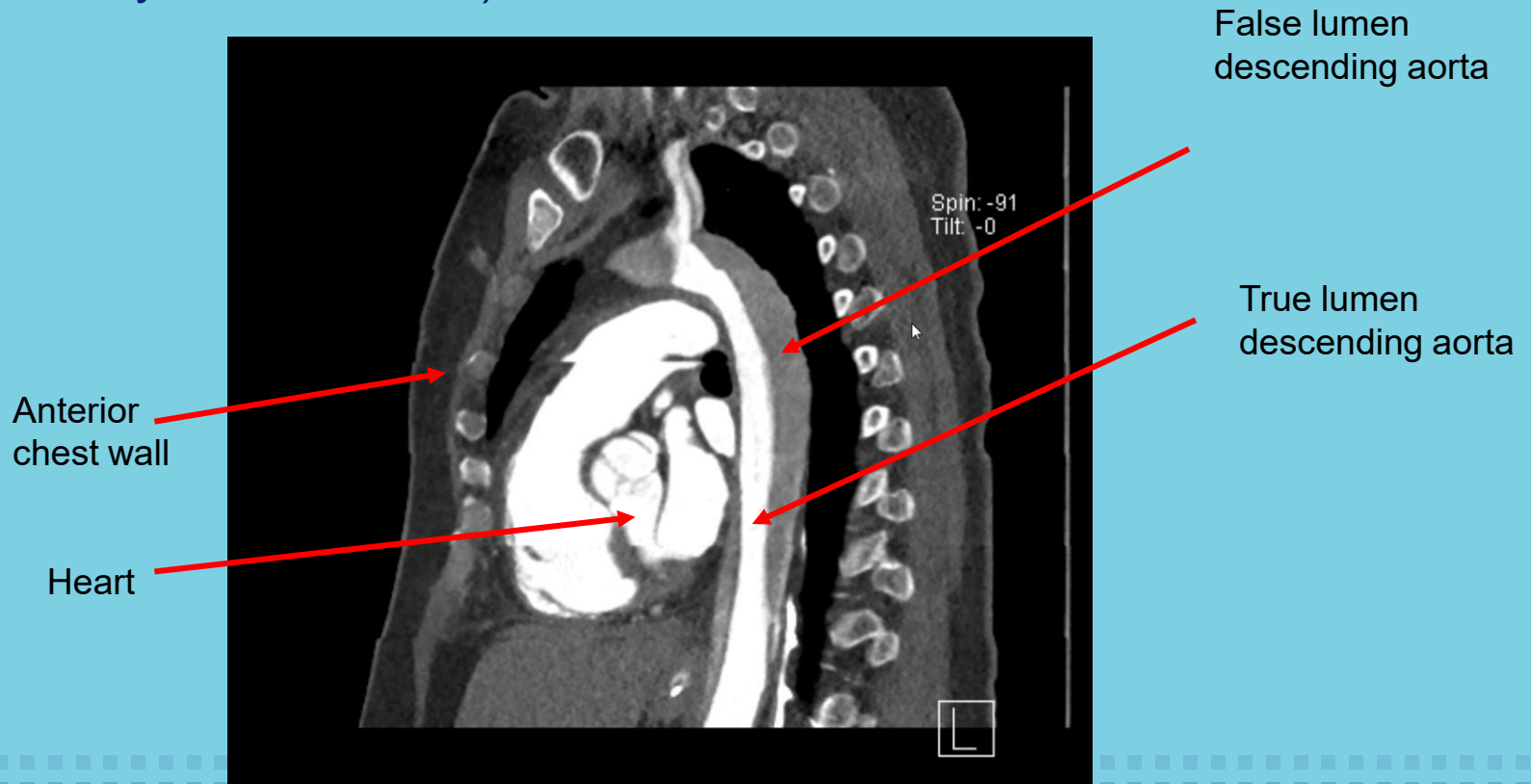
Emergency medical service examined her and suspect instable angina pectoris. Administered: Ticagrelor ( P2Y12-inhibitor) and acetylsalicylic acid.





# Hospital

- CT-scan revealed an aorta dissection (Type A dissection; tear in the inner layer of the aorta)

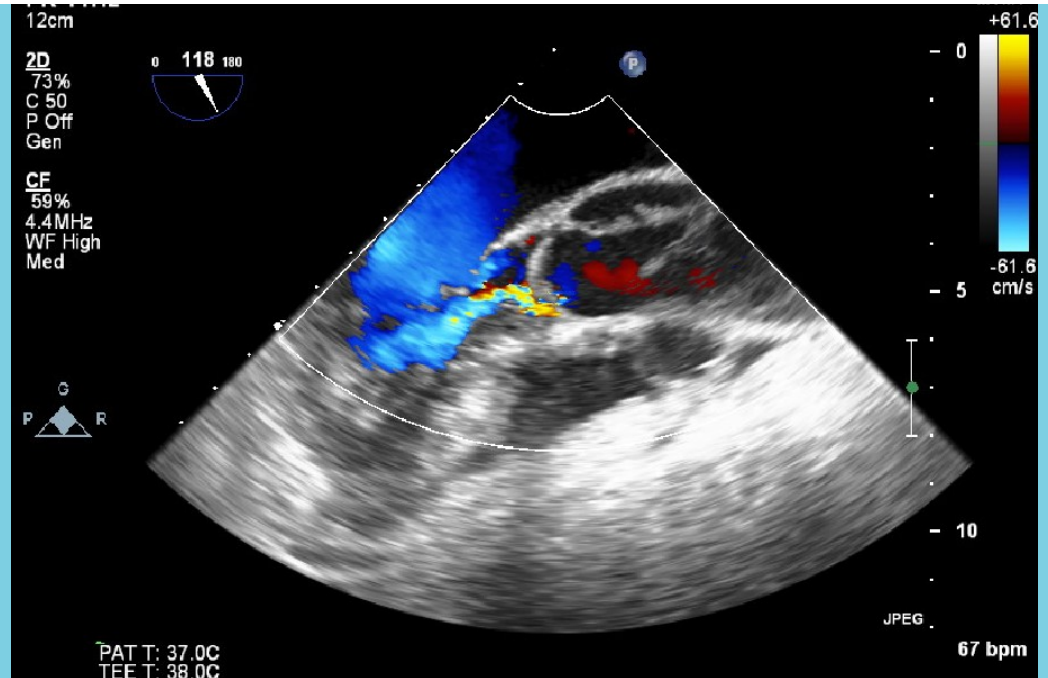
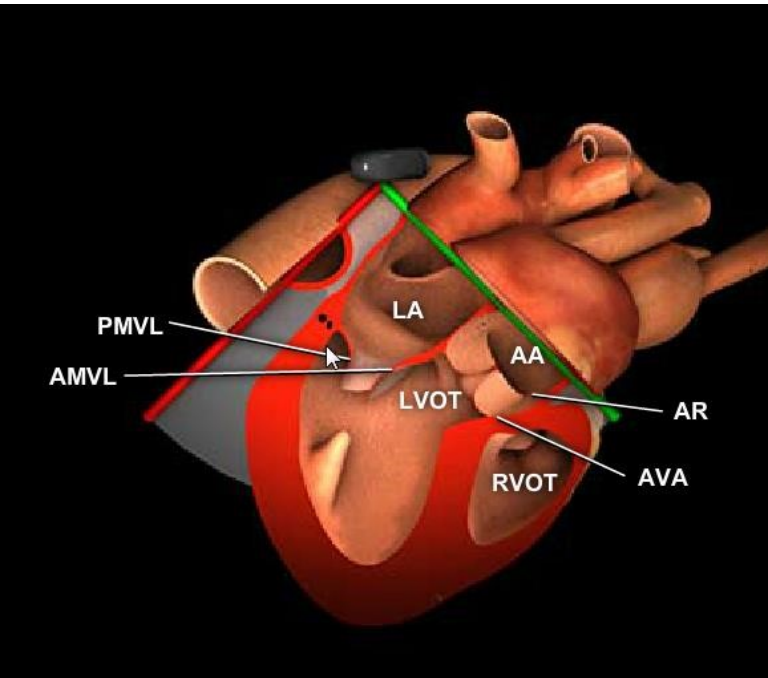


## Question 2

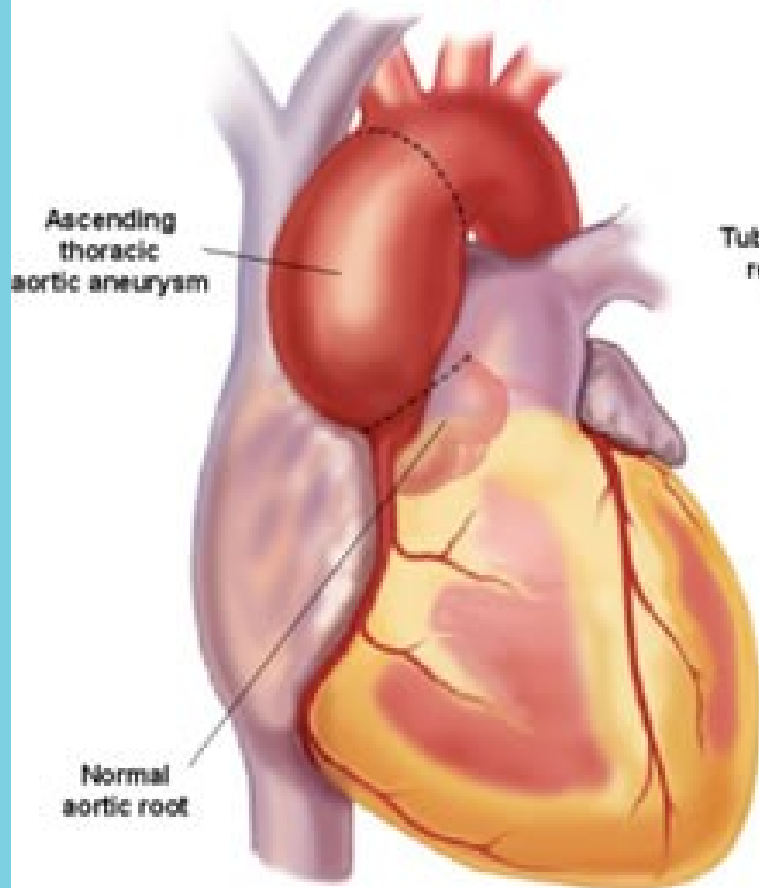
A type A aorta dissection is a life-threatening disease and should be operated immediately.

How would you optimize the coagulation?

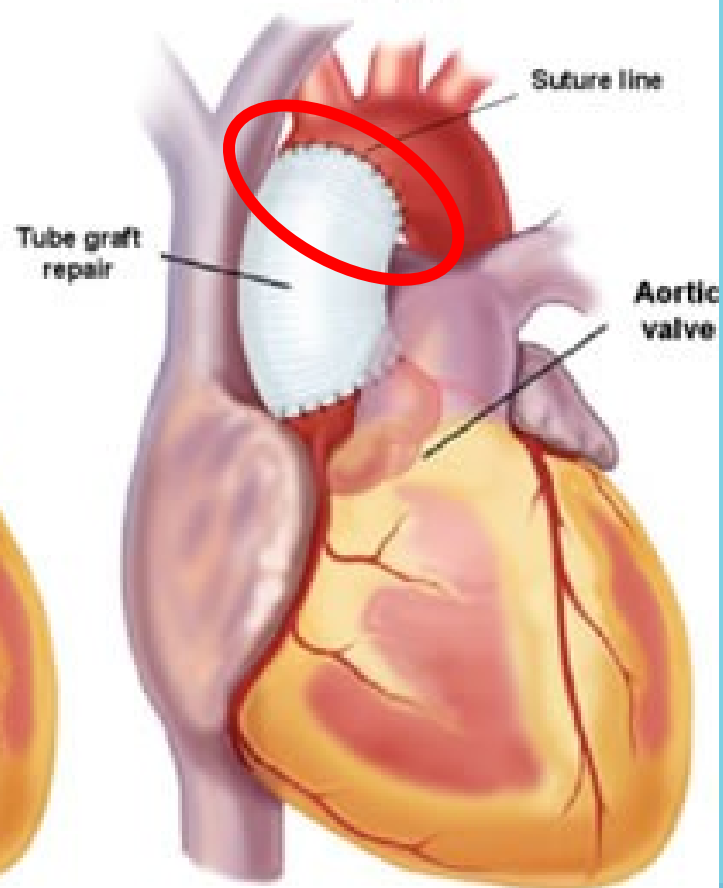
# Echocardiography



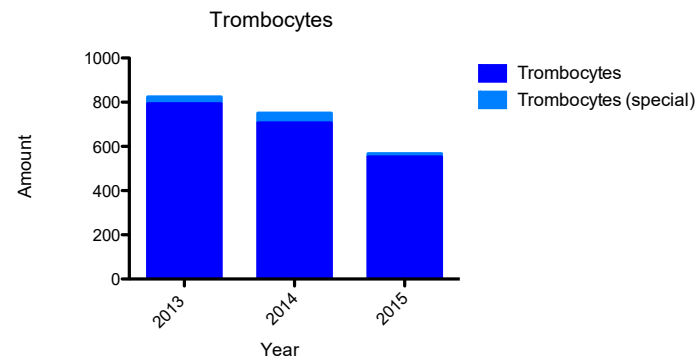
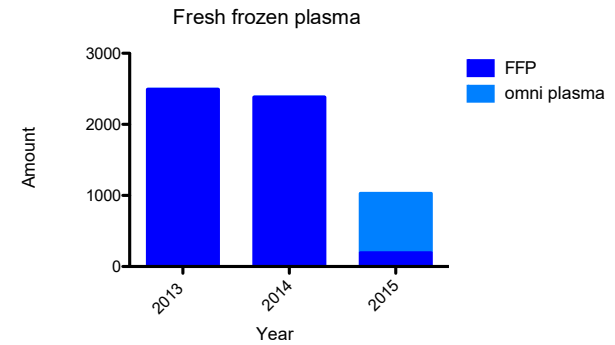
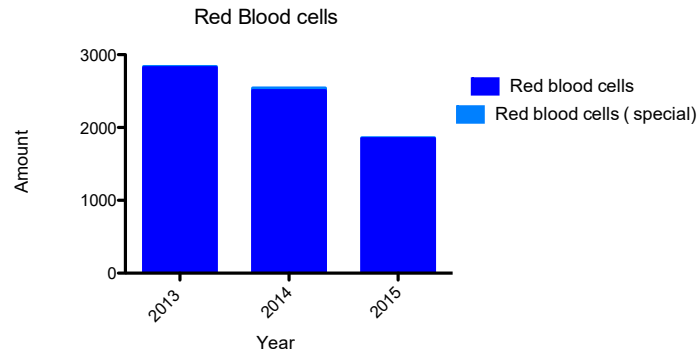
**Before Surgery**



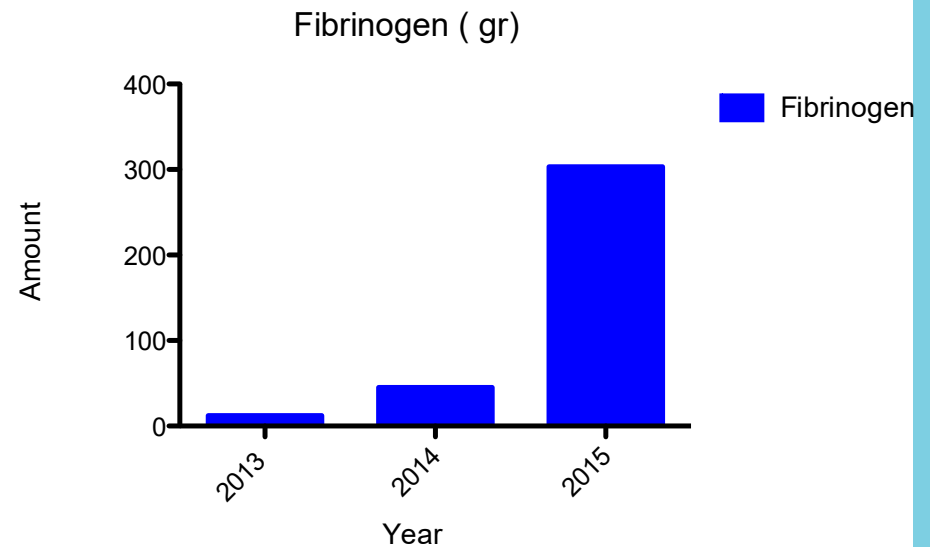
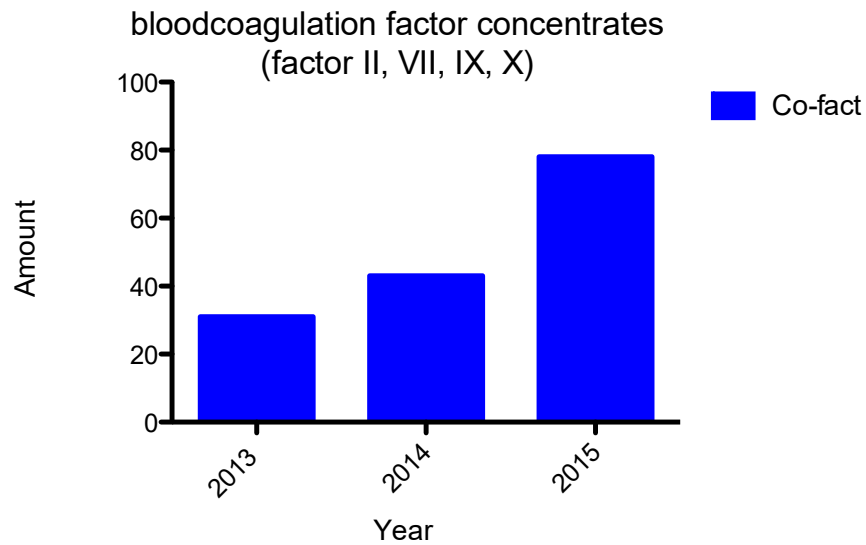
**After Surgery**



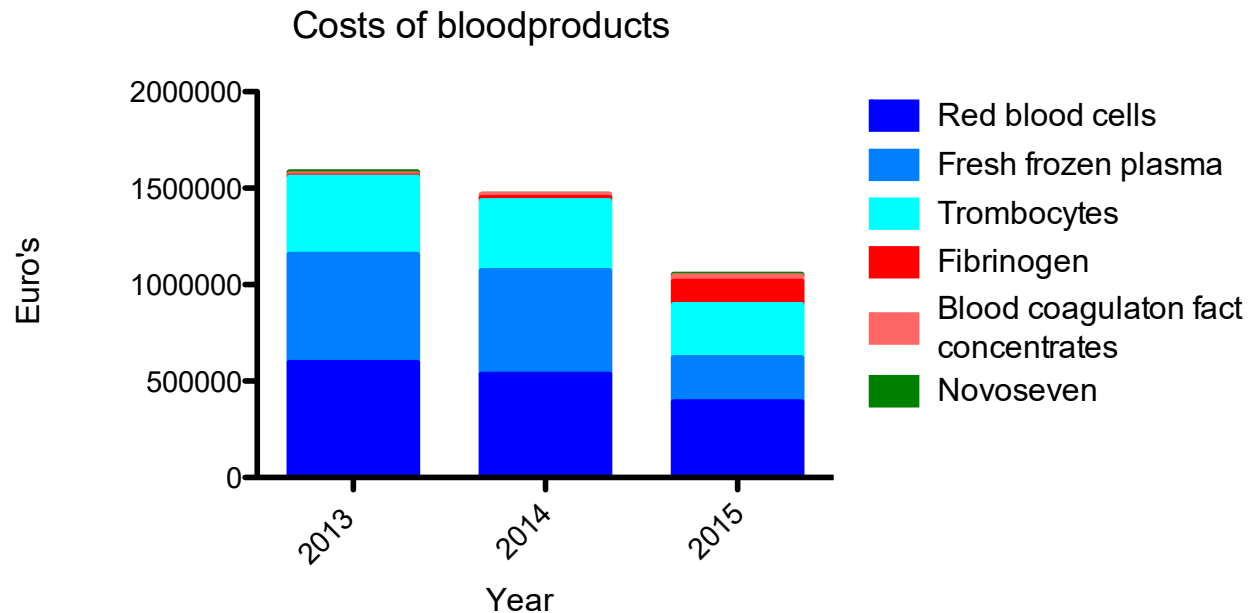
# Consumption of blood products



# Consumption of blood products



# Consumption of blood products



**AND 19 % reduction in re-thoracotomies**



### Authors' conclusions

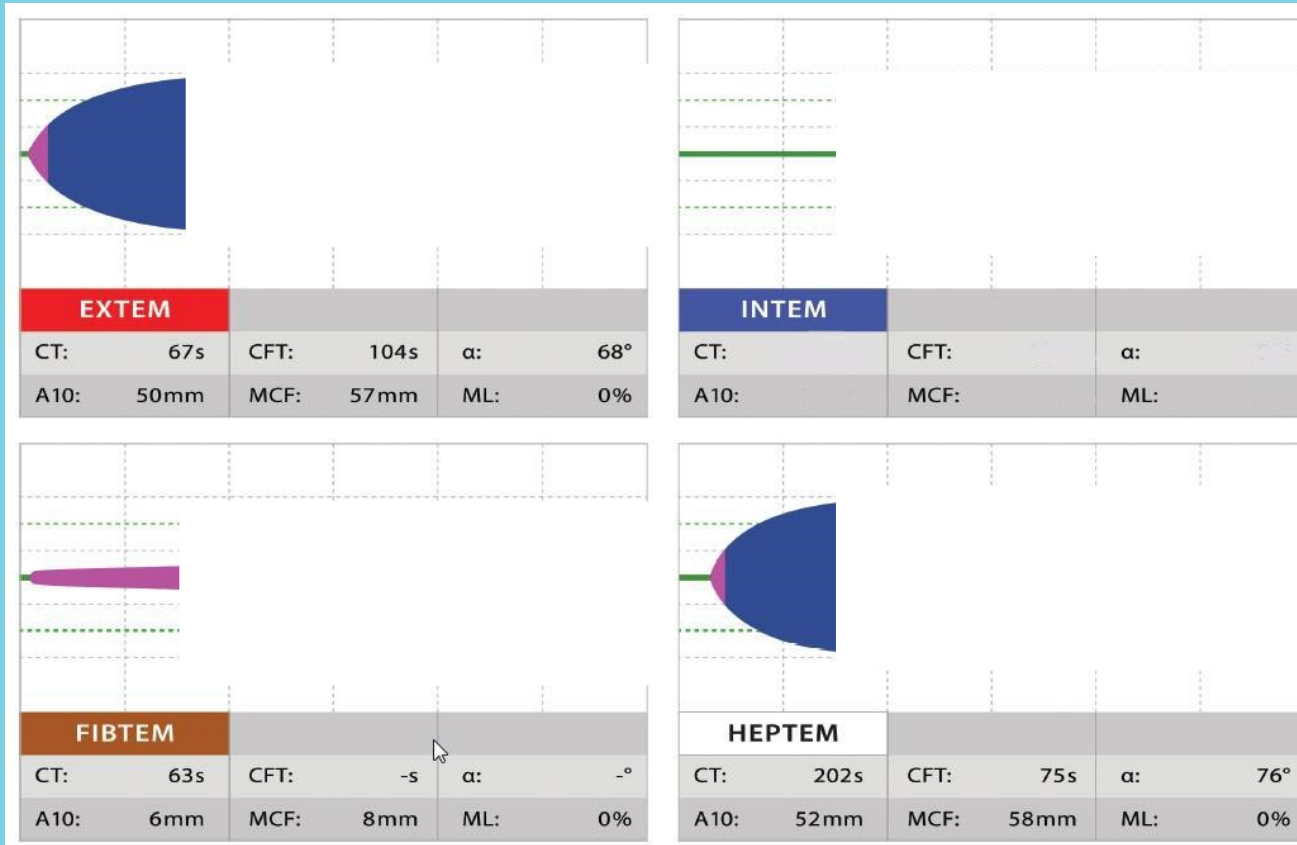
There is growing evidence that application of TEG- or ROTEM-guided transfusion strategies may reduce the need for blood products, and improve morbidity in patients with bleeding. However, these results are primarily based on trials of elective cardiac surgery involving cardiopulmonary bypass, and the level of evidence remains low. Further evaluation of TEG- or ROTEM-guided transfusion in acute settings and other patient categories in low risk of bias studies is needed.

## Thromboelastography (TEG) or thromboelastometry (ROTEM) to monitor haemostatic treatment versus usual care in adults or children with bleeding (Review)

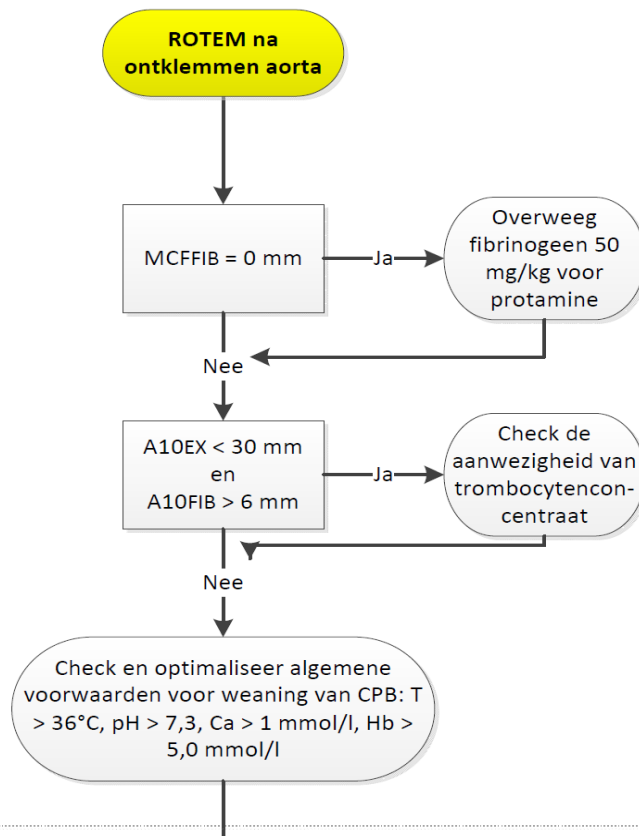
Wikkelsø A, Wetterslev J, Møller AM, Afshari A



# End of operation, still on heart lung machine



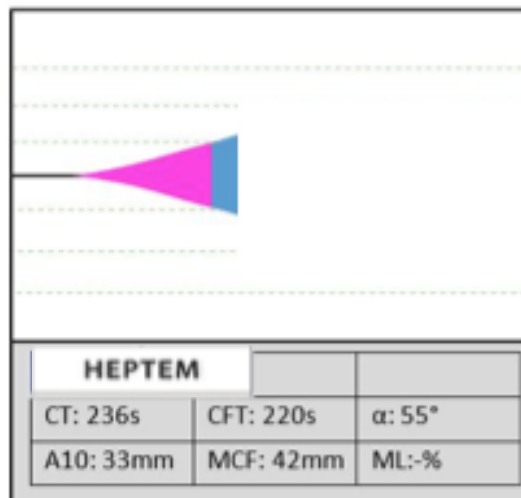
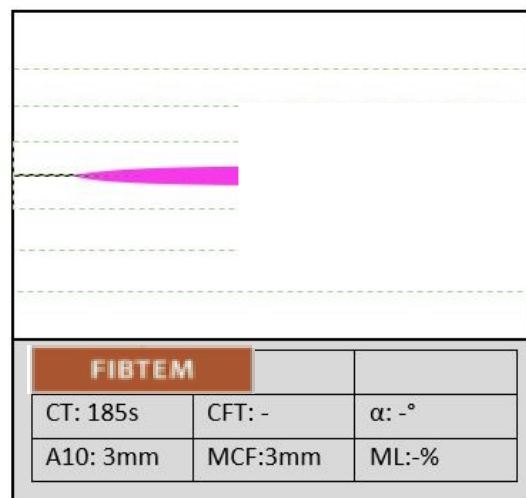
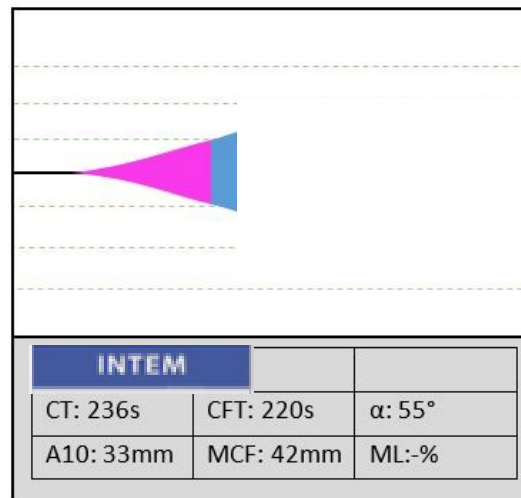
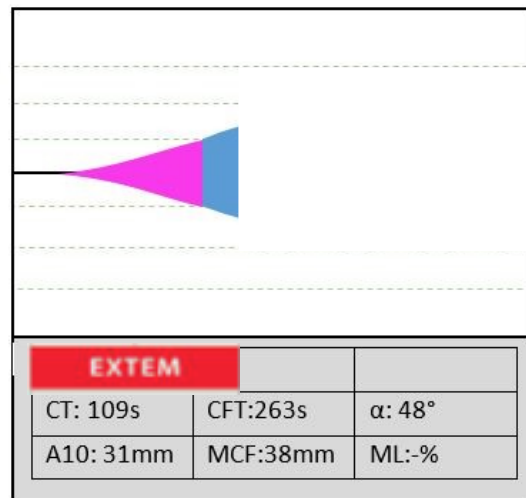
# Rotem Protocol Erasmus MC



## Post heart lung machine

- Patient was easily weaned from the heart lung machine, despite massive blood loss ( 400 cc/min; total circulating blood volume 4 liters)
- Protamine was administered to antagonize heparin.
- The surgeon optimized the surgical field with several stitches
- Coagulation was optimized with the transfusion of thrombocytes, red blood cells and Omni plasma.
- After ten minutes, the blood loss diminished to 100 cc/min.
- Standard laboratory tests and a Rotem were performed to evaluate the coagulation.

## Question 4



Ph: 7.38 kPa  
Hb: 5,6 mmol/L  
Calcium: normal

ACT: 165  
APTT: to be determined  
INR: : to be determined  
Thrombocytes: : to be determined

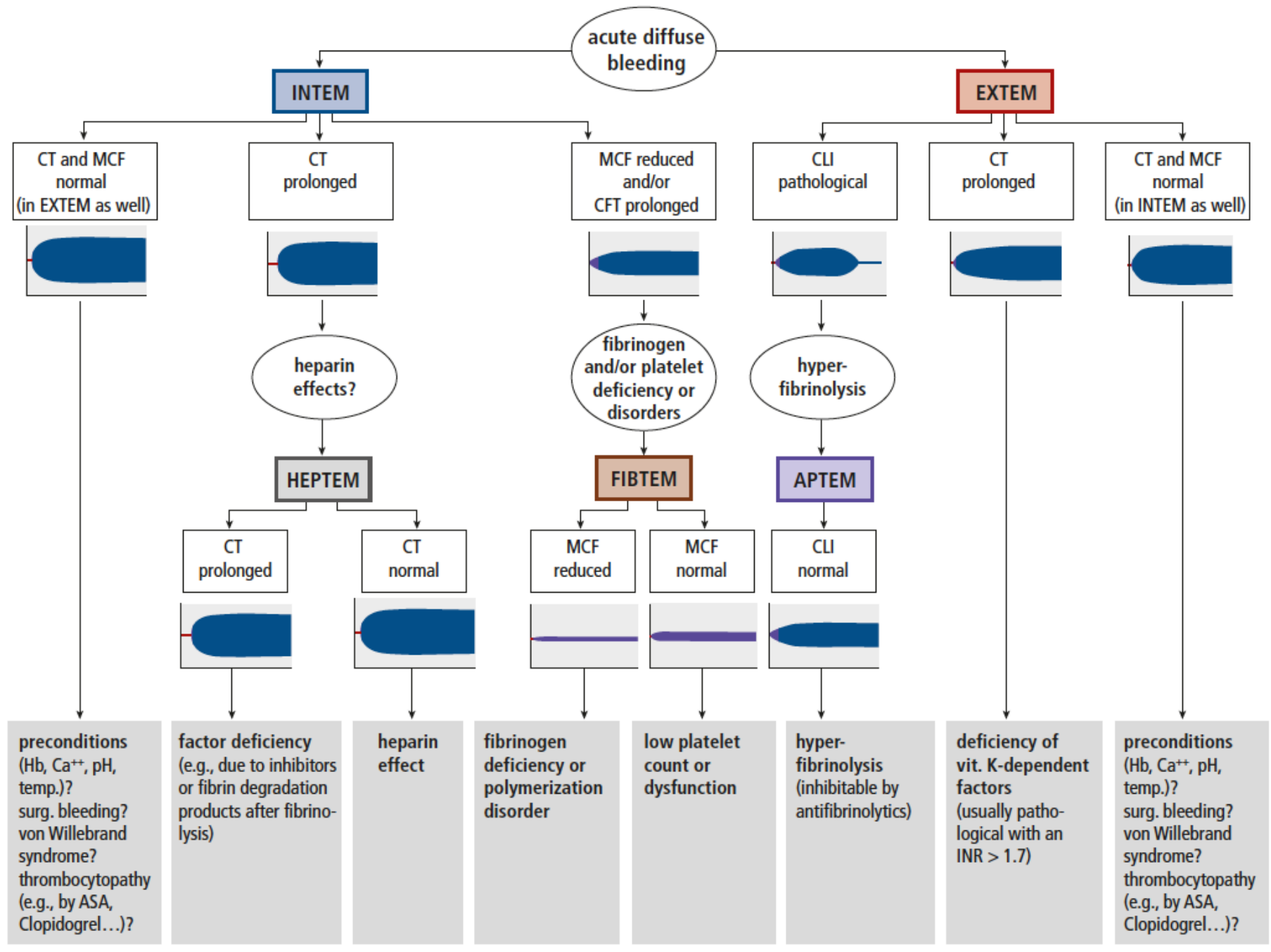
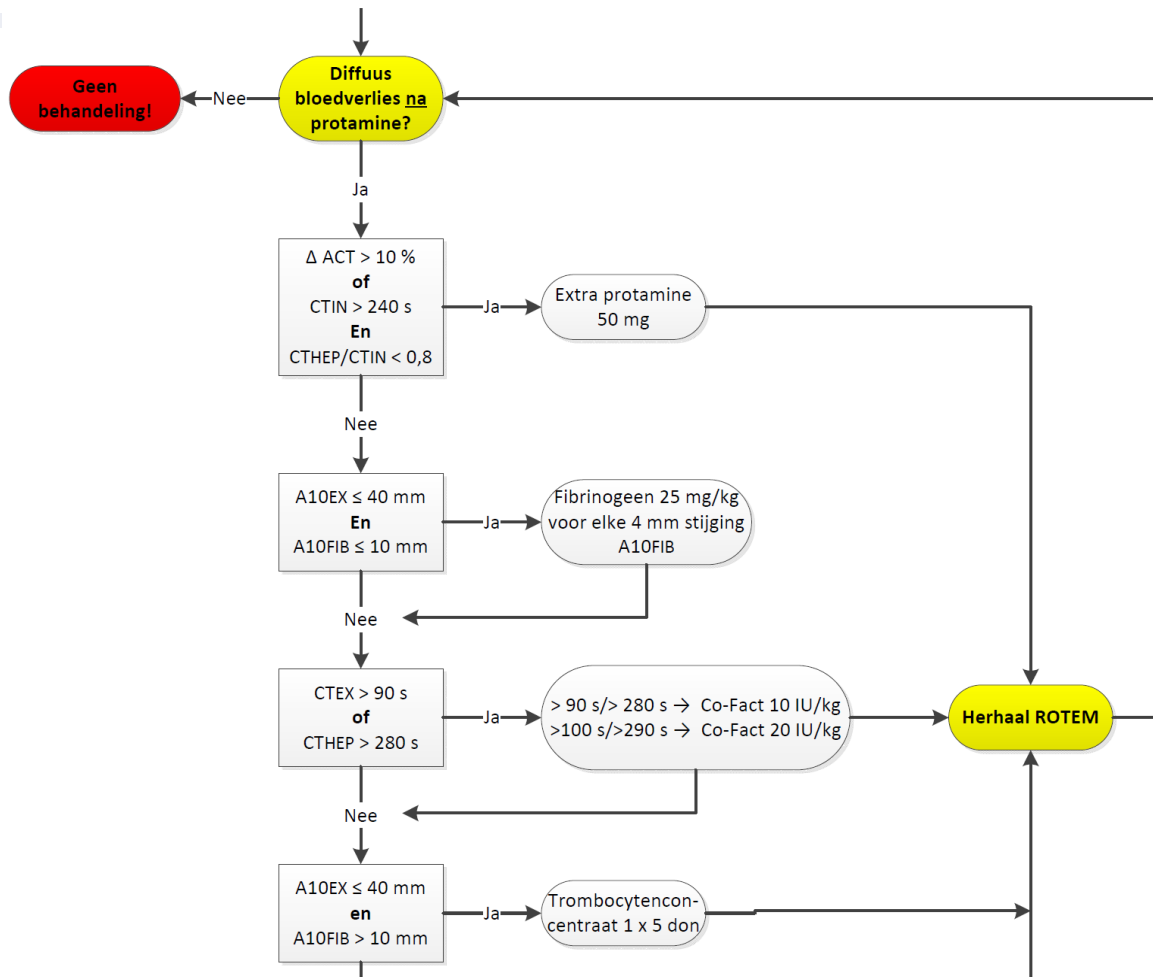


Fig. 2 ROTEM diagnostic algorithm of the „Essener-Runde“ task force

# Rotem Protocol Erasmus MC



## Question 4

Would you optimize the coagulation?

- A) Administer Red blood cells, omniplasma and thrombocytes
- B) Prolonged ACT: administer protamine
- C) Administer blood coagulation factor concentrates, fibrinogen, thrombocytes and cell salvage**
- D) Administer blood coagulation factor concentrates, fibrinogen, thrombocytes and protamin
- E) Just give the surgeon some extra suture material

## Conclusion

- Blood or blood product transfusion is associated with increased morbidity and mortality in cardiac surgery
- Transfusion protocols will diminish blood transfusions and costs
- Don't correct all abnormal laboratory or Rotem values, keep the whole patient in mind