

# **The bleeding trauma patient**

**Has there been a shift in the surgical approach**

**– The operative management view**



**Lauri Handolin**

**Traumasurgeon**

**Helsinki University Hospital**

# Topics Included

**Initial assessment**

**Bleeding – MOF – Damage control**

**Role of CT**

**(Interventional Radiology)**

**Prompt bleeding control military**

# INITIAL ASSESSMENT

**Beyond ATLS® is where the story begins...**

- **in trauma center**
- **with multidisciplinary traumateam**
- **with modern diagnostic and therapeutic resources**

**The question is not**

- **“should B be done after A but before C”**

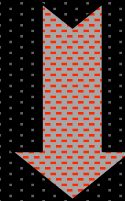
**The true challenge is**

- **To recognize massive bleeder as soon as possible**
- **To start treating massive bleeder as massive bleeder should be treated**

# ABC CABBC

Treatment of the bleeding is **stop the bleeding**

**A** → **B** → **C**



**C** → **A** → **B** → **C**

**C** = control of catastrophic (external) bleeding

**Stop losing : Red cells – Platelets – Coagulating factors**

**Minimize the need of : Fluids – Blood products**

# The goal of trauma resuscitation

What is the ultimate goal of trauma resuscitation?

To re-establish and maintain **sufficient tissue oxygenation!**

Why is primary & secondary survey done?

To find out if there are conditions compromising **sufficient tissue oxygenation!**

Why are certain radiological assessments done?

To find out if there are signs of possible major bleeding necessitating prompt surgical interventions to **“close the tap”** in order to re-establish and maintain **sufficient tissue oxygenation!**

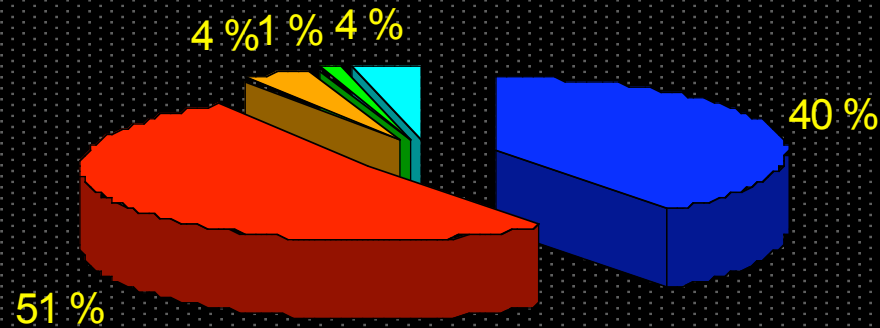
Why are certain laboratory tests done?

To find out how we are doing in re-establishing and maintaining **sufficient tissue oxygenation!**

# Bleeding is the major cause of acute death in trauma\*

USA

■ CNS   ■ Exsanguination   ■ CNS + Exsanguination   ■ Organ Failure   ■ Other



\* Patients dying in hospital within 48 hours (acute deaths, n=154)

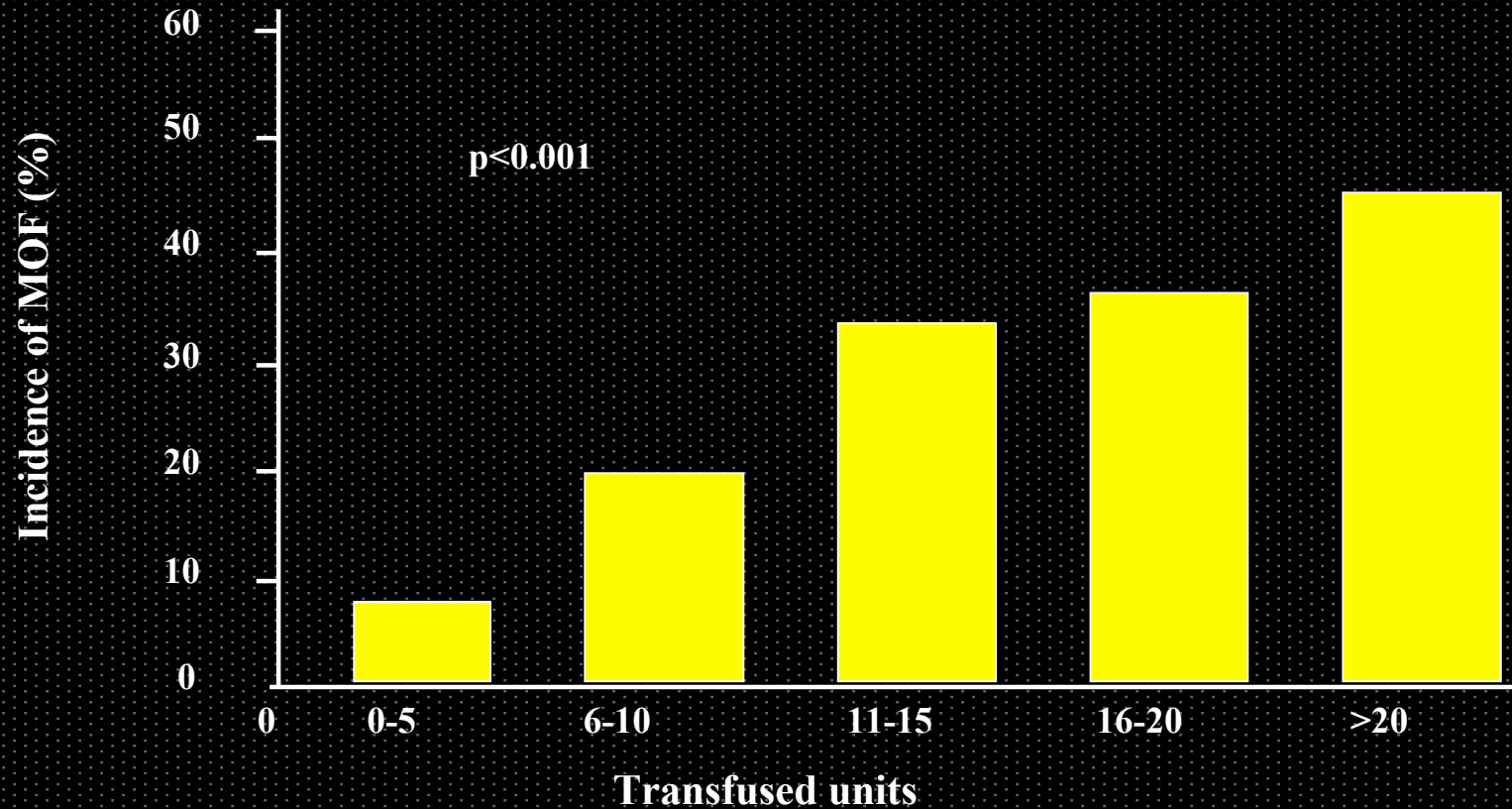
Sauaia A et al. *J Trauma* 1995;38:185-93

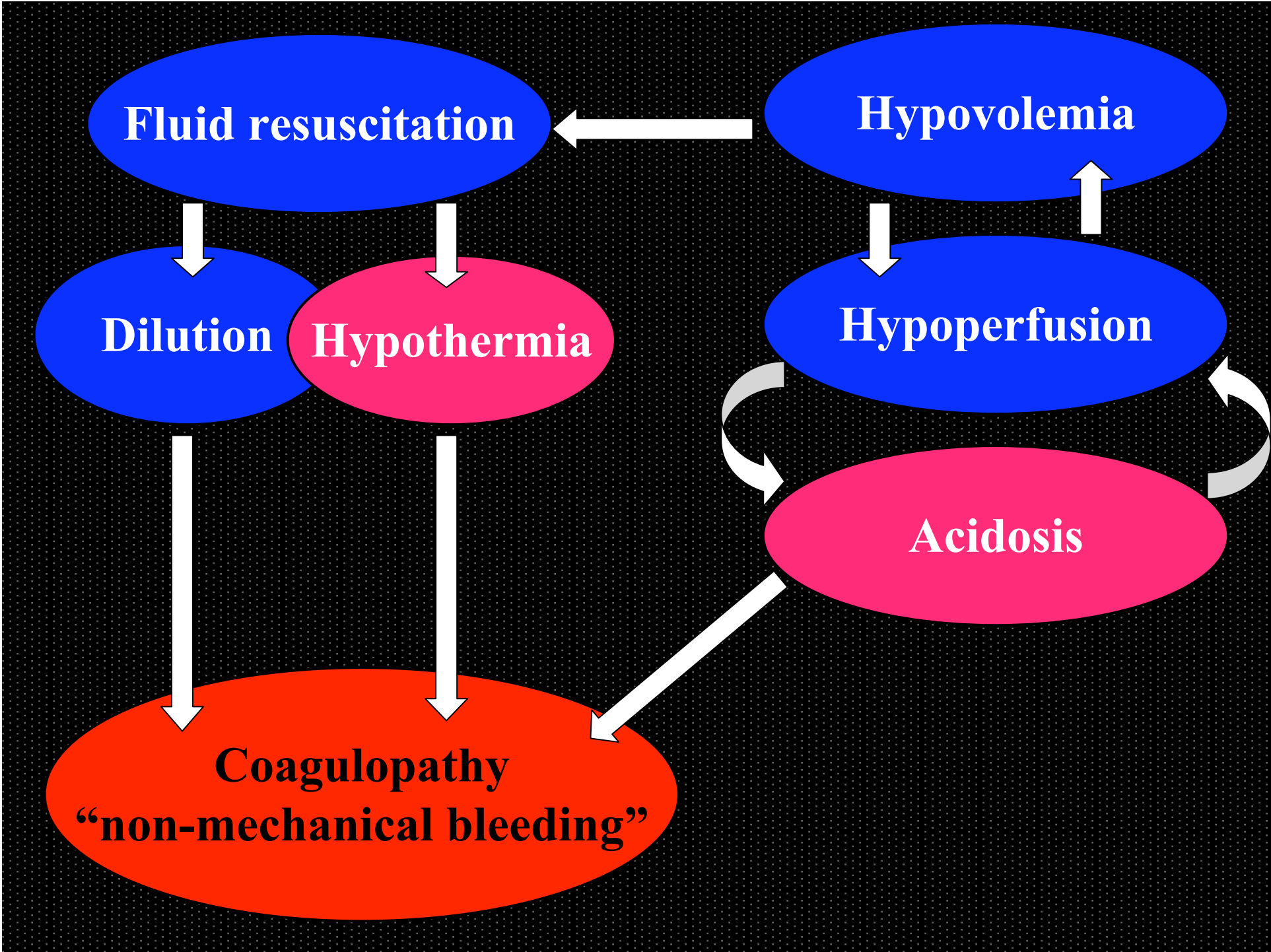
# ***Multi-organ failure* is a major clinical target in trauma management**

- **MOF occurs in major trauma as a result of**
  - **prolonged hypoperfusion** during acute haemorrhage
  - the systemic inflammatory response to injury  
(potentially **aggravated by massive transfusion**)
- **MOF is highly correlated with mortality in trauma**
- **Avoidance of MOF may be achievable through**
  - **the optimal management of haemorrhage**
  - **minimising transfusion of blood products**

# Multi-organ failure increases with transfusions following trauma

Relationship between units of transfused blood in the first 12 hours and the incidence of MOF





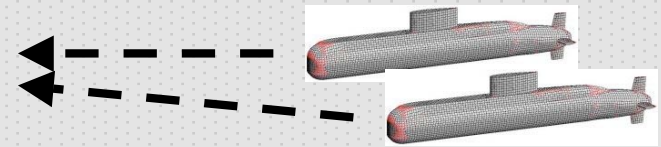
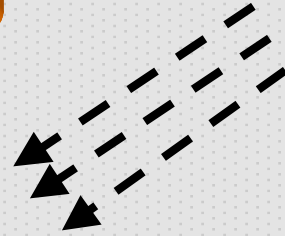
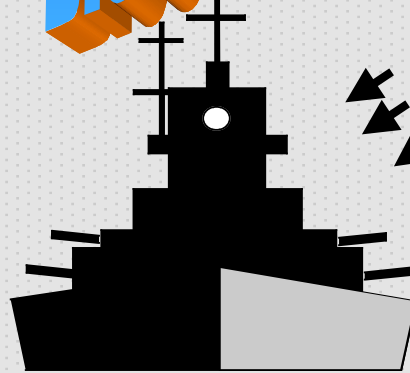
# DAMAGE CONTROLL



# Damage control



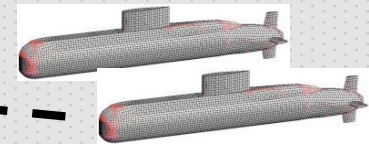
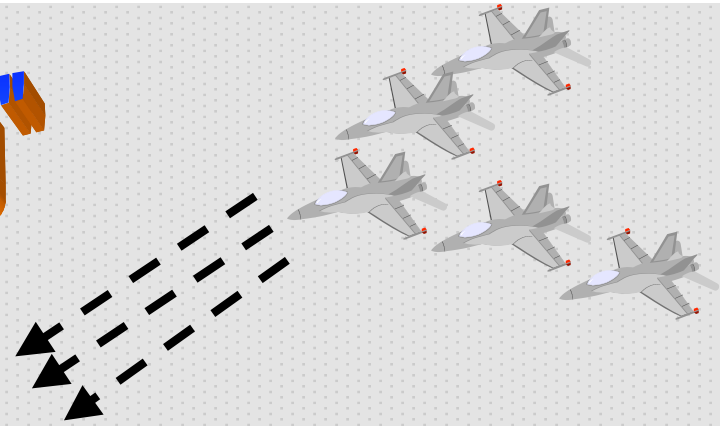
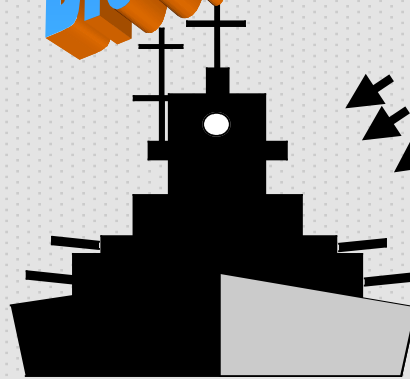
"Bleeding"



# Damage control



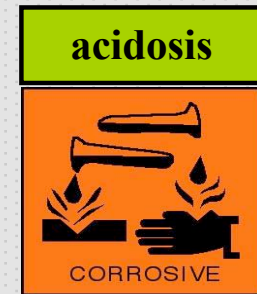
# "Bleeding"



# Damage control



# BLEEDING



# hypothermia



# CT - the golden standard

**ABCCTD = A B *CT* DEATH**



**No CT for critical patients**



**Prompt surgery instead**



**Use only the radiation needed**

**VOMIT = Victims Of Modern Imaging Technology**

**BARF = Brainless Application of Radiological Finding**

# CT – part of primary assessment

**Trauma Hospital Lorenz Boehler, Vienna, Austria**

*J Trauma March 2007: Weninger et al.*

*185 vs. 185 pts., 16-line MSCT*



**All trauma patients are taken into CT immediately after admission**

- **excluding pts. having SaO<sub>2</sub> > 90%, HR < 130 b/min, systolic BP > 70 mmHg**
- **intubated and ventilated + up to 250 ml hypertonic saline if needed**

**ER-time shorter**

**ER-OR time shorter**

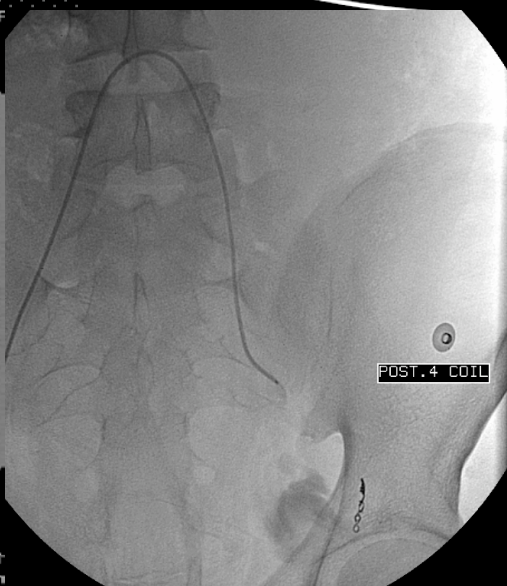
**ER-ICU time shorter**

**ICU stay / LOS shorter**

**No statistically significant difference in 24 h total fluids or packed red cells**

**No difference in hospital mortality rate**  
**Less organ (lung, kidney, liver) dysfunction**

# INTERVENTIONAL RADIOLOGY



- Pelvis
- Spleen
- Liver
- Various stentgrafts

# **Finnish Forward Surgical Team**

## **EUFOR Operation RD Congo 2006**



**Lauri Handolin**

**traumasurgeon**

**The Finnish Defence Forces**

**Helsinki University Hospital**



# The mission of FST

- LIFE & LIMB – saving surgery
  - In far away areas
  - Long transport times
  - To have **LIMITED** surgical capacity in close vicinity
  - Prompt surgical bleeding control
  - Control of contamination
  - Control of complicated soft tissue injuries
  - Temporary revascularization of limbs
  - Prevention of secondary complications (ACS, debridement)



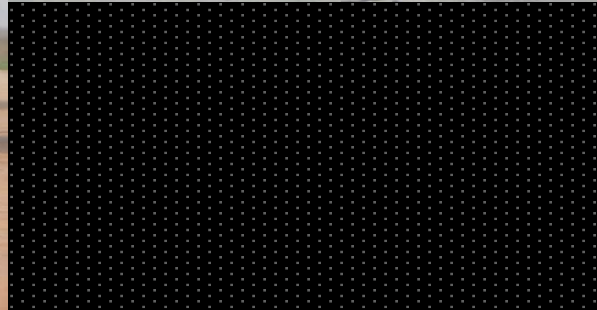


# FST = "tactical surgical asset"





# ROTARY & FIXED WING AIR MOBILITY



*“Nothing is difficult to those who have the will”*



*Thank you!*