



# Damage Control Resuscitation a katonai gyakorlatban

— kényszer szülte, de iránymutató megoldások...

Tóth Zoltán orvos alezredes

<sup>1</sup> NATO MILMED COE — Interoperability Branch

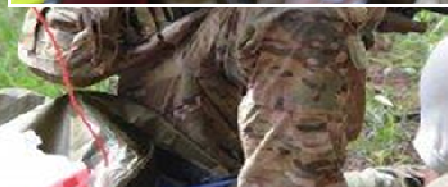
<sup>2</sup> MH. Egészségügyi Központ ('Honvédkórház')  
Sürgősségi Betegellátó Centrum





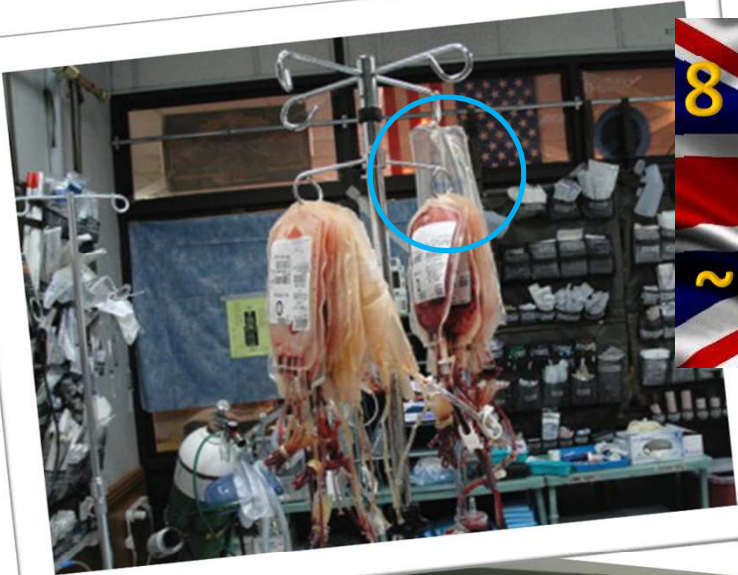
## FIGYELMEZTETÉS:

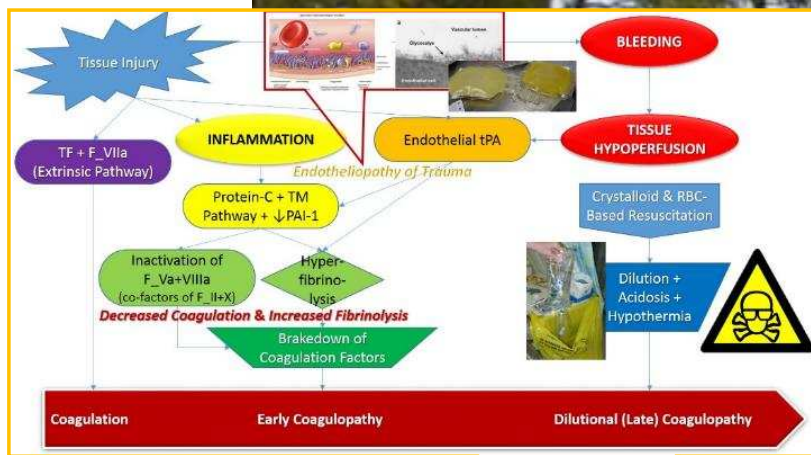
- Az összefoglalóban elhangzottak az előadó számára hozzáférhető, korszerű, nemzetközi, nyomtatott és elektronikus, nyílt szakirodalmi forrásokon alapulnak
  - Jelenleg létező és jövőbeli lehetséges megoldások
- Nem tekintendőek szükségképpen munkaadó szervezetei és/vagy katonai alakulata hivatalos állásfoglalásának
- Az előadónak nincs semmiféle anyagi érdekeltsége a prezentációban megjelenő eszközök, gyógyszerek gyártóival és forgalmazóival kapcsolatban



'10 : 1 : 2'

8 év alatt [2006-14]  
~15.500L vér  
~2.600 sérültnek





- To Do List:
1. **Stop Bleeding Aggressively!**
  2. **Promote Normal Hemostasis**
  3. **PRO-Coagulatory & ANTI-Fibrinolytically**
  4. **Restore Normal Tissue Perfusion**
  5. **Repay O<sub>2</sub>-Debt**
  6. **Repay O<sub>2</sub>-Debt**
  7. **Repay O<sub>2</sub>-Debt**

## Damage Control Resuscitation

Timely Targeted  
'Novel Hybrid Resuscitation'

Limited Crystalloid Resusc

to control  
**TRAUMA  
INDUCED/  
ASSOCIATED  
COAGULO-  
PATHY**

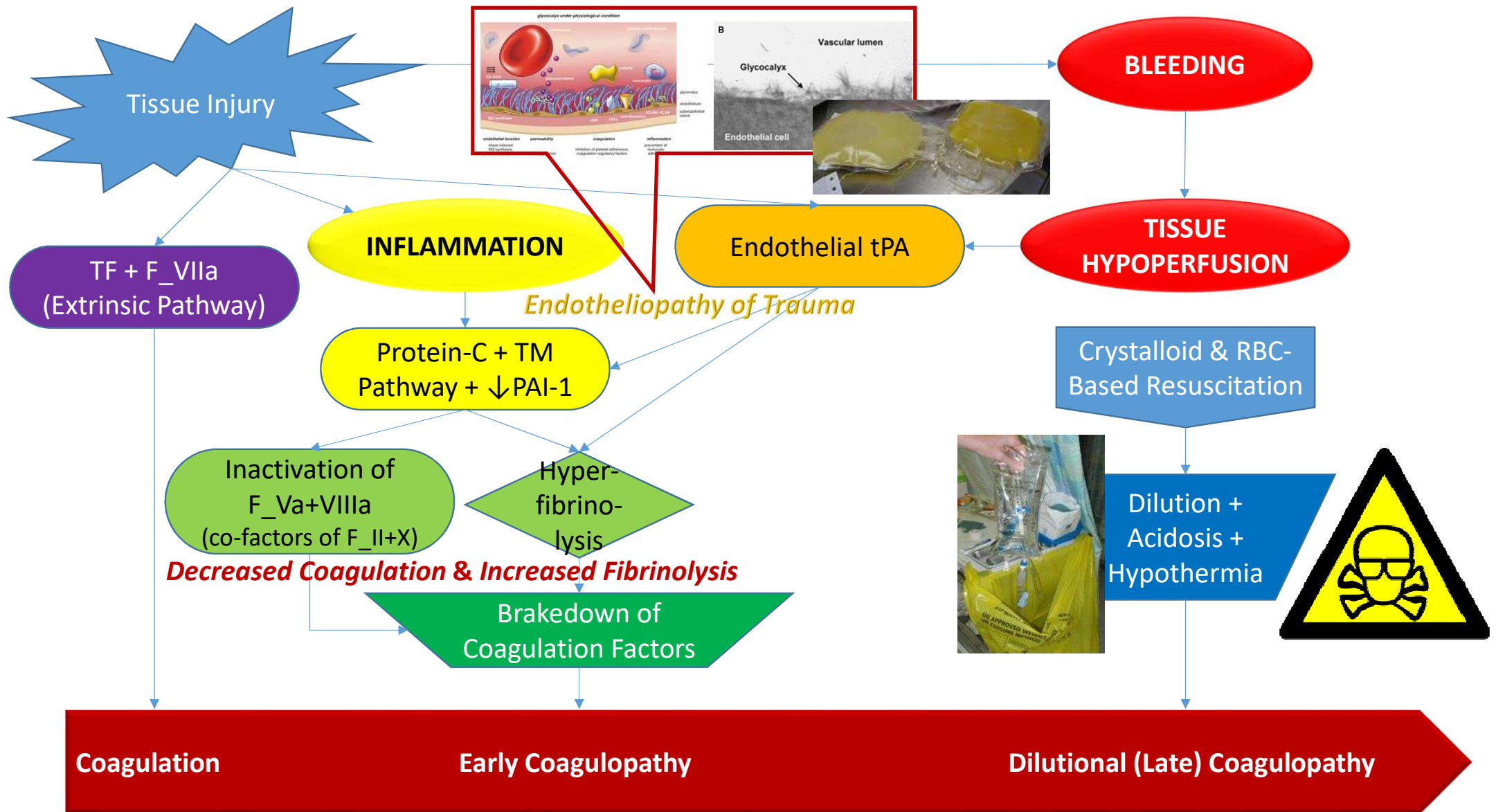


Hemostatic Resuscitation

Damage Control Surgery

Normal pH, T & [Ca<sup>2+</sup>]<sub>ic</sub>

Aggressive Bleeding Control



### Novel Hybrid Resuscitation:

- SAP: ~80mmHg 1 órán át
- SAP: 100-110mmHg, amíg a sebészi vérzéscsillapítás megvalósul
- Azután a normál vérnyomás-érték helyreállítása vérkészítmények használatával

*Dutton's Guide to Fluid Resuscitation in Bleeding Major Trauma Patients*

# Hæmostaticus integritás

# DCR

## Perfúziós nyomás

## O<sub>2</sub>-Transzport kapacitás

Walter B. CANNON  
@WW1

Edward D. CHURCHILL  
@WW2

Hæmostaticus Resuscitatio



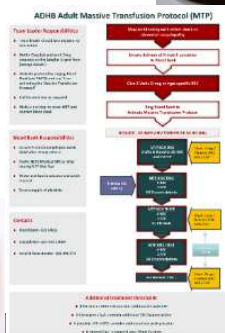


'Old-School'

'New-School'

NEW  
'Oldest-School'

<2:1:1:1



Lab-driven\* ('Pull')  
\*traditional Coag.Panels

Formula-driven ('Push')  
Massive Transfusion Protocol

PoC-Test\*-Corrected  
\*Viscoelastic Haemostatic Assays

„It is counterintuitive to resuscitate an acidotic, anaemic and coagulopathic patient with an acidotic, anaemic and coagulopathic fluid.”

Davies, RL: Should whole blood replace the shock pack?

J R Army Med Corps February 2016 Vol 162 No 1

**VVT-konc.:**  
**Hct 55%**  
**335mL**

**FFP:**  
**80%**  
**275mL**

**THRC.:**  
 **$5.5 \times 10^{10}$**   
**50mL**

1E VVT + 1E FFP + 1E THRC + 10cs Cryo  
= 660mL **HIDEG**

- ☐ Hct 29%
- ☐ thr 87K
- ☐ Coag aktivitás 65%
- ☐ 750mg Fibrinogen

**≠**

„There is one single product available on target which contains all the clotting factors, has fully functioning red blood cells and platelets, costs less than \$100 per unit to collect, and is maintained indefinitely at 98.6 degrees Fahrenheit .”

Fisher, AD et al.: Tactical Damage Control Resuscitation  
Military Medicine August 2015 Vol 180 No 8

**500mL meleg**  
**Hct: 38-50%**  
**thr: 150-400K**  
**Coag.: 100%**  
**1500mg Fibrinogen**



## Reviews

### Frozen blood products: clinically effective and potentially ideal for remote Australia

A. HOLLEY\*, D. C. MARKS†, L. JOHNSON‡, M. C. READE§, J. F. BADLOE\*\*, F. NOORMAN††

Department of Intensive Care Medicine, Royal Brisbane and Women's Hospital, Herston, Queensland, Australia; Military Blood Bank, Leiden, the Netherlands; and Australian Red Cross Blood Service, Sydney, New South Wales, Australia

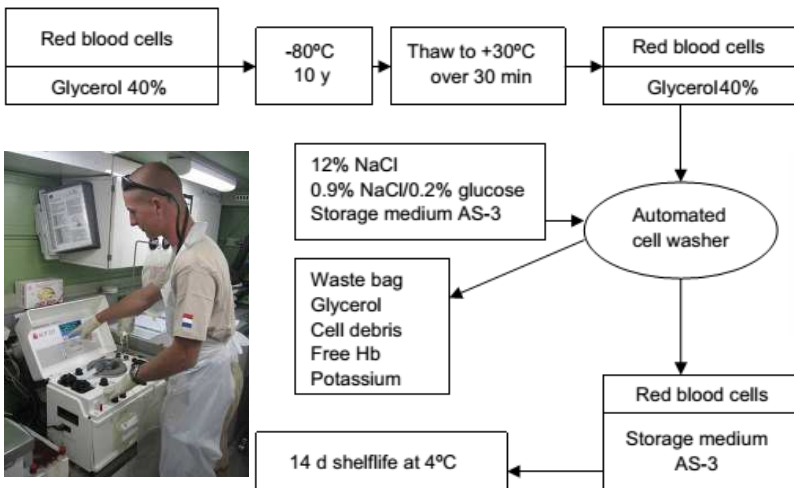


FIGURE 2: Overview of the production and thawing of cryopreserved red blood cells. y=years, min=minutes, d=days, NaCl=sodium chloride, Hb=haemoglobin, AS-3=additive solution 3, d=days.

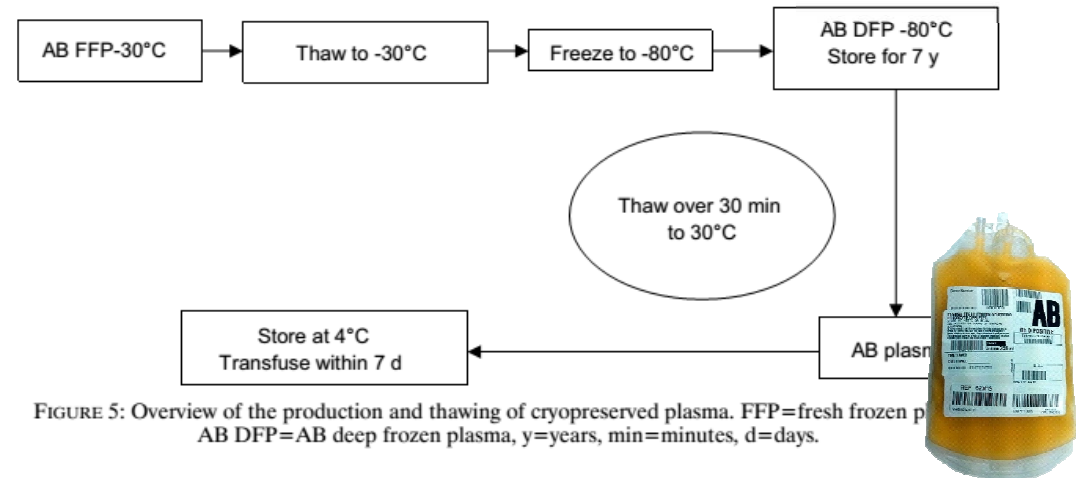
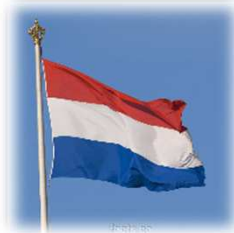


FIGURE 5: Overview of the production and thawing of cryopreserved plasma. FFP=fresh frozen plasma, AB DFP=AB deep frozen plasma, y=years, min=minutes, d=days.

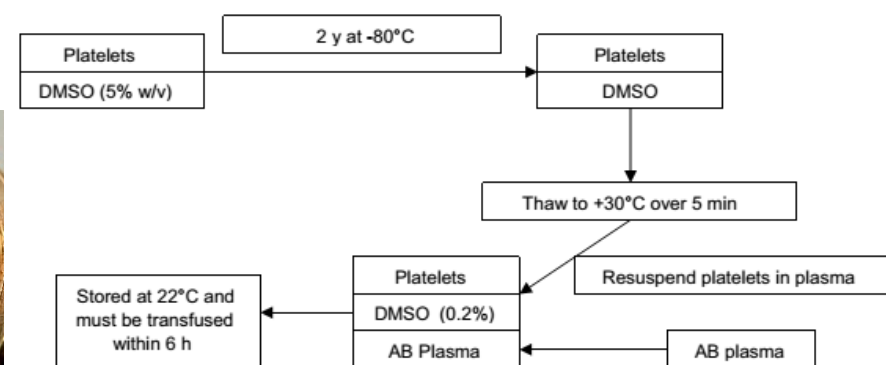


FIGURE 4: Overview of the production and thawing of cryopreserved platelets. DMSO=dimethyl sulfoxide, w/v=weight/volume, y=years, min=minutes, h=hours.



Fig. 2. Available dried plasmas. (A) French Lyophilized Plasma (FLYP), produced by the French Military Blood Institute (Centre de Transfusion Sanguine des Armees [CTSA]); (B) LyoPlas N-w, produced by the German Red Cross; (C) Bioplasma FDP, produced by National Bioproducts Institute, Pinetown, South Africa.

| TABLE 2. Characteristics of commercially available dried plasmas |                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                  | FLYP                                                                                                                                                                                                                                                                                                                                           | LyoPlas N-w                                                                                                                                                                                                                                                                                                      | Bioplasma FDP                                                                                                                                                                                                                                                       |
| Use                                                              | 1994-present—French Military<br>2011-present—Civilian (austere)                                                                                                                                                                                                                                                                                | General population—Germany                                                                                                                                                                                                                                                                                       | General population—South Africa & neighboring countries                                                                                                                                                                                                             |
| Processes                                                        | <ul style="list-style-type: none"> <li>• Lyophilized</li> <li>• Pooled apheresis FFP &lt;11 donors</li> <li>• All volunteer donors</li> <li>• Donor screening</li> <li>• Testing—disease &amp; factors</li> <li>• Hemovigilance program</li> <li>• 2003—Leukoreduced</li> <li>• 2010—No HLA Ab+ women</li> <li>• 2010—Amotosalen PR</li> </ul> | <ul style="list-style-type: none"> <li>• Lyophilized</li> <li>• 1990-2006: Pooled S/D</li> <li>• 2007-present—Single Donor</li> <li>• Donor screening</li> <li>• Hemovigilance Program</li> <li>• Frozen <math>\geq 4</math> mos for donor retest</li> <li>• Leukoreduced</li> <li>• No HLA Ab+ women</li> </ul> | <ul style="list-style-type: none"> <li>• Lyophilized</li> <li>• Pooled (up to 1,500 donors)</li> <li>• All volunteer donors</li> <li>• Donor screening</li> <li>• Comprehensive testing</li> <li>• Hemovigilance program</li> <li>• S/D treatment for PR</li> </ul> |
| Characteristics                                                  | <ul style="list-style-type: none"> <li>• Normal factor levels</li> <li>• ABO-universal</li> </ul>                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Normal factor levels</li> <li>• ABO type specific</li> </ul>                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>• Factor levels: <math>\geq 0.40</math> IU</li> <li>• ABO-universal plasma</li> </ul>                                                                                                                                        |
| Shelf-life                                                       | 2 years at room temperature                                                                                                                                                                                                                                                                                                                    | 15 months at 2°C-25°C                                                                                                                                                                                                                                                                                            | Store below 25°C                                                                                                                                                                                                                                                    |
| Reconstitution                                                   | <6 minutes                                                                                                                                                                                                                                                                                                                                     | A few minutes                                                                                                                                                                                                                                                                                                    | <10 minutes                                                                                                                                                                                                                                                         |
| Indication                                                       | As sole source of plasma where used                                                                                                                                                                                                                                                                                                            | Same as frozen plasma                                                                                                                                                                                                                                                                                            | Where plasma and/or coagulation factors are required                                                                                                                                                                                                                |
| Safety                                                           | No adverse events reported (including TRALI) since 1994 start of hemovigilance program                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• &gt;300,000 U S/D LyoPlas</li> <li>• &gt;230,000 U LyoPlas N-w (2007-2013)</li> <li>• Hemovigilance program reported no increase incidence of adverse events</li> </ul>                                                                                                 | Contraindicated: Severe Protein S deficiency<br><br><ul style="list-style-type: none"> <li>• Hemovigilance program—no increase in adverse events</li> </ul>                                                                                                         |
| Efficacy                                                         | Clinical use reports support efficacy as part of a 1:1 DCR approach <sup>12</sup>                                                                                                                                                                                                                                                              | No restrictions related to clinical efficacy have been identified                                                                                                                                                                                                                                                | No restrictions related to clinical efficacy have been identified                                                                                                                                                                                                   |

Pusateri, AE et al.: Dried plasma: state of the art science and recent developments  
*Transfusion* 2016;**56**(4)Suppl.2:S128-139



# Lehetséges Thrombocyta készítmények

- Folyékonyan tárolt
  - Szobahőmérsékleten (@20-24°C 5 napig; rázógépen)
  - Hidegen (@4°C)\*
  - Ciklikus hőmérsékleten (@4°C, 12h-ként 30min-re @37°C-ra melegítve)
- Kryoprezervált
  - Dimethylsulfoxidban szuszpendált; felolvasztás után eltávolított és plazmában reszuszpéndált
- Lyophilizált (fagyasztva szárított) — kutatás alatt

*\*A 4°C-on tárolt (így tulajdonképpen „előaktivált”) thrombocyta korábban tűnik el a keringésből, de aggregációs és alvadási szempontból **hatékonyabb**, mint a meleg, agitált...*

Reddoch, KM et al.: Hemostatic function of apheresis platelets stored at 4°C and 22°C      *Shock* 2014;**41**:54-61

Milford, EM; Reade, MC: Comprehensive review of platelet storage methods for use in the treatment of active hemorrhage *Transfusion* 2016;**56**(4)Suppl.2:S140-148

# A Teljes Vér [WB] meghatározása

## Whole Blood:

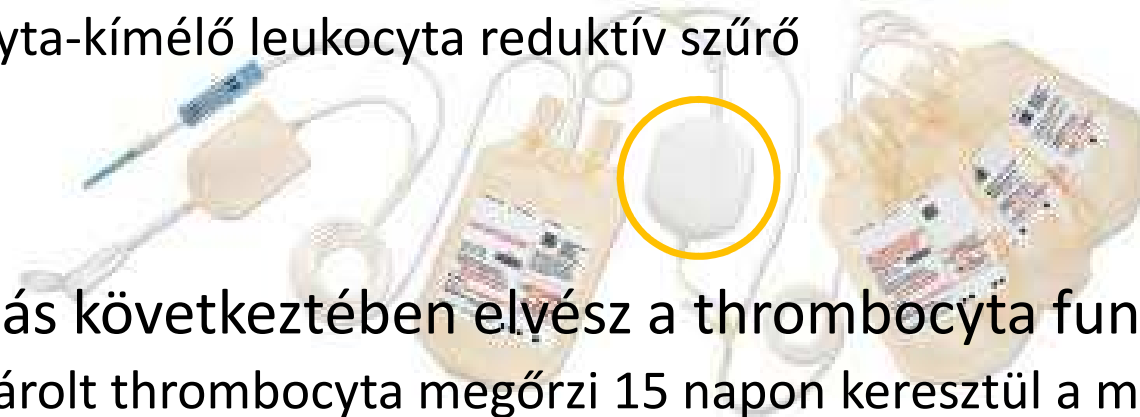
- ❑ Cold: @2-6°C
- ❑ Warm: @22-26°C
- ❑ Fresh: ÷48hrs

- ~450-500mL vér; nem-adenin tartalmú antikoagulánssal (CPD, CP2D, stb.) — 21 napig tárolható 1-6°C-on; CPDA-1 esetén 35 napig
    - Van idő a fertőző betegségek kiszűrésére
  - Katonai/mostoha feltételek közötti ellátás során a transzfúzióval átvihető betegségek tesztelése nem megoldott
    - Előszűrt és 90 naponta újra ellenőrzött donor-poolból
    - Gyorstesztek + utólagos ('*post-hoc*') tesztelés
- melegen tárolt (22°C 8h-ig; azután plusz 24h 4°C-on)
- Friss, ha a tárolás <48h
  - Csoportazonos vs. Alacsony-titerű '0' vércsoportú

# Tévhitek vs. Igazság a Teljes Vérről

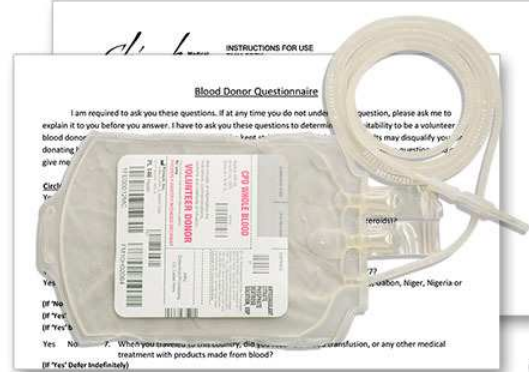


- ABO-csoportazonosnak kell lennie
  - Az alacsony anti-A és anti-B titerű '0' vércsoportú vér biztonságos univerzális donor
- Nem lehet leukoredukált és tartalmazhat thrombocytát egyidejűleg
  - Thrombocyta-kímélő leukocyta reduktív szűrő



- A hidegtárolás következtében elvész a thrombocyta funkció
  - A 4°C-on tárolt thrombocyta megőrzi 15 napon keresztül a működését

# Field Blood Transfusion - Special Operations Forces (TMM-FBT-SOF)



**DONOR**

**RECIPIENT**

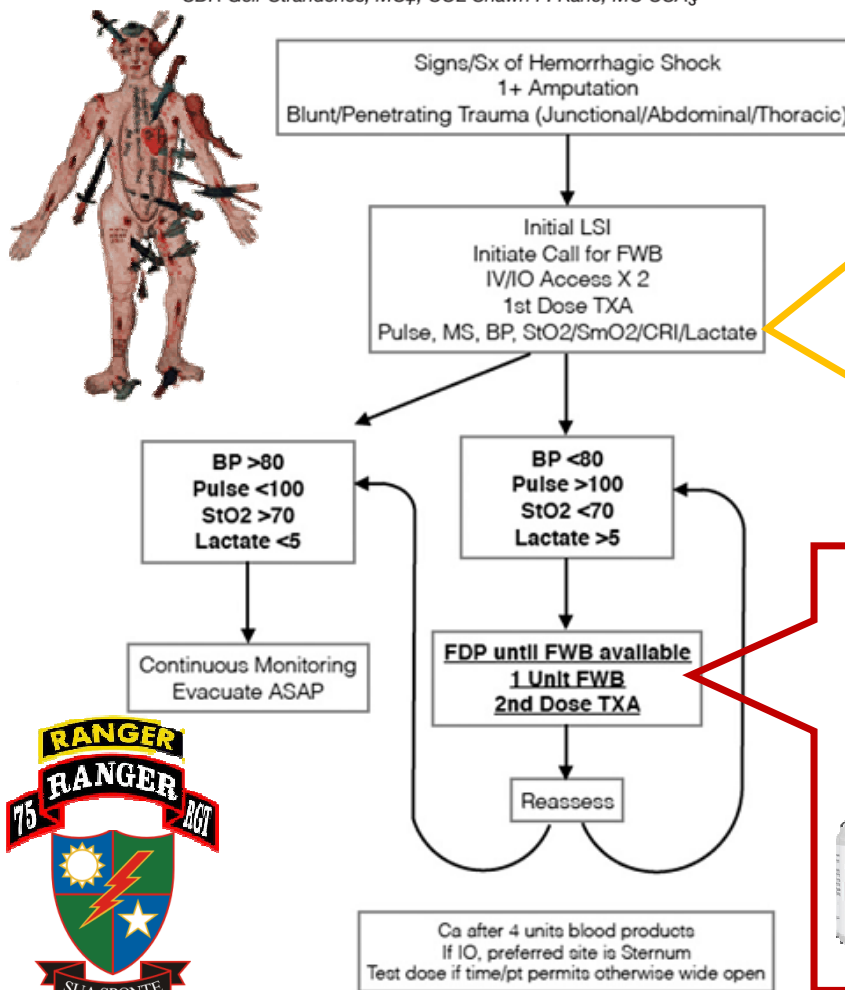


**Forward / Remote DCR**





# REVIEW ARTICLES *Military Medicine* 2015;**180**(8):869-75 **Tactical Damage Control Resuscitation** MAJ Andrew D. Fisher, SP USA\*; MAJ Ethan A. Miles, MC USA\*; LTC Andrew P. Cap, MC USA†; CDR Geir Strandenes, MC‡; COL Shawn F. Kane, MC USA§





**Field Emergency Donor Panel Questionnaire and Triage Tool**

- Give blood donor briefing to potential donor group
- Confirm blood group(s) required
- Exclude air crew, HGV drivers and key machinery operators

**Primary Triage** (Question as a group)

| Serial | Question                    | Yes | No | Action                            |
|--------|-----------------------------|-----|----|-----------------------------------|
| 1      | Do you want to give blood?  |     |    | Disqualify if NO                  |
| 2      | Have you given blood before |     |    | If yes - Consider early selection |

**Secondary Triage** (Question individually)

| Serial | Question                                                                                                                                                                      | Yes | No | Action                                                                      |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|-----------------------------------------------------------------------------|
| 3      | Are you unwell now?<br>New Fever/ Diarrhoea / Vomiting<br>Chronic medical condition and not well                                                                              |     |    | Disqualify if YES                                                           |
| 4      | Are you taking medication for blood pressure; stroke or heart, lung, kidney, cancer or blood conditions?                                                                      |     |    | Disqualify if YES                                                           |
| 5      | Have you had a blood transfusion or blood products in the last year                                                                                                           |     |    | Disqualify if YES<br>Accept after 1 year                                    |
| 6      | Are you living with HEP B,C / HIV / AIDS – OR living with anyone with these conditions                                                                                        |     |    | Disqualify if YES                                                           |
| 7      | Have you ever been refused as a donor or told not to donate blood<br>(a past history of treated anaemia may be acceptable)                                                    |     |    | Disqualify if YES                                                           |
| 8      | Male donors only. Have you ever had sex with another male?                                                                                                                    |     |    | Disqualify if YES                                                           |
| 9      | Have you ever taken illegal drugs with a needle (even steroids)                                                                                                               |     |    | Disqualify if YES                                                           |
| 11     | Are you currently pregnant or breast-feeding?                                                                                                                                 |     |    | Disqualify if YES                                                           |
| 12     | Conduct a physical examination<br>Check: Temperature / Rash / Malnutrition, / Pallor / Jaundice / Cyanosis / Shortness of breath / Intoxication from alcohol or drugs / Veins |     |    | Disqualify any potentially unwell donor or donors with very difficult veins |

- The remaining group form the Emergency Donor Panel (EDP)
- Use the Risk Triage Screen to risk score the potential donors

**Risk Triage** (Question individually)

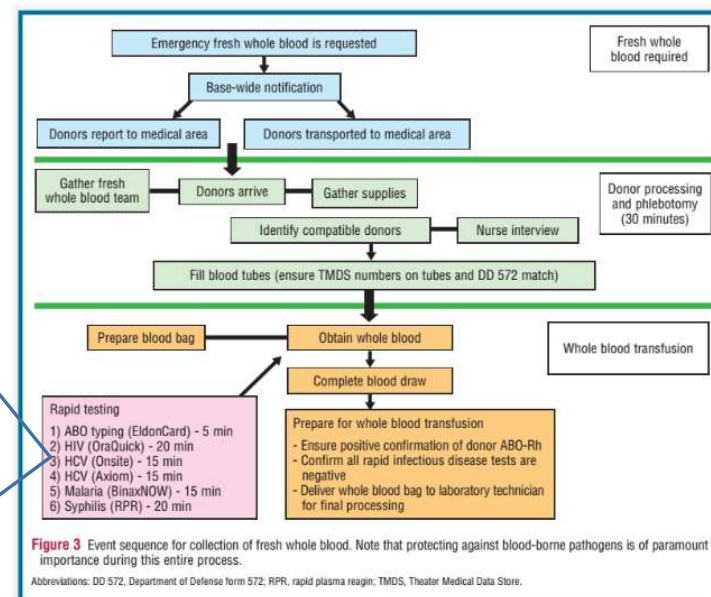
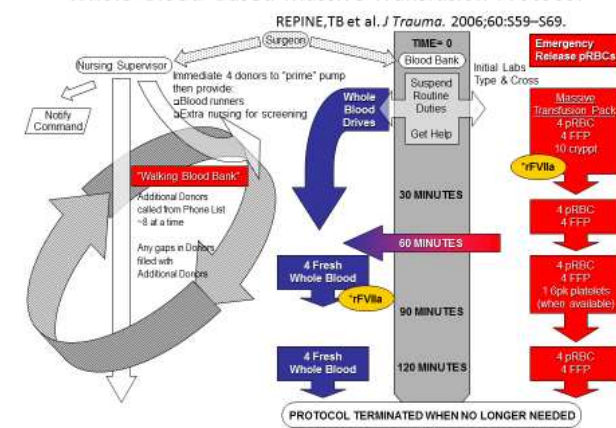
| Score                             | Questions                                                       | Subtotal | Notes               |
|-----------------------------------|-----------------------------------------------------------------|----------|---------------------|
| <b>Blood donation history</b>     |                                                                 |          |                     |
| 1                                 | Regular Donor                                                   |          | Optimum             |
| 2                                 | Previous Donor                                                  |          |                     |
| 3                                 | Non Donor                                                       |          |                     |
| <b>Veins and body weight</b>      |                                                                 |          |                     |
| 1                                 | Good lateral (outer) vein                                       |          | Optimum             |
| 3                                 | Poor or difficult vein                                          |          | Risk of fainting    |
| 3                                 | Under 60 kg                                                     |          |                     |
| <b>Infection</b>                  |                                                                 |          |                     |
| 1                                 | > 21 Days Well                                                  |          | Optimum             |
| 3                                 | < 21 Days Well                                                  |          |                     |
| <b>Travel</b>                     |                                                                 |          |                     |
| 1                                 | No travel in the countries below in the last 6 months           |          | Optimum             |
| 2                                 | South America                                                   |          |                     |
| 4                                 | Asia and Africa                                                 |          |                     |
| <b>Life style:</b>                |                                                                 |          |                     |
| 1                                 | Sex with one partner                                            |          | Optimum             |
| 3                                 | Sex with multiple partners but protected                        |          |                     |
| -                                 | Sex with a sex worker or in exchange for money/drugs            |          | Avoid for 12 months |
| <b>Serious medical conditions</b> |                                                                 |          |                     |
| 1                                 | None                                                            |          | Optimum             |
| 3                                 | Past or present serious medical conditions but managed and well |          |                     |
| 3                                 | Untreated current medical conditions but well                   |          |                     |
| <b>TOTAL</b>                      |                                                                 |          |                     |

- Add up score and record: Lowest score = Lowest Risk
- Use Point of Care Test for TTT's – Eliminate and counsel any positives
- Blood type donors and document results

## Walking Blood Bank



## Whole-Blood-Based Massive Transfusion Protocol



Doughty, H et al.: A proposed field emergency donor questionnaire and triage tool  
*Transfusion* 2016;56(4)Suppl.2:S119-127

Goforth, CW et al.: Fresh Whole Blood Transfusion: Military and Civilian Implications  
*Critical Care Nurse* 2016 Jun;36(3):50-57

# WFWB as the ... Option

**BEST**



**Single**

**Ultimate**



# Beszélhetünk-e egy nyelvet?

(„Major Hæmorrhage”, ill. „Military” Transfusion Medicine?)

## Hematológiai/Onkológiai javallat

- Krónikus anémiás panaszok és tünetek, thrombocytopenia következtében minor vérzések; (thrombo-embólia hajlam?)
- Statikus laboratóriumi tesztek (pl. sejtszámok)
- Cél: a tartós eredmény — minél ritkább transzfúzió
  - A megfelelő komponenssel

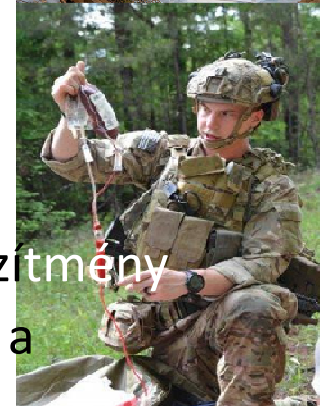
## Súlyos (traumás) vérzés ellátási javallata

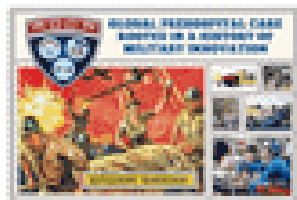
- Hirtelen föllépő, katasztrofális mértékű kivérzés
  - Másodlagosan, de rövid időn belül kialakuló életveszélyes alvadási zavarral
- Dinamikus, POC-tesztek (pl. viszkoelasztometria/-gráfia)
- Cél: mielőbbi, minél hatékonyabb hatás ~ *teljes vér* adásával



# Tehát:

- A súlyos sérültek ellátásában a **vér alapú (damage control ÷ hæmostaticus) reszuszcitáció**ra kellene törekedni
- Ennek során egyszerűbb és vsz. jobb lenne **teljes vért** adni
  - **Hidegen** (@4°C) tárolt, **alacsony titerű 'O'**-s vér hatékony univerzális készítmény
  - Speciális esetben (zárt kis csoport, előszűrés és szoros eü-i kontroll, stb.) a meleg (@22°C) friss teljes vér helyszíni alkalmazása elfogadható lehetne
- A **hidegen** tárolt **thrombocyta hatékony**(*abb...*)
- **TXA** általános korai, helyszíni használata
  - — vsz. fibrinogén koncentrátum is jó és biztonságos lenne
- A **liofilizált plazmakészítmények** minél korábbi alkalmazása kiemelt jelentőségű
  - — Jó lenne, ha thrombocyta, esetleg teljes (saját) vér állna rendelkezésre...





## SUPPLEMENT ARTICLE

### NATO Blood Panel perspectives on changes to military prehospital resuscitation policies: current and future practice

Tom Woolley,<sup>1</sup> John Badloe,<sup>2</sup> Milos Bohonek,<sup>3</sup> Audra L. Taylor,<sup>4</sup>  
Hans Erik Heier,<sup>5</sup> and Heidi Doughty<sup>6</sup>

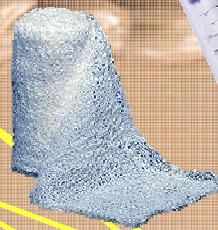
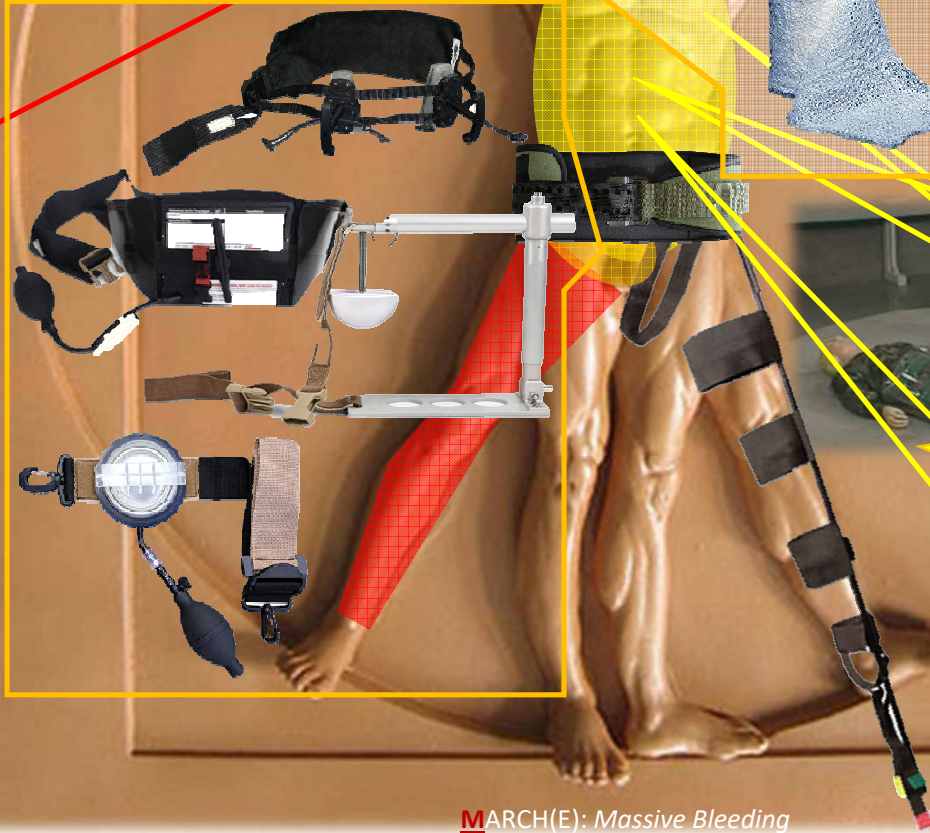


- Keep it scientific and be critical.
- KISS: '*Keep it Stupid Simple!*' — because:
  1. Nothing is as easy as it looks;
  2. Everything will take longer than you expect;
  3. If anything can go wrong, it will;
  4. Avoid blood group-dependent products where possible;
  5. Training is essential and training must not forget the simple procedures;
  6. The treatment of bleeding is to stop the bleeding





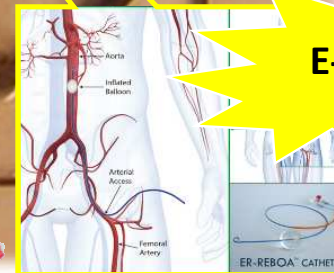
KÉRDÉS???

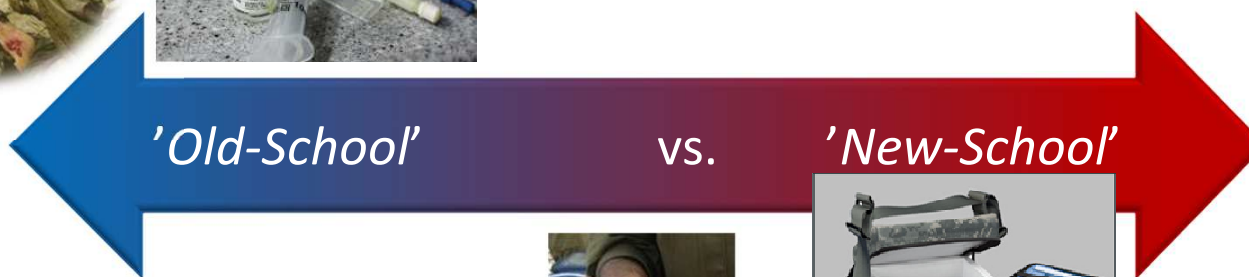


Fejlesztés  
alatt

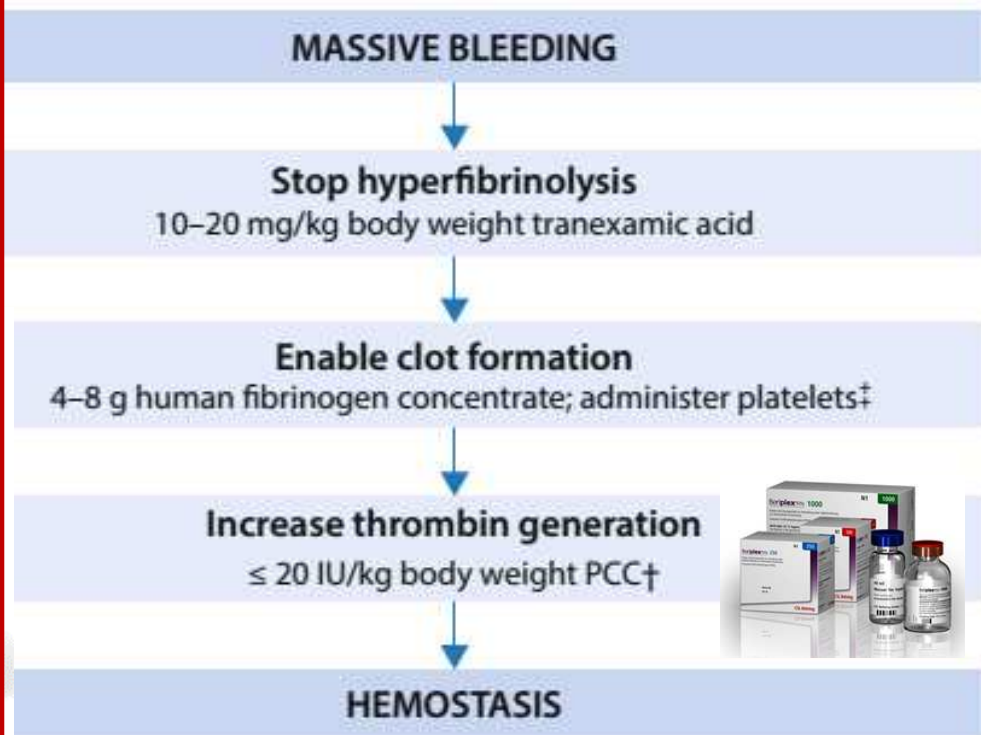
E-MERT?

**M**ARCH(E): Massive Bleeding





MARCH(E): Circulatory support



Maegele, M: Coagulation factor concentrate-based therapy for remote damage control resuscitation (RDCR): a reasonable alternative?

*Transfusion* Apr 2016;**56**(Suppl 2):S157-165

**Stop (Hyper)fibrinolysis**  
1(-2)g TXA

**Support Clot Formation**  
3-4g Fibrinogen Concentrate

**Increase Thrombin Generation**  
≤20IU/kg Prothrombin Complex Concentrate

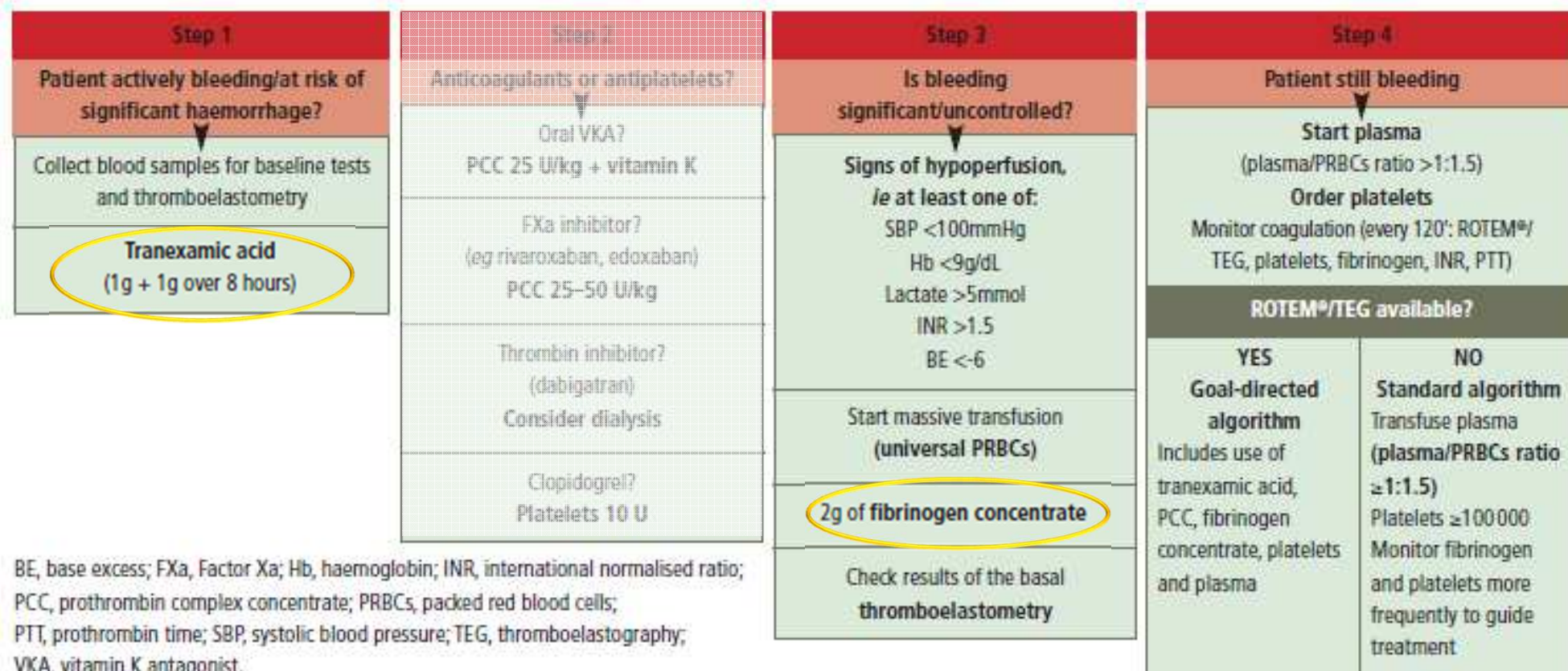


**Rational and Timely Use of Coagulation Factor Concentrates in Massive Bleeding Without Point-of-Care Coagulation Monitoring**

O. Grottke, D. R. Spahn, and R. Rossaint

**Fig. 1** Possible stepwise approach for rational and timely hemostatic therapy in patients with massive bleeding when point-of-care coagulation monitoring is unavailable. PCC: prothrombin complex concentrate; rFVIIa: recombinant human activated factor VII. ‡ Transfusion of platelets should be considered if platelet count is <50,000–100,000/μl [1]. † If first-line treatment with a combination of surgical approaches and best-practice use of hemostatic therapy fails to control bleeding, administration of rFVIIa to enhance thrombin generation, or FXIII to increase clot stability has been considered in the literature [45]

# Early Coagulation Support Protocol



<http://keyopinions.info/issues/haematology/building-on-the-pillars-of-traumatic-coagulopathy-advancing-the-management-of-trauma-related-bleeding/1/?type=1>

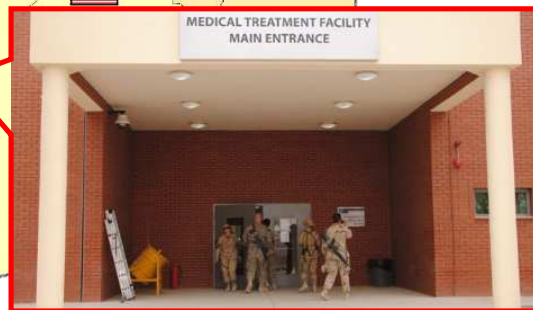




# AFGHANISTAN AND PRT LOCATIONS



- Regional Command West  
Lead nation: France
- Regional Command North  
Lead nation: Germany
- Regional Command East  
Lead nation: Italy
- Regional Command South  
Lead nation: Netherlands
- Regional Command Center  
Lead nation: United States



|  |      |  |       |
|--|------|--|-------|
|  | 2    |  | 9     |
|  | 90   |  | 1770  |
|  | 450  |  | 150   |
|  | 2    |  | 490   |
|  | 820  |  | 1590  |
|  | 2830 |  | 30    |
|  | 280  |  | 860   |
|  | 580  |  | 20    |
|  | 700  |  | 230   |
|  | 140  |  | 70    |
|  | 110  |  | 780   |
|  | 2780 |  | 290   |
|  | 1    |  | 170   |
|  | 3465 |  | 660   |
|  | 140  |  | 10    |
|  | 370  |  | 25    |
|  | 8    |  | 8300  |
|  | 7    |  | 26215 |
|  | 2350 |  |       |
|  | 7    |  |       |

The names shown on this map or chart do not necessarily indicate official recognition of the political status of the territories concerned.

## Medical care at Camp Bastion

Many of the techniques and processes developed by UK Armed Forces medical personnel are now saving lives in the NHS

**300**

doctors, nurses and support personnel at the hospital

**450**

personnel evacuated by the Critical Care Air Support Team to the UK

**14,000**

UK personnel seen at Role 3 Hospital

**39,000**

CT scans

**50,000**

X-rays

**15,500**

litres of blood transfused to

**2,600**

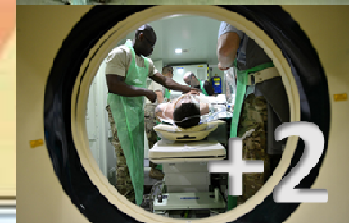
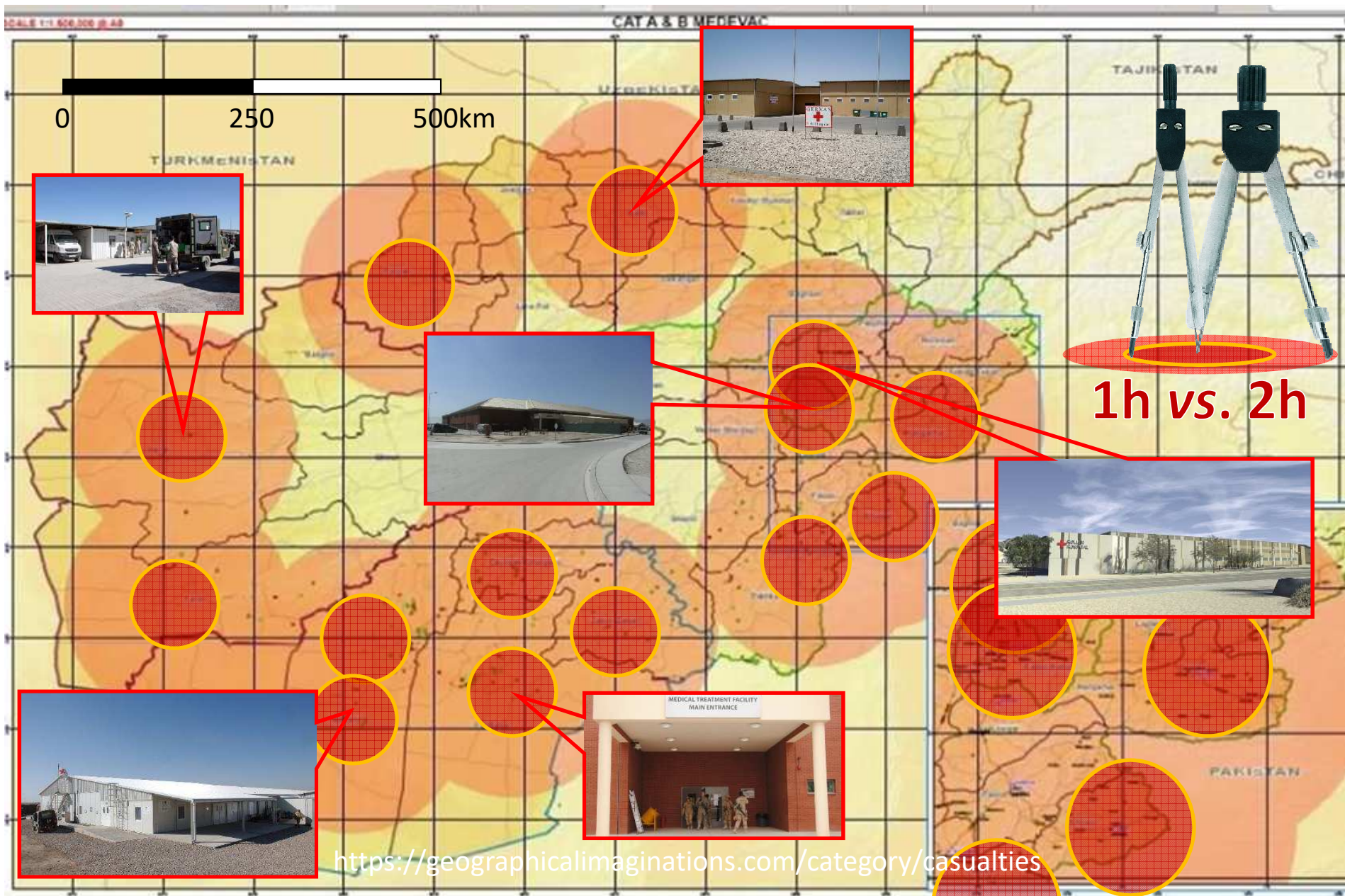
trauma patients

**6,500**

cases transferred to Bastion by Chinook Medical Emergency Response Team

Bastion's Role 3 Hospital opened in 2006 and became one of the world's leading trauma care facilities

Figures are approximate



<https://geographicalimagination.com/category/casualties>

# enhanced Medical Emergency Response Team

## MEGFELELŐ:

- ☐ sérültet
- ☐ időben
- ☐ járművön
- ☐ kísérettel
- ☐ ellátás mellett
- ☐ útvonalon
- ☐ fogadóhelyre

- ☐ **M:** Agresszív vérzéscsillapítás
  - ☐ TQ, HSD, sebüreg kitamponálás, J/AT, medenceöv, húzósín, stb.
- ☐ **A:** Emeltszintű légútbiztosítás
  - ☐ RSI
- ☐ **R:** Légzésmechanika rendezése
  - ☐ digitalis ('mini') thoracostomia
- ☐ **C:** Hemosztatikus reszuszcitáció
  - ☐ TXA
  - ☐ melegített 'O'VVT és 'AB'FFP
- ☐ **H:** Kihűlés elleni védelem