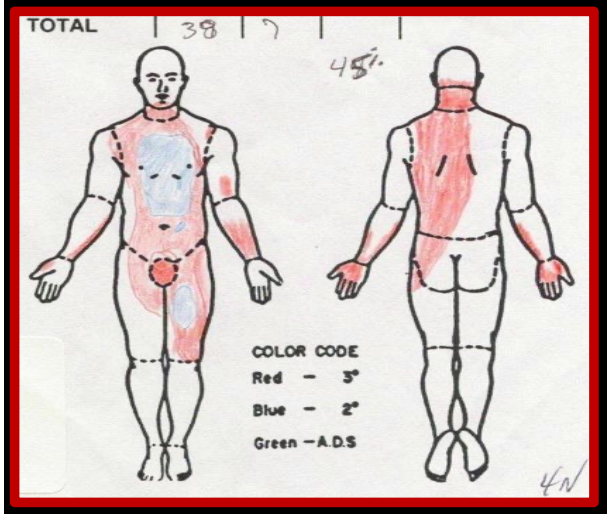
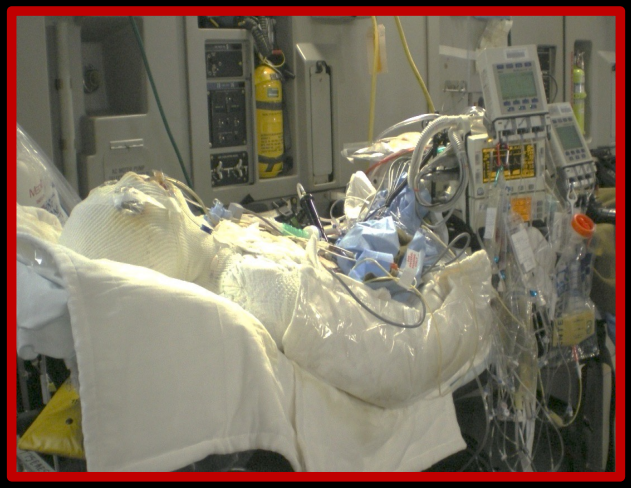
Plasma and Burns:
What's Old is New Again





Jennifer Gurney, MD FACS
COL, MC, US Army

STRAC Whole Blood Summit
15 July 2025

NATIONAL WHOLE BLOOD SUMMIT

STRAC
Southwest Texas Regional Advisory Council

NATIONAL WHOLE BLOOD SUMMIT

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Southwest Texas Regional Advisory Council

Disclosures

The following are the private views of the author and are not intended as official policy of the Department of the Army, the Defense Health Agency, or the Department of Defense.

No financial disclosures.

No Conflicts of interest.


SPACE
THE FINAL
FRONTIER


BOWS

Burns: Last Frontier in Resuscitation

- Variability in resuscitation practices
  - No universally accepted resuscitation strategy
- Physiologic response to thermal injury
  - Variable physiologic response
- Resuscitation morbidity
  - It's real and it's deadly
- Burn Patient Challenges with depending on environment
  - Military burn care / management of burns in rural areas

Burn Resuscitation

Why do we care?

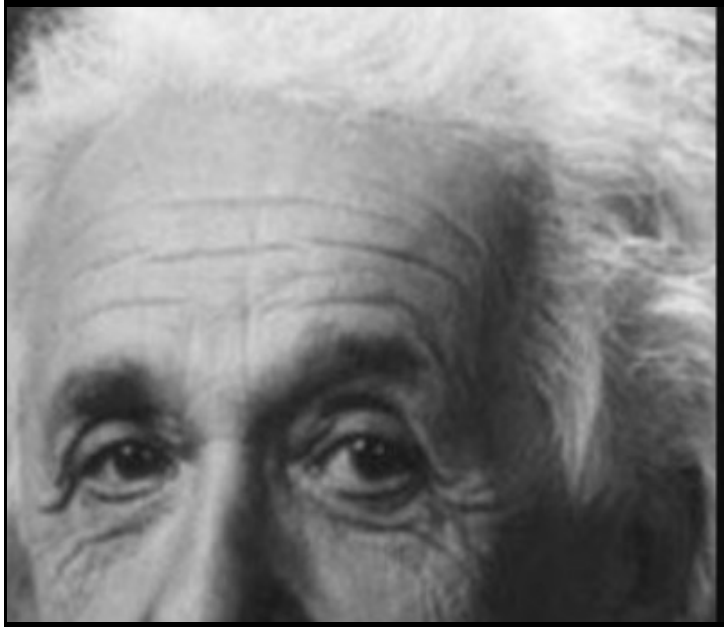
UKRAINE
BURN
TRAUMA
RESCUE

Why do we care?

…combat, disasters, accidents

Why do we care?

the future is unknown…



If you want to know the future, look at the past.

— Albert Einstein —

Where Do We Come From?
What Are We? Where Are We Going?

Gauguin, 1897

Where Do We Come From?
What Are We? Where Are We Going?

Gauguin, 1897

Plasma – History's Full Circle

- 1918: Capt Gordon Ward
- 1936: Dr. John Elliott introduced plasma as a substitute for whole blood
  - *"A Preliminary Report of a new Method of Blood Transfusion"*
- 1941: Committee on Blood Substitutes of the accepted LP & FDP as new therapeutics

WWII: Turning Point in Burn Care

- Pre-WWII CCC Research
  - US anticipated likelihood of war
  - Committees on Surgery & Chemotherapeutics
- WWII huge amount of burn casualties
  - Chemical debridement with pyruvic acid and starch

PRIMARY RESUSCITATION FLUID DURING WWII FOR BURN PATIENTS?

PRIMARY RESUSCITATION FLUID DURING WWII FOR BURN PATIENTS?

World War II: PLASMA RESUSCITATION

WWII: PLASMA RESUSCITATION

World War II:
Plasma for bleeding

Pearl Harbor, 7 December 1941

Pearl Harbor, 7 December 1941

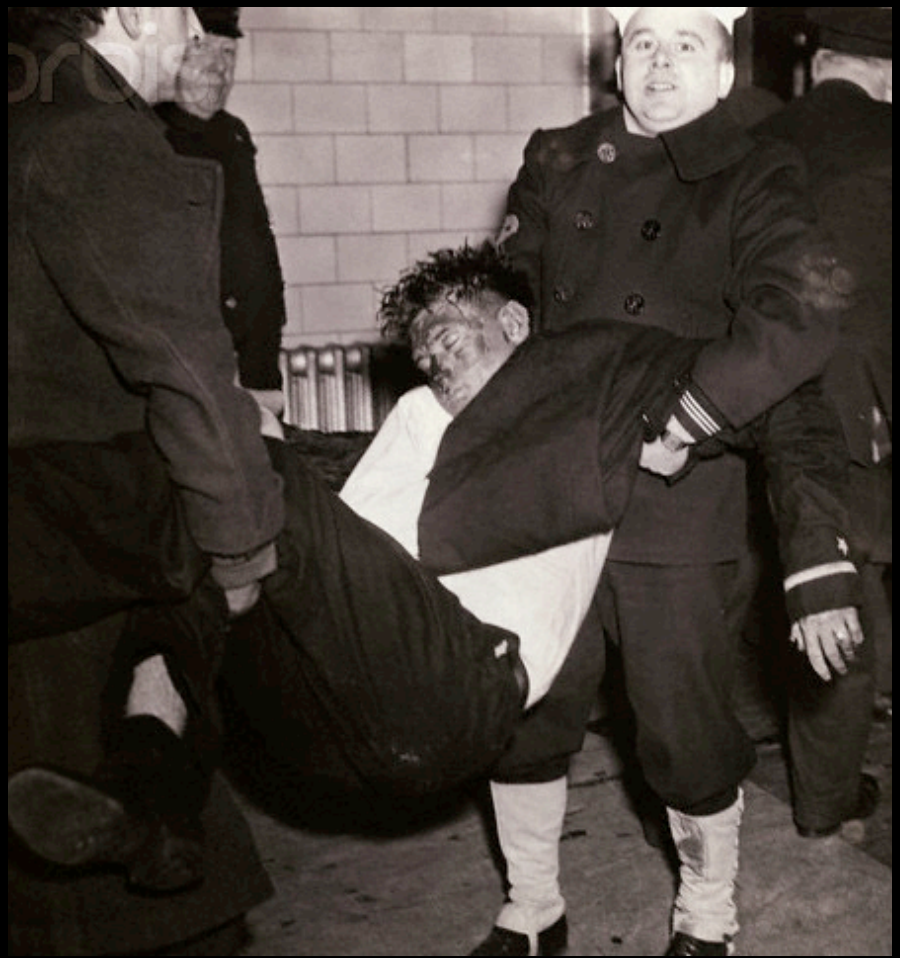
World War II:
Plasma for burns

Cocoanut Grove Fire

28 November 1942

Cocoanut Grove Fire

28 November 1942



UNE, 1943 Vol. 117, No. 6

ANNALS of SURGERY

A Monthly Review of Surgical Science and Practice

Symposium on the

MANAGEMENT OF THE COCOANUT GROVE BURNS

at the

MASSACHUSETTS GENERAL HOSPITAL

ANNALS OF SURGERY

VOL. 117 JUNE, 1943 No. 6

MANAGEMENT OF THE COCOANUT GROVE BURNS

AT THE

MASSACHUSETTS GENERAL HOSPITAL

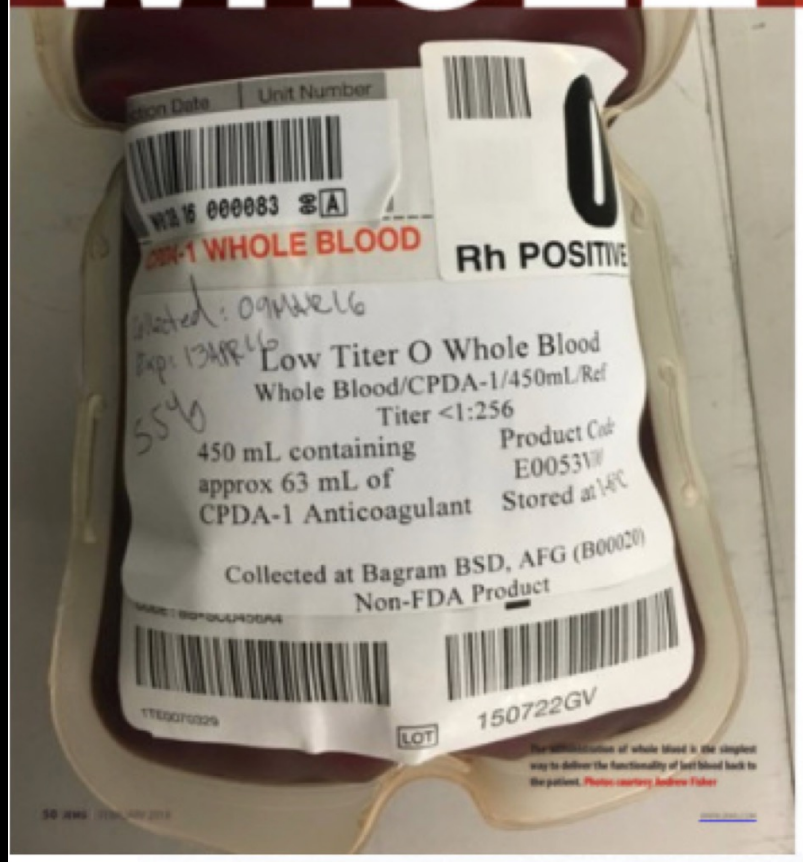
FOREWORD

On Saturday evening, November 28, 1942, almost a year after America entered the war, a disastrous fire occurred in the Cocoanut Grove, a Boston night club. As a result, 491 people lost their lives and many were injured.

Boston & Wartime
~Lessons Learned~

…and Lessons Relearned

WHOLE BLOOD



The administration of whole blood is the simplest way to deliver the functionality of [set] blood back to the patient. Photos: courtesy Andrew Fisher

The case for the use of whole blood in prehospital civilian medicine

By **Max Dodge**, BS, NRP, EMT-P; **Dominic Thompson**, EMT-P; **Eric Bank**, LP, NRP; **Wren Nealy**, LP & **Andrew D. Fisher**, MPAS, PA-C

You're called to the home of a 38-year-old woman who has been fainting. When you arrive, her husband tells you that she's been experiencing heavy vaginal bleeding for about two weeks. She recently underwent a cesarean-section delivery of her second child.

On exam, she appears pale and sweaty, with notable pallor of the lips and gums. Her eyes remain closed as she stumbles over her words and barely follows commands. Her initial set of vitals are as follows:

- Blood pressure (BP): 71/33 mmHg
- Heart rate (HR): 116 beats per minute
- Respiratory rate (RR): 28 breaths per minute
- Temperature: 36°C (96.8°F)
- Point-of-care lactate: 4.7 mmol/L

Your patient complains of shortness of breath and appears to lose consciousness several times as you load her into your ambulance. You suspect that she's suffering from hypovolemic shock secondary to blood loss. What would be your fluid of choice for resuscitation?

Increasing numbers of EMS agencies are developing the capability to administer blood products to patients in need. Although this relatively new therapy in EMS appears to decrease mortality, there's more that can be done.

The U.S. military has been successfully transfusing whole blood at the point of injury (POI) for severely wounded patients on the battlefield. The Ranger Group O Low Titer (ROLO) whole blood program has allowed U.S. Army combat medics to replace the blood lost from combat wounds at the POI.

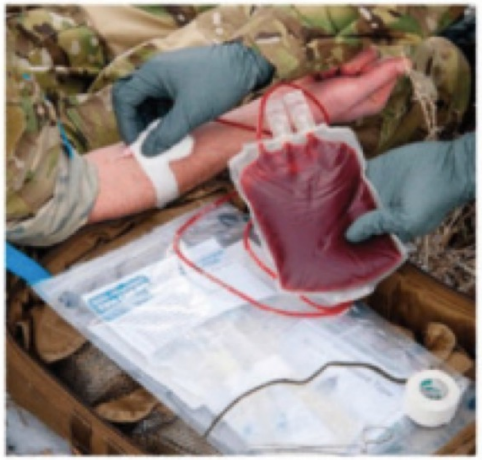
Whole blood is the natural, unseparated blood collected from a donor. It contains all the components of blood that you'd find in healthy blood (i.e., red cells, plasma, clotting factors and platelets)—because it *is* normal, healthy blood.

Since the late 1970s, prehospital trauma resuscitation has relied on administration of crystalloid solutions such as 0.9% sodium chloride or "normal" saline, lactated Ringer's, and colloids like hydroxyethyl starch (HES).

The use of crystalloids in resuscitation stems from the Vietnam War and studies carried out in the 1970s and 1980s. Advanced Trauma Life Support (ATLS) built its curriculum around the recommendation to start resuscitation with a two-liter bolus of crystalloids.[1] However, many of these protocols weren't founded upon evidence-based medicine.

The last 17 years of war have brought tremendous advances in prehospital and trauma care to both the military and civilian sectors. Evidence now suggests that whole blood is a better option for trauma resuscitation and can increase survival of severely injured patients.[2-4]

In today's EMS setting, it's uncommon for ground EMS services to carry and use blood



RESUSCITATION AND SEDATION OF PATIENTS WITH BURNS WHICH INCLUDE THE AIRWAY

SOME PROBLEMS OF IMMEDIATE THERAPY

HENRY K. BEECHER, M.D.

FROM THE ANESTHESIA LABORATORY OF THE HARVARD MEDICAL SCHOOL, AND THE ANESTHESIA SERVICE AT THE MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.

CERTAIN ASPECTS of the Cocoanut Grove disaster are characteristic of conditions encountered in most conflagrations of the flash-burn type. In

- Dr. HK Beecher from Mass General Hospital:
  - **75 ml of plasma and 75 ml of isotonic crystalloid** solution per % TBSA, with one-half given over the first 8 hours, and one-half over the second 16 hours

The 1970's

Crystalloid, Component Therapy …and Disco

Resuscitation of the Interstitial Space

FLUID AND ELECTROLYTE BALANCE IN BURNS

Capt. Eric Reiss, Lieut. Jerry A. Stirman, Major Curtis P. Artz, Capt. John H. Davis
and
Col. William H. Amspacher, (MC), U. S. Army

THE BURN PATIENT: I. INITIAL CARE

BASIL A. PRUITT, JR., M.D.

kins,[32] Cope and Moore,[33] Evans et al.[34] and the group at Brooke Army Medical Center,[35] a plasma volume deficit was found to be the central feature of burn shock and several formulas for predicting postburn fluid replacement needs have been advanced. In recent years, 2 additional formulas for estimating postburn resuscitation fluid needs have been proposed; they recommend, respectively, the use of greater volumes of balanced salt solution and of more concentrated salt solutions than the earlier formulas.[36, 37] (Table 1).

Resuscitation
….using salt water

kins,[32] Cope and Moore,[33] Evans et
Army Medical Center,[35] a plasma v
the central feature of burn shoc
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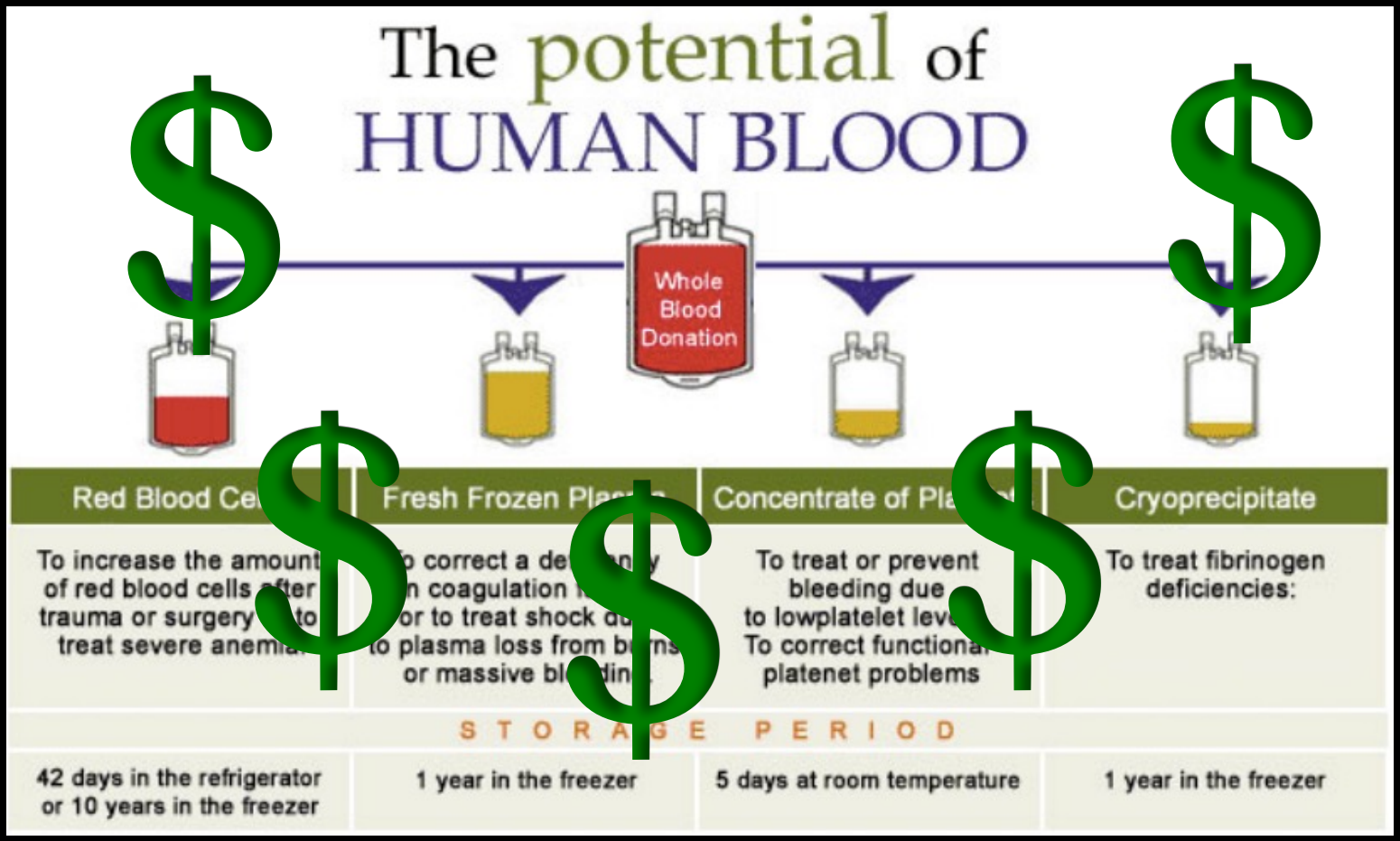
Fractionation of Blood



Resuscitation in the 1970s

CRITICAL CARE MEDICINE

Vol. 4, No. 2
Printed in U.S.A.

Fluid resuscitation following injury: rationale for the use of balanced salt solutions

CHARLES J. CARRICO, MD; PETER C. CANIZARO, MD; G. TOM SHIRES, MD

In summary, a plan for initial resuscitation of patients in hemorrhagic shock has been described which is based on physiological replacement of interstitial fluid loss. This approach when used rationally appears to be the perferable method for the management of the injured patient in hemorrhage.

Resuscitation of the Interstitial Space

Randomized Trial of Efficacy of Crystalloid and Colloid Resuscitation on Hemodynamic Response and Lung Water Following Thermal Injury

CLEON W. GOODWIN, M.D., JAMES DORETHY, M.D., VICTOR LAM, M.D., BASIL A. PRUITT, JR., M.D.

water. Although the numbers of patients in each treatment group are insufficient for statistical analysis at this time, the raw mortality data suggest that the addition of colloid to crystalloid resuscitation solutions may have later deleterious effects. When utilized according to the above described resuscitation guidelines, crystalloid solutions appear to be the preferred fluid for the treatment of acutely burned patients.


Changes in Surgery

A NEW CONCEPT IN THE EARLY EXCISION AND IMMEDIATE GRAFTING OF BURNS

ZORA JANŽEKOVIČ, M.D.
Maribor, Yugoslavia

Vol. 10, No. 12
Printed in U.S.A.

THE JOURNAL OF TRAUMA

How does practice change?

…examine history

Surgical: Early Excision and Grafting

- ✓ Readily adopted once clinical benefit was realized
- ✓ One of the most critical advances in modern burn care

Resuscitation: Components & Crystalloid

- ✓ FFP safer and longer shelf life; but not adopted by burn community
- ✓ Whole Blood resuscitation mostly abandoned
- ✓ Crystalloid was King

Where Do We Come From?
What Are We? Where Are We Going?

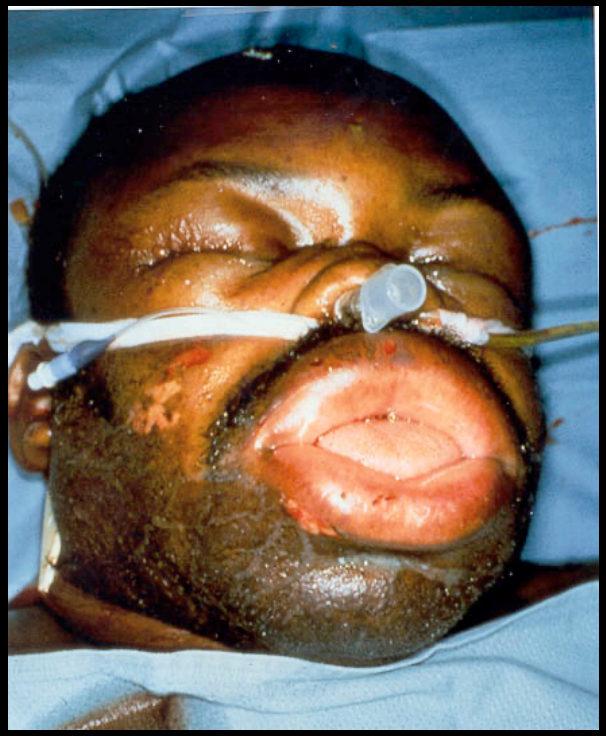
Gauguin, 1897

Where Do We Come From?
What Are We? Where Are We Going?

Gauguin, 1897

The hallmark of acute burn management is fluid re[illegible] management

“Fluid resuscitation AND edema management plan”



The massive fluids lost during burn shock go into the ‘third space’ and cause edema

“Fluid resuscitation AND edema management plan”

- Amount of fluids is based on TBSA / burn size
- Important to be as accurate as possible with burn size estimate!

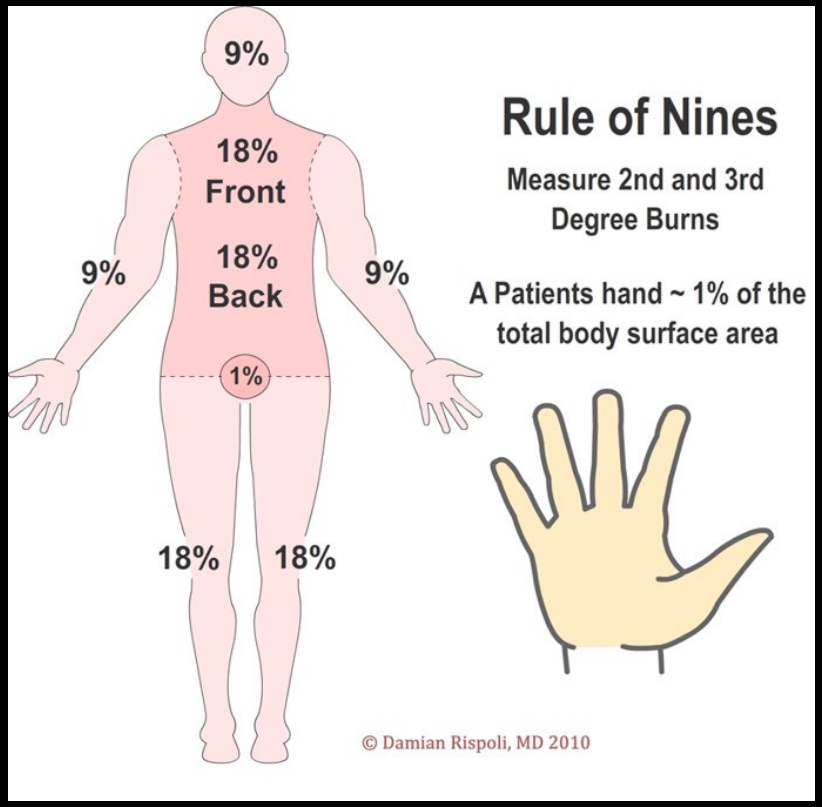
Burn Wound Injury Assessment

Define the extent of Burn Wound

- **Depth and Surface Area**

% TBSA = 2nd + 3rd degree area

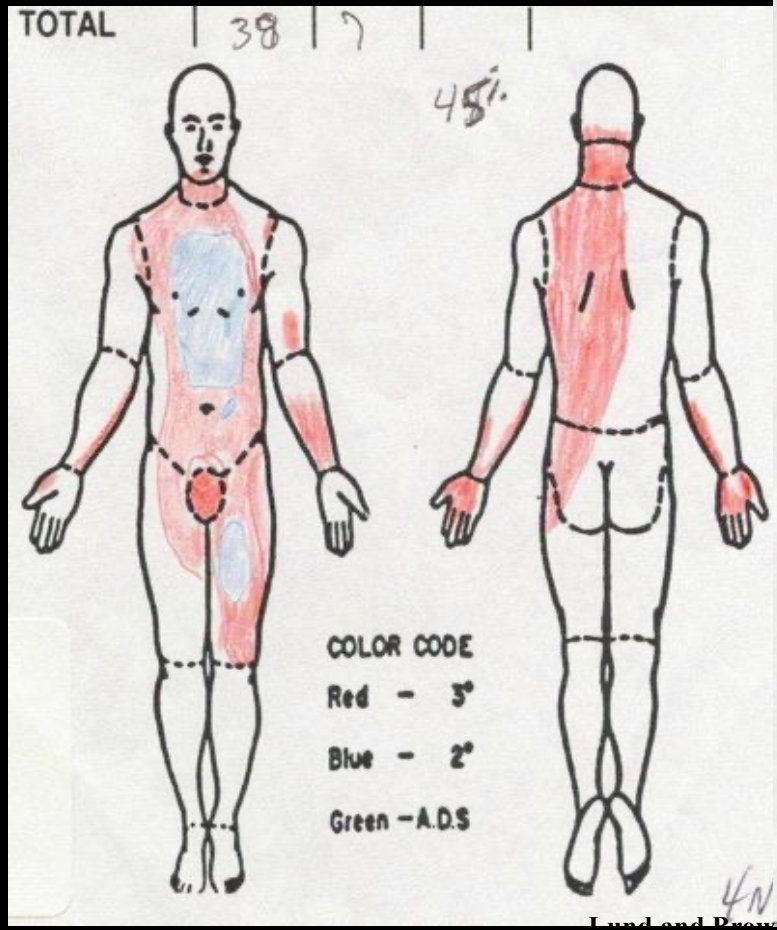
- In adults: "Rule of Nines"
- Lund-Browder chart more accurate
- The patient's hand = approximately 1% TBSA



Rule of Hands

Patient's hand = 1% of their body (all ages)

Resuscitation based on TBSA



BURN ESTIMATE AND DIAGRAM

AGE vs AREA

AREA	Birth 1 yr.	1-4 years	5-9 years	10-14 years	15 years	ADULT	2nd Degree	3rd Degree	TOTAL	Donor Areas
Head	19	17	13	11	9	7	1			
Neck	2	2	2	2	2	2	2			
Ant. Trunk	13	13	13	13	13	13	7	5		
Post. Trunk	13	13	13	13	13	13	8			
R. Buttock	2½	2½	2½	2½	2½	2½				
L. Buttock	2½	2½	2½	2½	2½	2½	1.5			
Genitalia	1	1	1	1	1	1	1			
R. U. Arm	4	4	4	4	4	4				
L. U. Arm	4	4	4	4	4	4	1			
R. L. Arm	3	3	3	3	3	3	1			
L. L. Arm	3	3	3	3	3	3	2			
R. Hand	2½	2½	2½	2½	2½	2½	2			
L. Hand	2½	2½	2½	2½	2½	2½	2.5			
R. Thigh	5½	6½	8	8½	9	9½	4			
L. Thigh	5½	6½	8	8½	9	9½	4	2		
R. Leg	5	5	5½	6	6½	7				
L. Leg	5	5	5½	6	6½	7				
R. Foot	3½	3½	3½	3½	3½	3½				
L. Foot	3½	3½	3½	3½	3½	3½				
TOTAL							38	7		

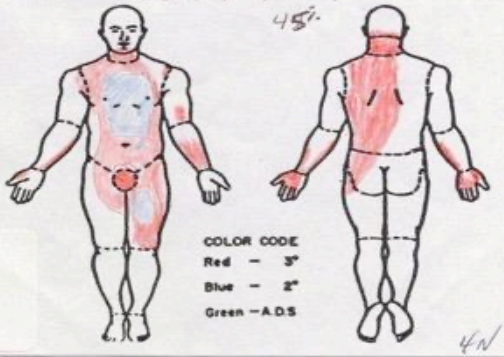
39 y M

BURN DIAGRAM

AGE 39

SEX M

WEIGHT PRE BURN WT 59.6 KG



Lund and Browder. Surg Gyn Ob 1944;79:352-8

Resuscitation based on TBSA

- Parkland: 4ml/kg/%TBSA
- Modified Brooke: 2ml/kg/%TBSA
- ABA Consensus for
  - Adults: 2ml/kg/%TBSA
  - Children: 3ml/kg/%TBSA
  - Electrical: 4ml/kg/%TBSA
- Give ½ the total amount of fluid over the first 8 hrs post-burn and the other ½ during the remaining 16 hrs

Phase	First 24 h post burn	Second 24 h post burn
Burn Budget Formula	LR: 1000 mL–4000 mL 0.5 normal saline: 1200 mL Colloid: 7.5% of body weight Glucose in water: 1500–5000 mL	
Evans Formula	Normal saline: 1 mL/kg/% TBSA burn Colloid: 1 mL/kg/% TBSA burn D5W: 2000 mL	
Brooke Formula	LR: 1.5 mL/kg/% TBSA burn Colloid: 0.5 mL/kg/% TBSA burn D5W: 2000 mL	
Modified Brooke	LR: 2 mL/kg/% TBSA burn With ½ of the volume given during the first 8 h and ½ over the next 16 h	
Parkland	LR: 4 mL/kg/% TBSA burn With ½ of the volume given during the first 8 h and ½ over the next 16 h	
Modified Parkland	LR: 4 mL/kg/% TBSA burn With ½ of the volume given during the first 8 h and ½ over the next 16 h	
Monafo Hypertonic Formula	250 mEq Na, 150 mEq Lactate, 100 mEq Cl with volume adjusted to maintain urine output of 30 mL/h	⅓ normal saline with volume adjusted by urine output

Formulas are just a starting point

…..requires continuous reassessment

Burns
Volume 46, Issue 1, February 2020, Pages 52-57

Fluid volumes infused during burn resuscitation 1980–2015: A quantitative review

Alia Shah [b], Irene Pedraza [a], Charles Mitchell [a], George C. Kramer [a]

Conclusions

These analyses suggest that burn units currently administer volumes larger than Parkland formula with great patient variability. Individual patient hourly data is needed to better understand the record of burn resuscitation and Fluid Creep.

Fluid Begets Fluid

Resuscitation of Severely Burned Military Casualties: Fluid Begets More Fluid

Kevin K. Chung, MD, Steven E. Wolf, MD, Leopoldo C. Cancio, MD, Ricardo Alvarado, MD, John A. Jones, BS, BBA, Jeffery McCorcle, PA, Booker T. King, MD, David J. Barillo, MD, Evan M. Renz, MD, and Lorne H. Blackbourne, MD

(*J Trauma.* 2009;67: 231–237)

More Volume, More Problems

Resuscitation of Severely Burned Military Casualties: Fluid Begets More Fluid

Kevin K. Chung, MD, Steven E. Wolf, MD, Leopoldo C. Cancio, MD, Ricardo Alvarado, MD, John A. Jones, BS, BBA, Jeffery McCorcle, PA, Booker T. King, MD, David J. Barillo, MD, Evan M. Renz, MD, and Lorne H. Blackbourne, MD

- Retrospective analysis
- Modified Brooke:
  - 3.8 ml/kg/TBSA
- Parkland:
  - 5.9 ml/kg/TBSA

The Association Between Fluid Administration and Outcome Following Major Burn

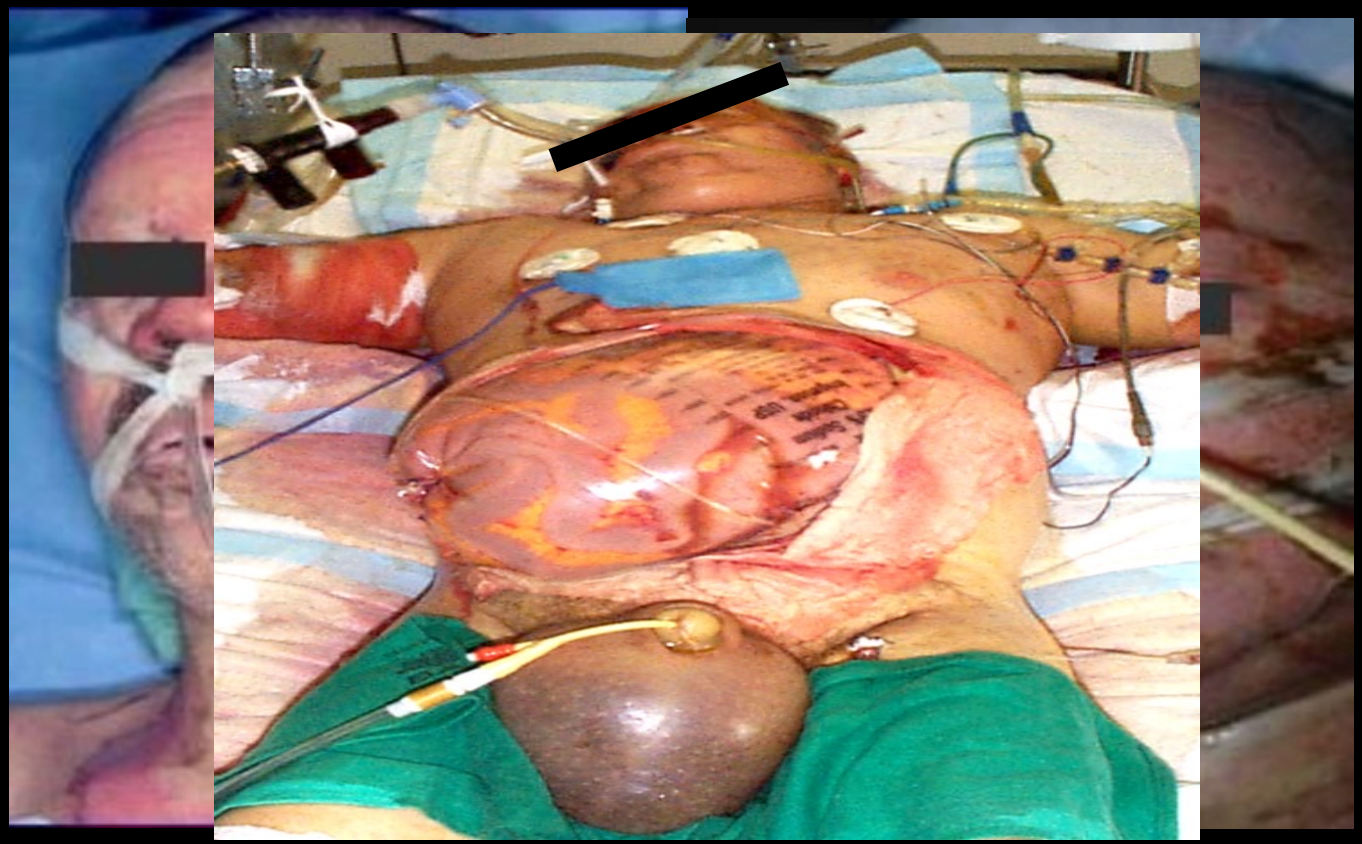
A Multicenter Study

Matthew B. Klein, MD, Douglas Hayden, MS,† Constance Elson, PhD,† Avery B. Nathens, MD, PhD, MPH,‡ Richard L. Gamelli, MD,§ Nicole S. Gibran, MD,* David N. Herndon, MD,‖ Brett Arnoldo, MD,¶ Geoff Silver, MD,‡ David Schoenfeld, PhD,† and Ronald G. Tompkins, MD, ScD#*

- Retrospective analysis
- Increased volume of resuscitation = increased risks of complications

Resuscitation Morbidity

Over resuscitation can be **DEADLY**



Runaway Crystalloid Resuscitation

American Burn Association Clinical Practice Guidelines on Burn Shock Resuscitation

Journal of Burn Care & Research, 2023,

Robert Cartotto, MD, FRCS(C)[*,1], Laura S. Johnson MD, FACS, FCCP, FCCM[2], Alisa Savetamal MD FACS[3], David Greenhalgh MD, FACS[4], John C Kubasiak MD[5], Tam N. Pham MD[6], Julie A. Rizzo MD[7,8], Soman Sen MD[9], Emilia Main MI[10]

This Clinical Practice Guideline (CPG) addresses the topic of acute fluid resuscitation during the first 48 hours following a burn injury for adults with burns ≥20% of the total body surface area (%TBSA). The listed authors formed an investigation panel and developed clinically relevant PICO (Population, Intervention, Comparator, Outcome) questions. A systematic literature search returned 5978 titles related to this topic and after 3 levels of screening, 24 studies met criteria to address the PICO questions and were critically reviewed. We recommend that clinicians consider the use of human albumin solution, especially in patients with larger burns, to lower resuscitation volumes and improve urine output. We recommend initiating resuscitation based on providing 2 mL/kg/% TBSA burn in order to reduce resuscitation fluid volumes. We recommend selective monitoring of intra-abdominal and intraocular pressure during burn shock resuscitation. We make a weak recommendation for clinicians to consider the use of computer decision support software to guide fluid titration and lower resuscitation fluid volumes. We do not recommend the use of transpulmonary thermodilution-derived variables to guide burn shock resuscitation. We are unable to make any recommendations on the use of high-dose vitamin C (ascorbic acid), fresh frozen plasma (FFP), early continuous renal replacement therapy, or vasopressors as adjuncts during acute burn shock resuscitation. Mortality is an important outcome in burn shock resuscitation, but it was not formally included as a PICO outcome because the available scientific literature is missing studies of sufficient population size and quality to allow us to confidently make recommendations related to the outcome of survival at this time.

Journal of Burn Care & Research, 2023,

ABA GUIDELINES

American Burn Association Clinical Practice Guidelines on Burn Shock Resuscitation

Robert Cartotto, MD, FRCS(C)[*,1], Laura S. Johnson MD, FACS, FCCP, FCCM[2], Alisa Savetamal MD FACS[3], David Greenhalgh MD, FACS[4], John C Kubasiak MD[5], Tam N. Pham MD[6], Julie A. Rizzo MD[7,8], Soman Sen MD[9], Emilia Main MI[10]

- Mortality was not used as an outcome measure
- Paucity of studies in the scientific literature with sufficient power that link resuscitation to outcomes
- FFP / plasma was not recommended for resuscitation outside of a research protocol

Resuscitation based on TBSA

- Parkland: 4ml/kg/%TBSA
- Modified Brooke: 2ml/kg/%TBSA
- ABA Consensus for
  - Adults: 2ml/kg/%TBSA
  - Children: 3ml/kg/%TBSA
  - Electrical: 4ml/kg/%TBSA
- Give ½ the total amount of fluid over the first 8 hrs post-burn and the other ½ during the remaining 16 hrs

PubMed®

plasma burn resuscitation

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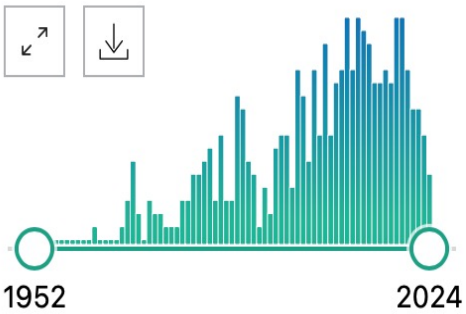
417 results

RESULTS BY YEAR



1 Therapeutic Plasma

Cite Mohan PB, Chittoria RK, K

Share Ahmed FM.

J Cutan Aesthet Surg. 202

PMID: 38189078 Free

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exchange has been used

component, and, therefor

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whole blood trauma

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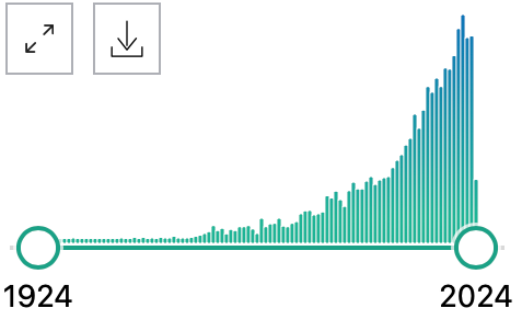
6,456 results

RESULTS BY YEAR



1 Whole blood

Cite Mitra B, Wood EM

Injury. 2022 May;5

Share PMID: 35526869

2 Whole blood

Rangrass G.

Curr Opin Anaest

The Physiologic Basis of Burn Shock and the Need for Aggressive Fluid Resuscitation

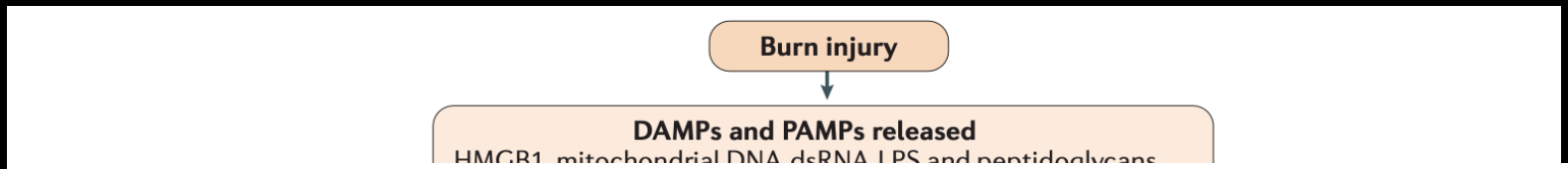
Lisa Rae MD [a], Philip Fidler MD [b], Nicole Gibran MD [c]

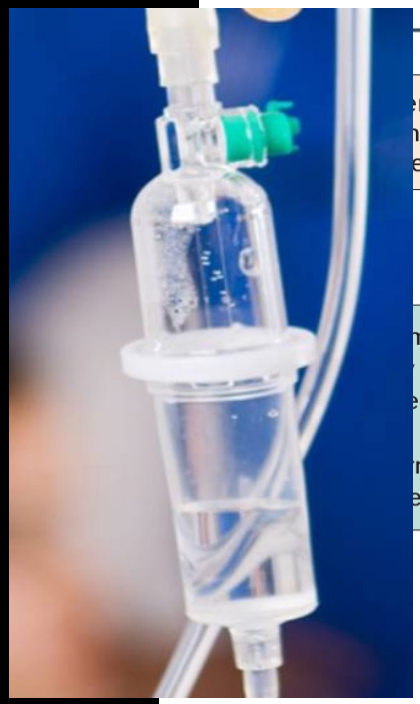
Critical Care Clinics
Volume 32, Issue 4, October 2016, Pages 491-505

KEY POINTS

- The inflammatory responses to burn injury cause multiorgan failure and early death without adequate resuscitation.
- Inflammatory mediator's effects on endothelial and smooth muscle cells result in leakage of fluid from the intravascular to extravascular space at the site of the burned tissue, and systemically in all organs leading to hypovolemic shock.
- Resuscitation causes edema, which contributes to morbidity and mortality in the thermally injured patient.
- Reactive oxygen species produced by injured tissue contributes to the inflammatory response.
- Nitric oxide production after injury potentiates endothelial leak, contributing to hypotension and poor organ perfusion.

- The inflammatory responses to burn injury cause multiorgan failure and early death without adequate resuscitation.





Marc G. Jeschke[1,2]✉, Margriet Nicole S. Gibran[7] and Sarvesh L

Endothelial Activation: Crystalloid fluids can induce endothelial cell activation, leading to the release of inflammatory cytokines and adhesion molecules. This activation can contribute to inflammation and endothelial dysfunction.

Immunomodulation: Crystalloid fluids may affect immune cell function and modulate the inflammatory response. For example, some studies suggest that crystalloid resuscitation can alter the balance of pro-inflammatory and anti-inflammatory cytokines, potentially promoting a more pro-inflammatory state.

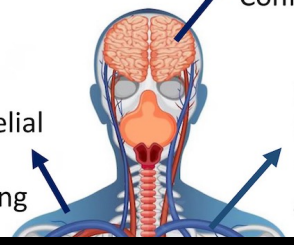
Oxidative Stress: Crystalloid fluids may promote oxidative stress by increasing the production of reactive oxygen species (ROS). Oxidative stress can damage cellular components and activate inflammatory pathways.

Capillary Leak: Administration of large volumes of crystalloid fluids may increase capillary permeability, leading to fluid extravasation into the interstitial space. This capillary leak can exacerbate tissue edema and inflammation.

Central nervous system
Confusion

Body water
Possible damage to the endothelial glycocalyx
↑ interstitial fluid volume leading to oedema

Metabolic
Hyperchloraemic acid
↑ need for buffers to
acidosis



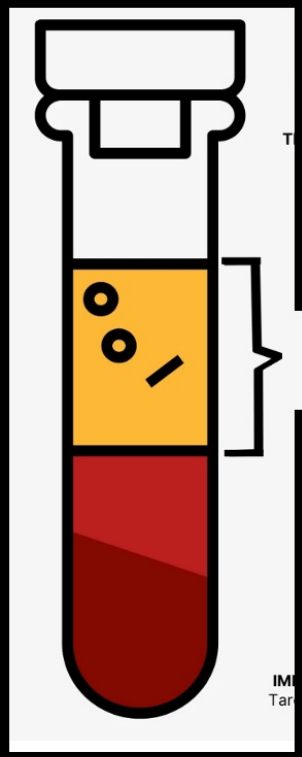
Gastrointestinal
Gastrointestinal o
Intestinal stretch
Ileus
Impaired anastom
healing

Haematologica
↑ intraoperativ
↑ need for blo
transfusion

The 2023 Sir David Cuthbertson Lecture. A fluid journey: Experiments that influenced clinical practice

Dileep N. Lobo [a, b, c, d, *]

Clinical Nutrition 42 (2023) 2270–2281



PLASMA

IMMUNOGLOBULINS
Targets & neutralizes invadors

GROWTH FACTORS
Repairs cells

IGG
Binds toxins & pathogens

CYTOKINES
Anti-inflammatory

TRANSFERRIN
Binds iron

LYSOZYME
Attacks bacteria

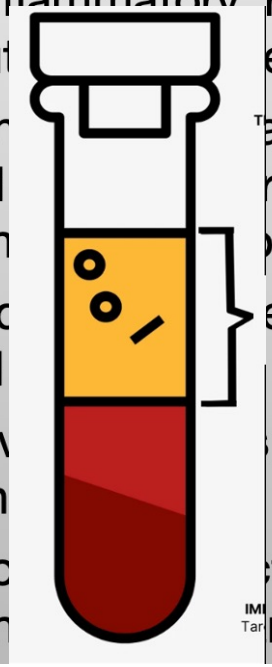
The Physiologic Basis of Burn Shock and the Need for Aggressive Fluid Resuscitation

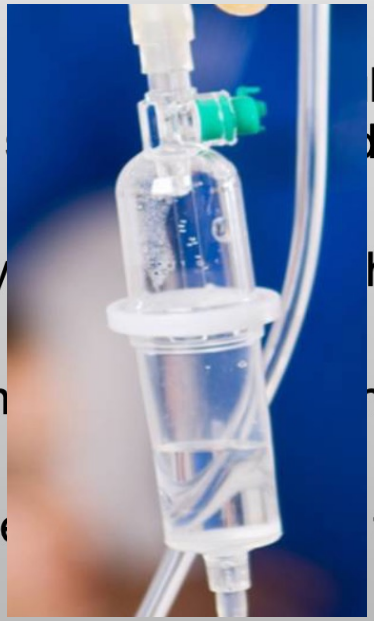
Lisa Rae MD [a], Philip Fidler MD [b], Nicole Gibran MD [c]

Critical Care Clinics
Volume 32, Issue 4, October 2016, Pages 491-5

KEY POINTS

- The inflammatory responses to burn injury caus
without esuscitation.
- Inflamm ator's effects and smooth lt in leakage
of fluid ravascular ace at the d tissue, and
system rgans le hyp hock.
- Resusc es eden ibut norbidity he thermally
injured
- Reactiv pecies by ssue con nflammatory
respon
- Nitric c tion after inju endothelial l to hypoten-
sion an n perfusion.





Who is using Plasma?

Plasma Resuscitation

Austin Journal of Emergency and Critical Care Medicine

Open Access

Austin Publishing Group

Research Article

Burn Resuscitation with Fresh Frozen Plasma: 5 Years of Experience with the West Penn Formula

Jones LM*, Brown N, Phillips G, Blay BA, Bhatti P, Miller SF and Coffey R

Wexner Medical Center, The Ohio State University, USA

Abstract

Introduction: Administering fresh frozen plasma (FFP) for burn resuscitation

Open Access Original Article

Vural S, Yasti C A, Dolapçı M (January 07, 2023) Comparison of Albumin and Fresh Frozen Plasma as Colloid Therapy in Patients With Major Burns. Cureus 15(1): e33485. DOI 10.7759/cureus.33485

Comparison of Albumin and Fresh Frozen Plasma as Colloid Therapy in Patients With Major Burns

Selahattin Vural [1] , Cinar A. Yasti [2] , Mete Dolapçı [3]

1. General Surgery, Giresun University Faculty of Medicine, Giresun, TUR 2. Department of General Surgery, University of Health Sciences, Ankara, TUR 3. Department of General Surgery, Ufuk University, Ankara, TUR

- Retrospective analysis of 196 patients
- Had to survive first 24h / colloid resuscitation p 24h
- Groups similar with age and %TBSA
- Groups either received albumin only or FFP only

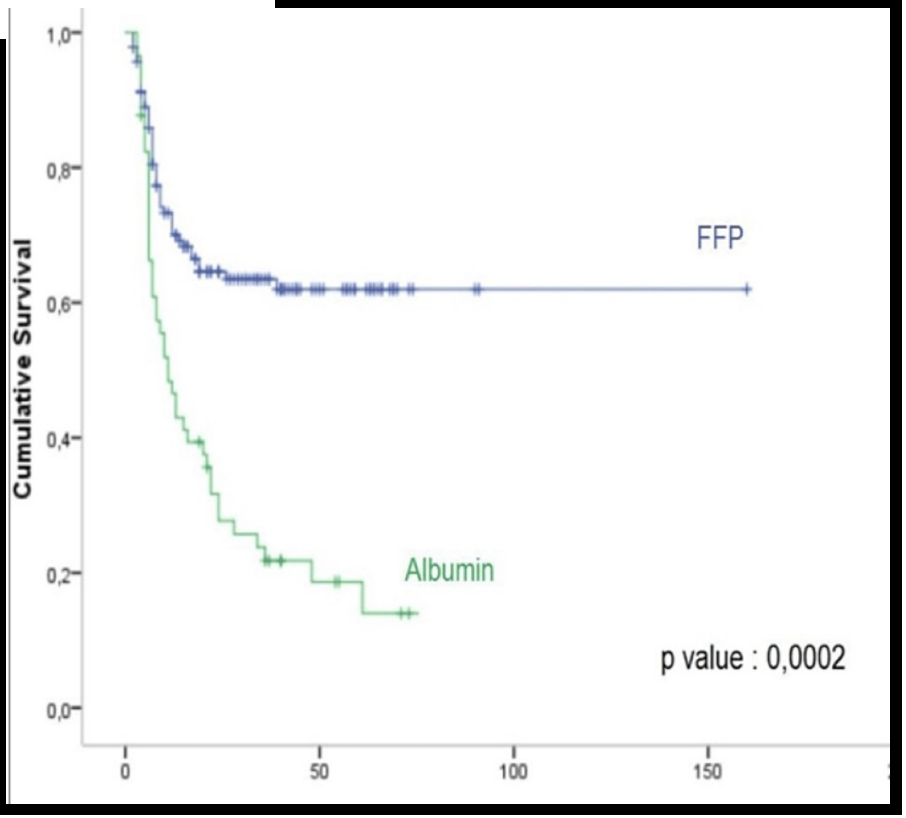
Comparison of Albumin and Fresh Frozen Plasma as Colloid Therapy in Patients With Major Burns

Selahattin Vural [1] , Cinar A. Yasti [2] , Mete Dolapçı [3]

1. General Surgery, Giresun University Faculty of Medicine, Giresun, TUR 2. Department of General Surgery, University of Health Sciences, Ankara, TUR 3. Department of General Surgery, Ufuk University, Ankara, TUR

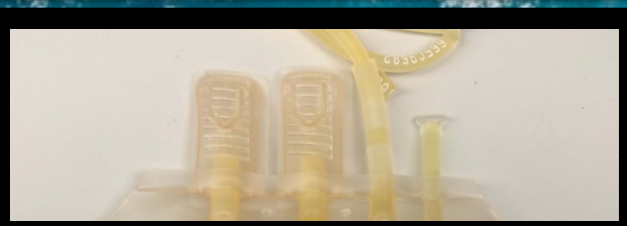
- Age and %TBSA were independent predictors in the model and were controlled for

- Survival with Albumin: **33.8%**
- Survival with FFP: **78.9%**

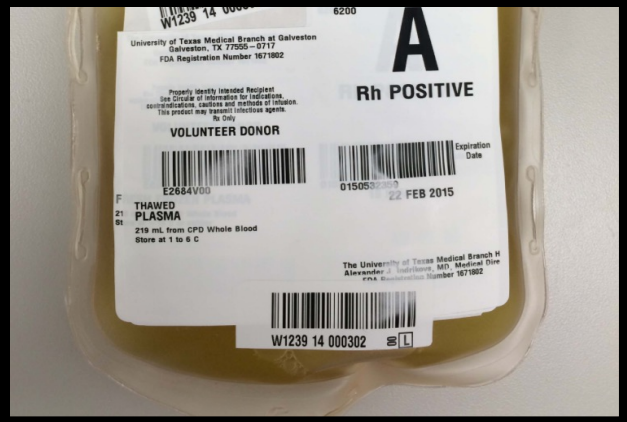


Overall: the data is weak

- The science & physiology make sense
- *Resuscitate* don't *exacerbate*



Plasma → Burn Resuscitation



Where Do We Come From? What Are We? Where Are We Going?

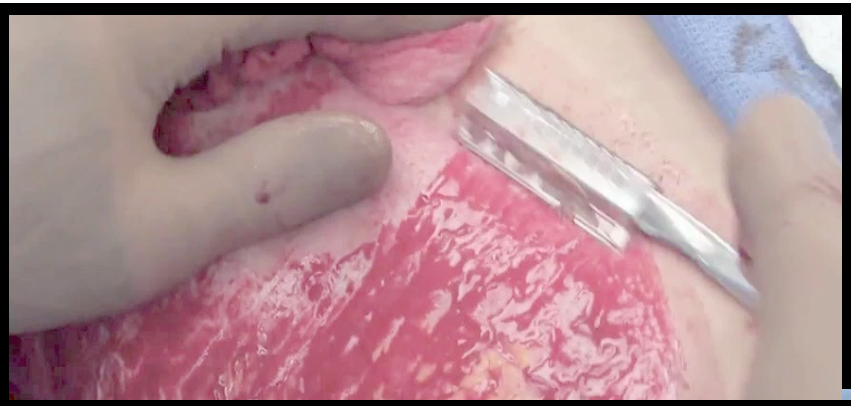
Gauguin, 1897

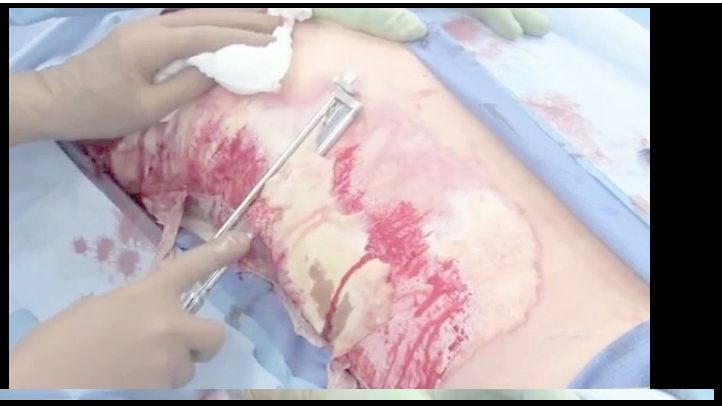
Where Do We Come From?
What Are We? Where Are We Going?

Gauguin, 1897

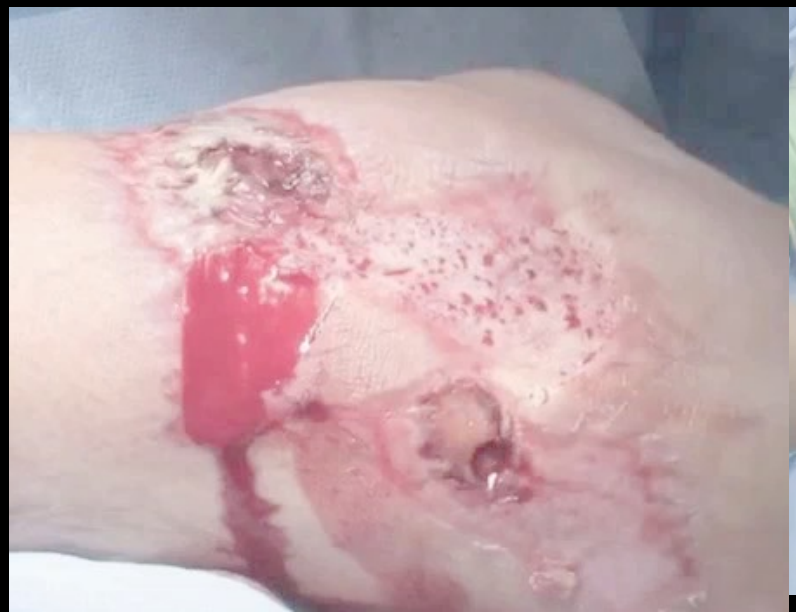
Burn Surgery is Bloody

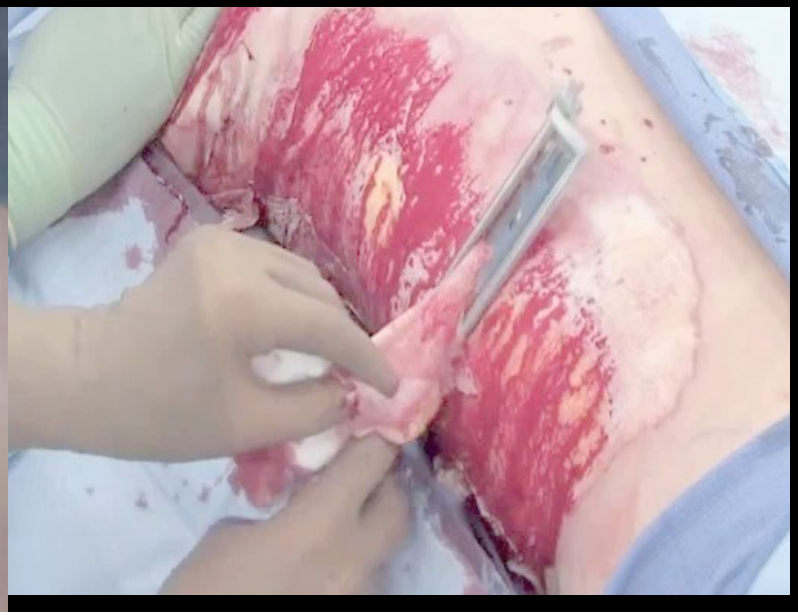
Whole Blood in Burn OR!

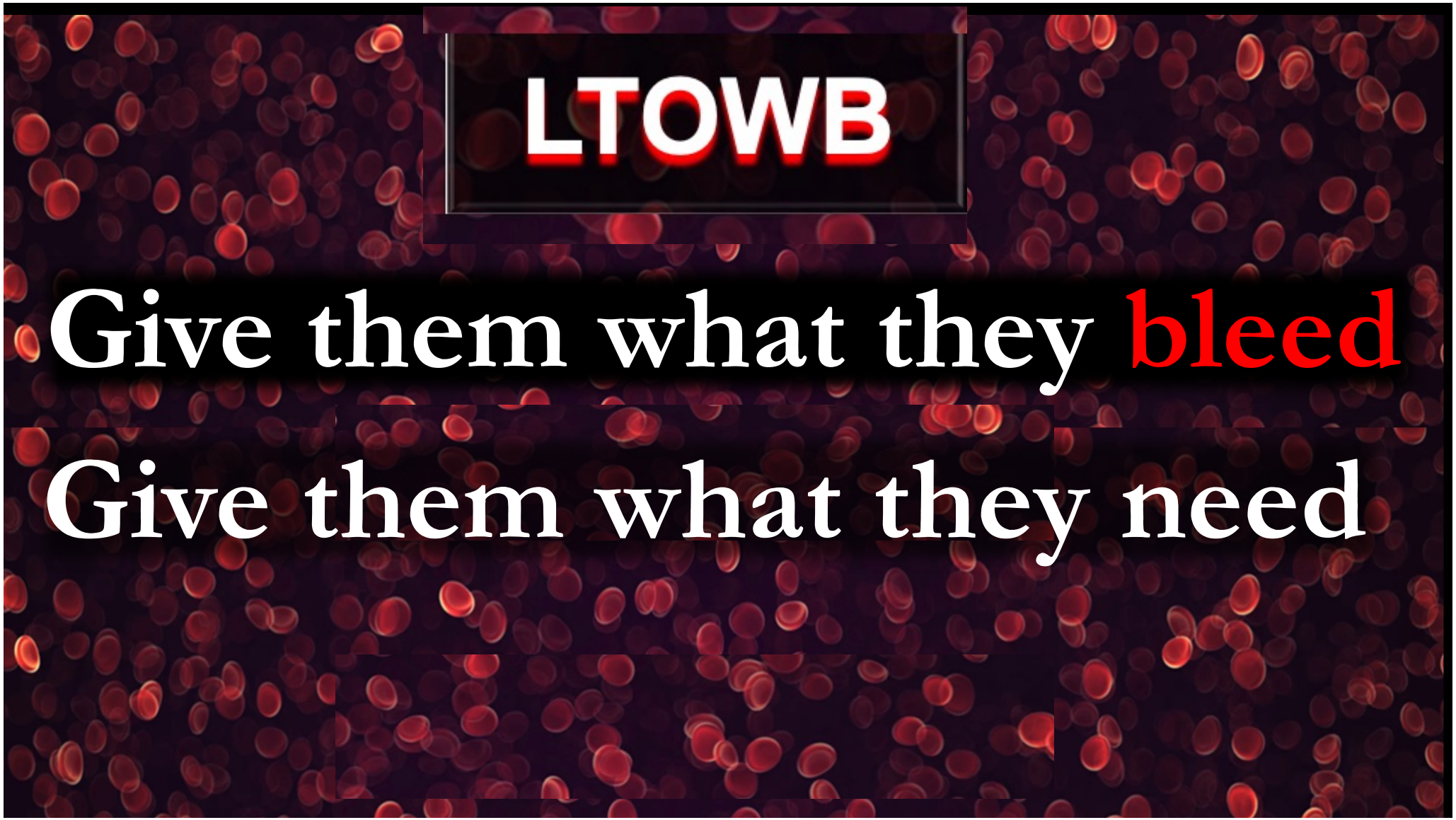




Why not use Whole Blood in Burn OR?





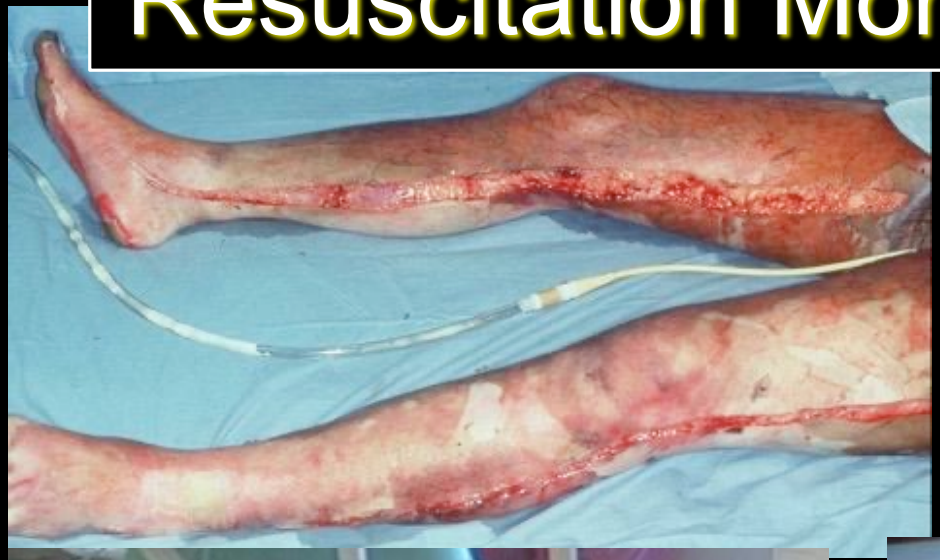

LTOWB
Give them what they bleed
Give them what they need

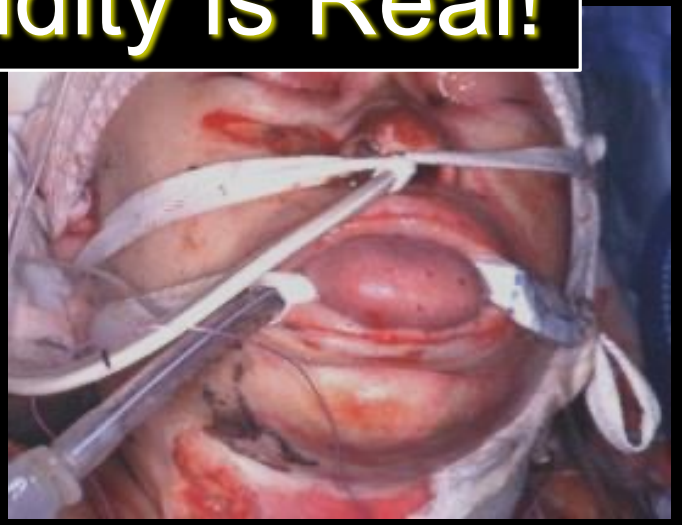
PLASMA

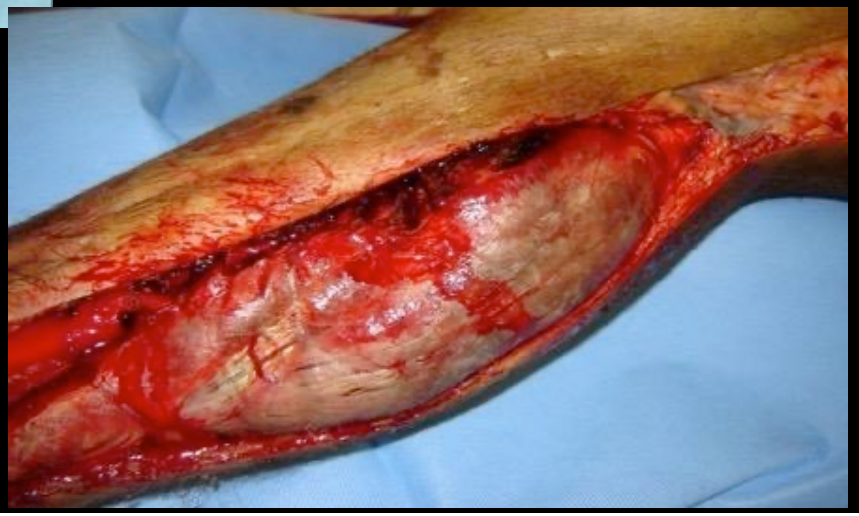
Resuscitate - don't exacerbate

Burn Shock = Plasma Deficit

Resuscitation Morbidity is Real!







Plasma for Burn Shock

Plasma for Burn Shock

Data for Plasma Resuscitation

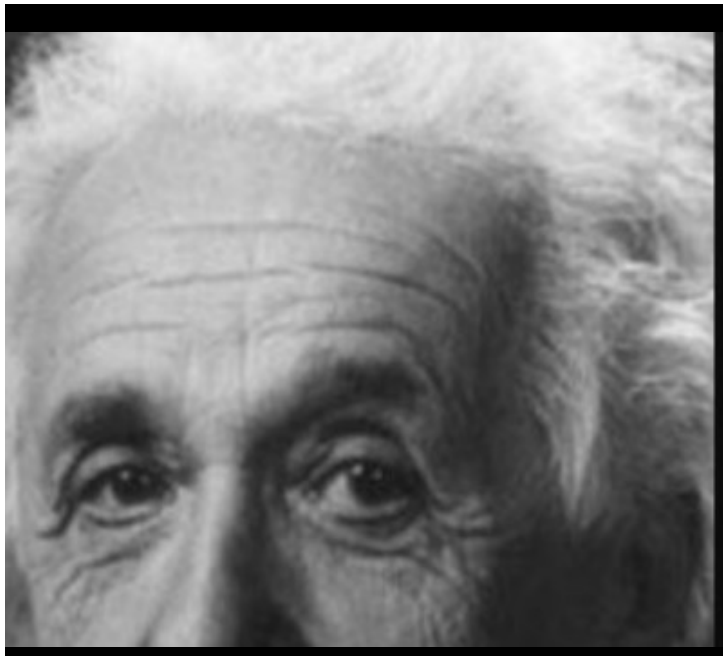
- Lowers total volume transfused
- Decreases edema and body weight
- Lower intraabdominal pressures
- Only one study demonstrating large mortality difference

Need better data and more studies!

Plasma for burn shock resuscitation: is it time to go back to the future?

Jennifer M. Gurney[1,2] *Rosemary A Kozar,*[3] *and Leopoldo C. Cancio*[1]

TRANSFUSION Volume 59, April 2019



If you want to know the future, look at the past.

— Albert Einstein —

RESUSCITATION AND SEDATION OF PATIENTS WITH BURNS WHICH INCLUDE THE AIRWAY

SOME PROBLEMS OF IMMEDIATE THERAPY

HENRY K. BEECHER, M.D.

FROM THE ANESTHESIA LABORATORY OF THE HARVARD MEDICAL SCHOOL, AND THE ANESTHESIA SERVICE AT THE MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.

CERTAIN ASPECTS of the Cocoanut Grove disaster are characteristic of conditions encountered in most conflagrations of the flash-burn type. In

Cocoanut Grove Fire
28 November 1942

Frozen Plasma and Dried Plasma used to resuscitate burn patients

A NOTE ON THE BLOOD BANK

Annals of Surgery
June, 1943

LAMAR SOUTTER, M.D.

FROM THE SURGICAL SERVICES AT THE MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS

A BLOOD BANK is a requisite for the efficient handling of patients in a disaster. In the first place it is economical. In the second place, with burn casualties particularly, it is imperative to feel free to administer all the plasma necessary. There need be no restraint in the use of frozen plasma. Dried

plasma, with its content of mercurial preservative, offers a drawback, since, theoretically, kidney damage may result if too much is given.

Supplies on Hand.—At the time of the Cocoanut Grove fire the Massachusetts General Hospital had 391 units of sterile frozen plasma in its own bank, 38 flasks of whole blood, 106 units of dried plasma, and a reserve of 76 units of frozen plasma stored for emergency use at the Faulkner Hos-

Timing is everything

Further Studies Needed

- FFP
- FDP
- Inflammatory modulators

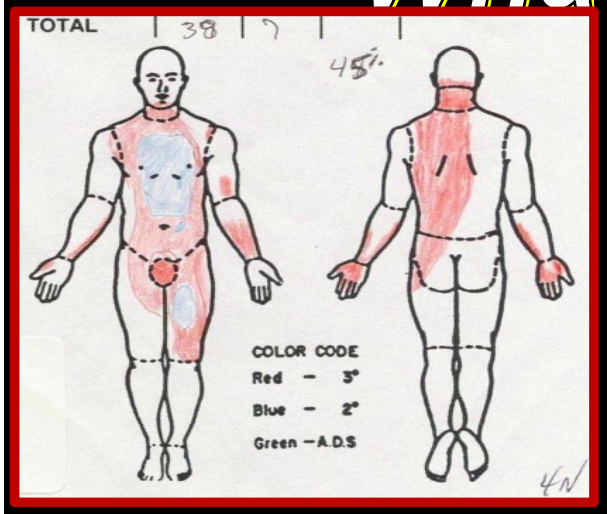
} *seal & heal*

- Does early resuscitation NOT using SALT WATER effect:
  - Pneumonia / Sepsis
  - Catabolic state
  - Hypertrophic scarring / Topical Plasma and PRP
- More trials comparing FFP to crystalloid / precision medicine

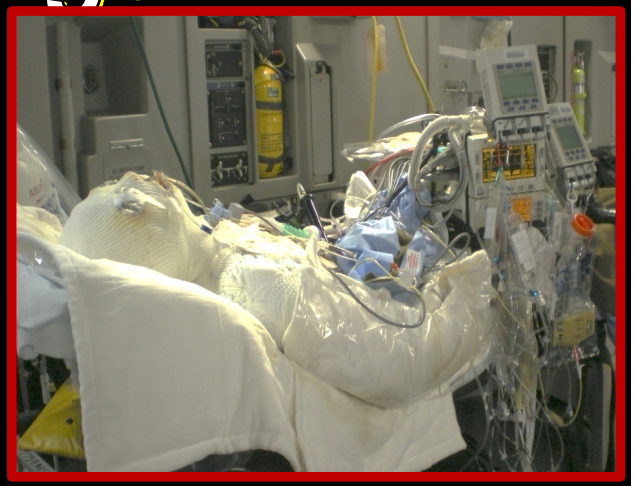
We made too many wrong mistakes.
Yogi Berra


Everything old is new again

Plasma and Burns:
What's Old is New Again



Thank you



Jennifer Gurney, MD FACS
COL, MC, US Army

STRAC Whole Blood Summit
15 July 2025

NATIONAL WHOLE BLOOD SUMMIT

STRAC
Southwest Texas Regional Advisory Council


Thank you