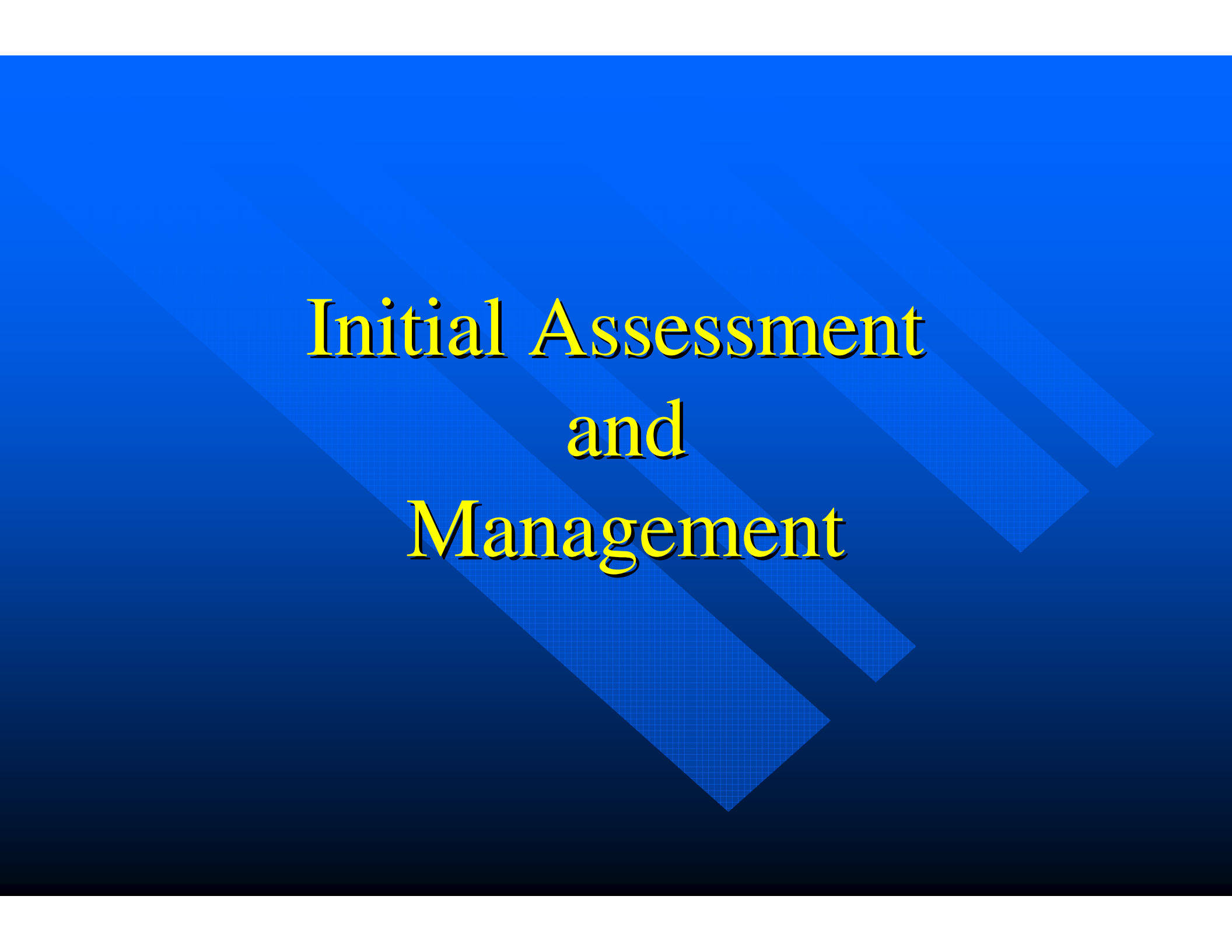


# Patient Problem

- Patient is a forty-eight year old male who is a victim of a cabin fire while on a hunting trip. He was trapped in the fire and needed to be rescued by the volunteer fire department. The scene report is that he has burns involving the front and back of the torso, the head and neck area and both upper extremities. He is awake, breathing spontaneously, however, complaining of chest pain. His vital signs at the scene are pulse 105, BP 106/70, respiratory rate 28, he is wheezing and complaining of pain. He has no history of a loss of consciousness, there appears to have been no explosion during the course of the fire.

# Questions:

- List step-by-step the diagnostic and therapeutic procedures indicated in the early management of a burn patient.



# Initial Assessment and Management

# Stop Further Injury

- Extinguish or remove burning clothing
- Cool, but do not remove molten material

# Stop Further Injury

- Cold water lavage or soaks for 2° degree burns < 10%
  - Caution: Avoid Hypothermia

# Airway Management

# Airway Management

- Establish Patient Airway
- O<sub>2</sub>

# Airway Management

- Assess for Airway Injury
  - Singed Vibrissae
  - Carbonaceous Material
  - Mucosal Edema of Inflammatory Changes



# Airway Management

- Maintain Airway
  - Intubation
  - Neck Trauma
  - Chest Wall Injury

# Effect of Edema on Airway Cross-Sectional Area

Tracheal Diameter	Cross-Sectional Area	Cross-Sectional Area w/1mm Edema	% Reduction
14 mm	153 mm <sup>2</sup>	113 mm <sup>2</sup>	26%
6 mm	28 mm <sup>2</sup>	12.6 mm <sup>2</sup>	55%

# Risk Factors for Inhalation Injury

- Enclosed Space Fire
- Burns of the Head and Neck
- CO > 15%

# CO

Hb Affinity – CO 200 x O<sub>2</sub>

O<sub>2</sub> Transport ↓ 50% with CO = 0.1%

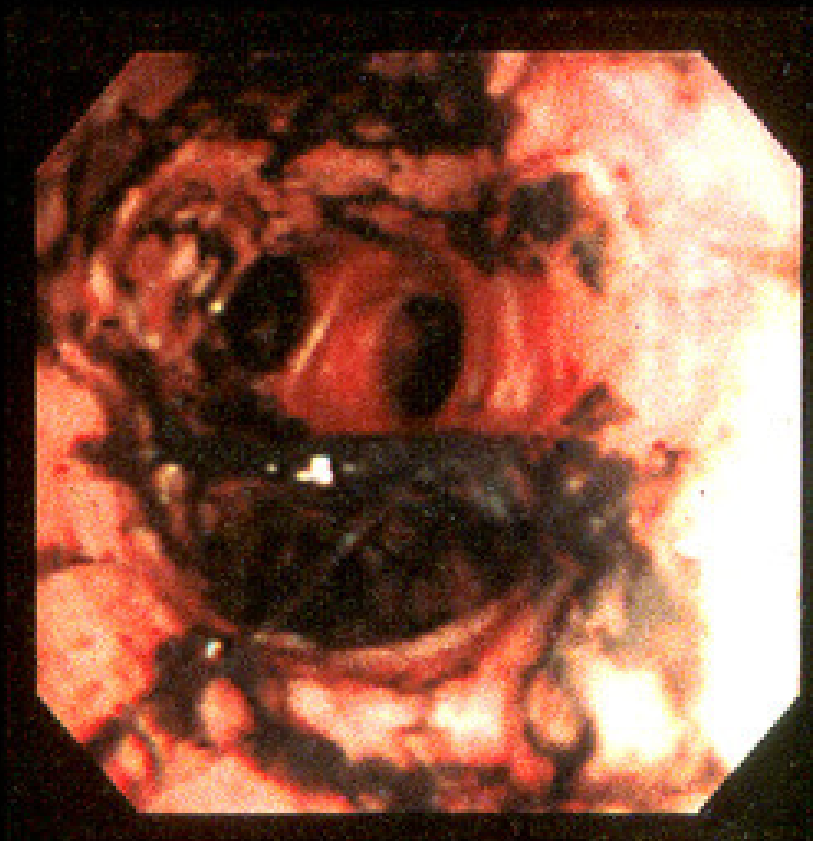
-- Myoglobin Binding

1308064  
M

DOE, TERRY

10/04/98  
09:48:05

SCV-----9



COMMENT :

ID. NO:

NAME:

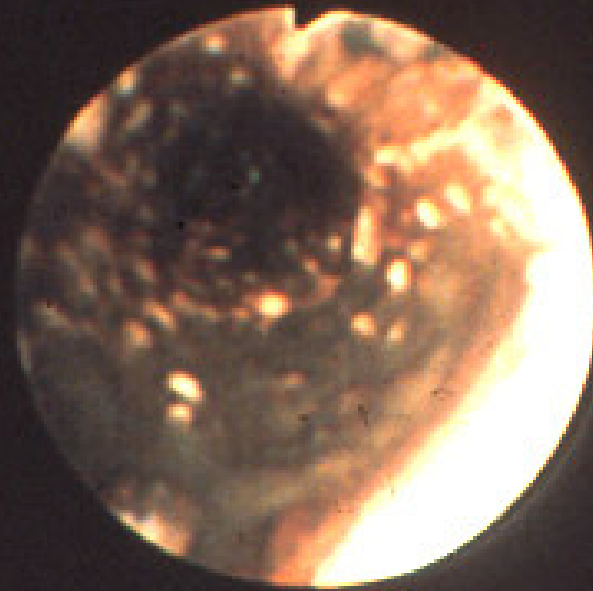
SEX: AGE:

D. O. BIRTH:

10/04/98

10:09:25

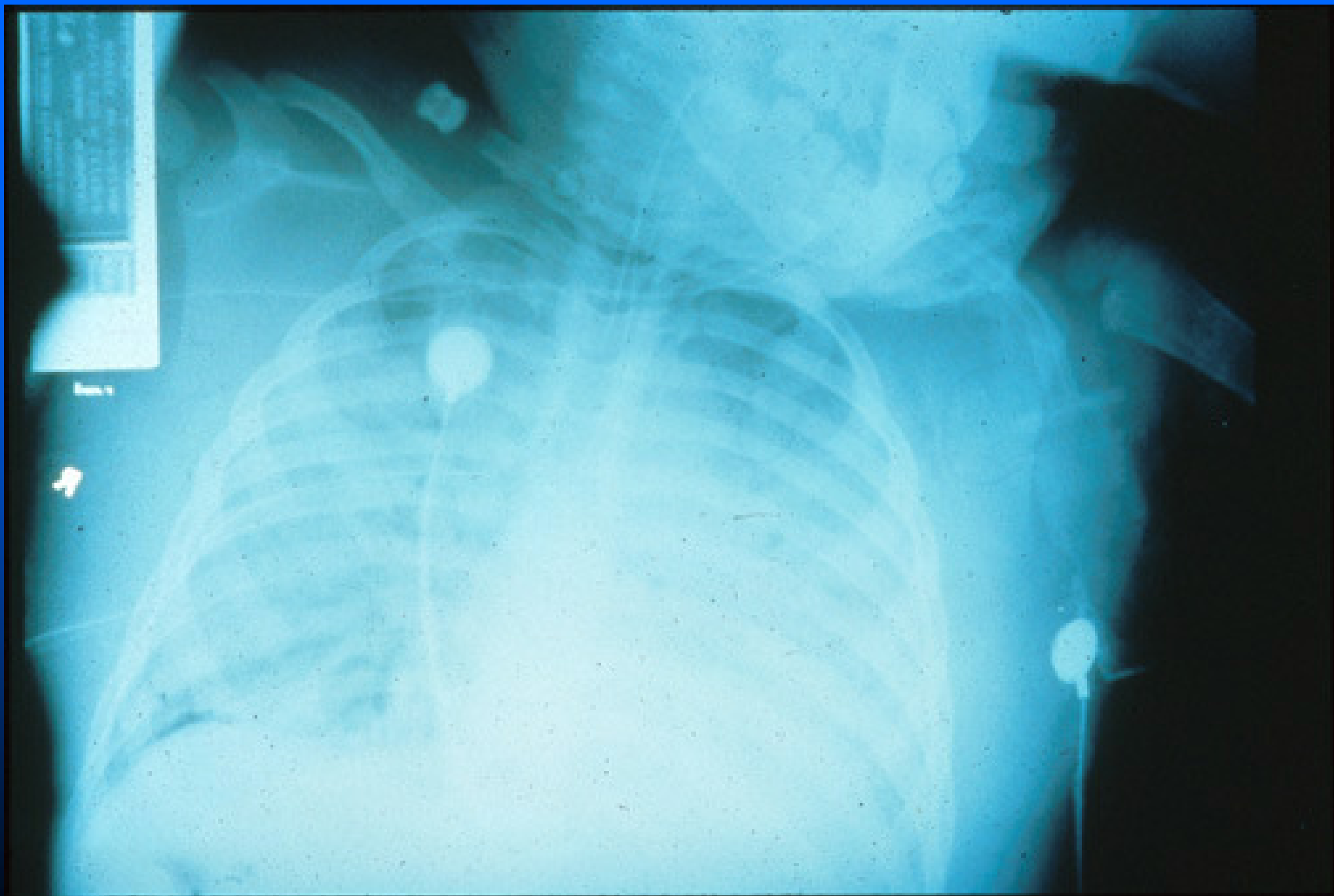
SCV-----15



COMMENT:



Fig. 2





# Inhalation Injury Impact on Burn Mortality

Inhalation  
Injury

% TBSA

MORTALITY

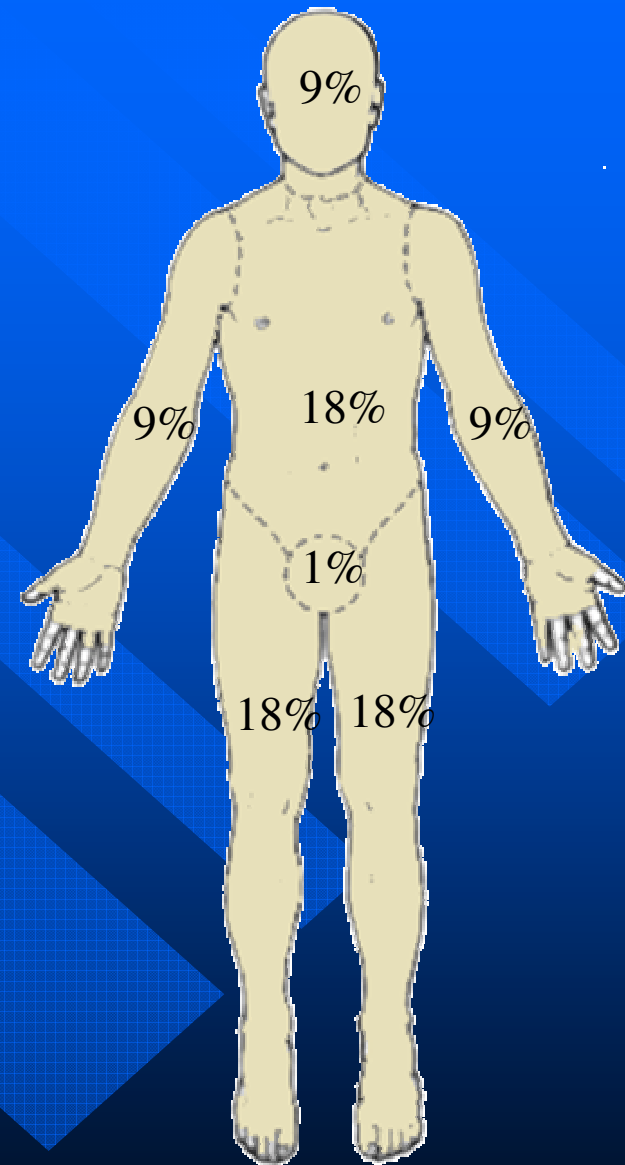
Age



# Question:

- Using the “Rule of Nines”, calculate the approximate percentage of body surface area burn.

# *Rule of Nines*

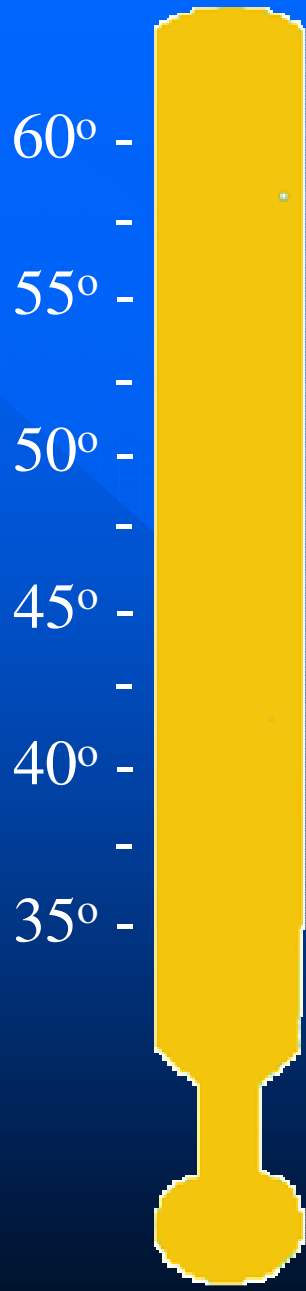


# Questions

- Describe the pathological classification of burn depth and the clinical significance of burn depth.
- What clinical findings are used to estimate burn depth?
- What depth of burn would you expect to predominate in your patient?

# Depth of Burn Injury

- Tissue Involved
- Intensity of Energy Source
- Duration of Exposure



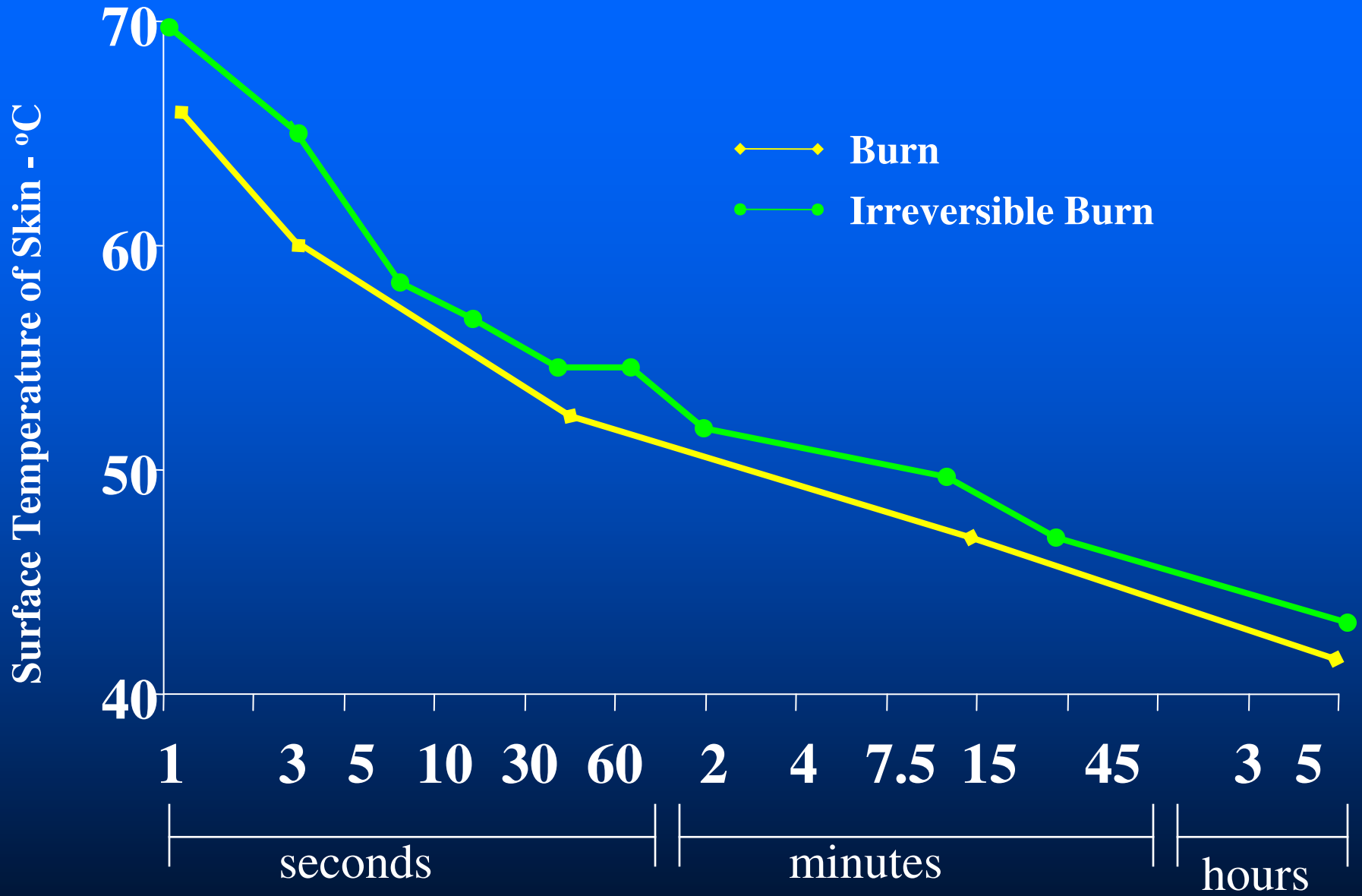
-Protein Coagulation – Cell Death

-Denaturation of protein elements

-recovery with short exposure

-Varying degrees of cell injury recovery likely

-No cell damage below this temperature



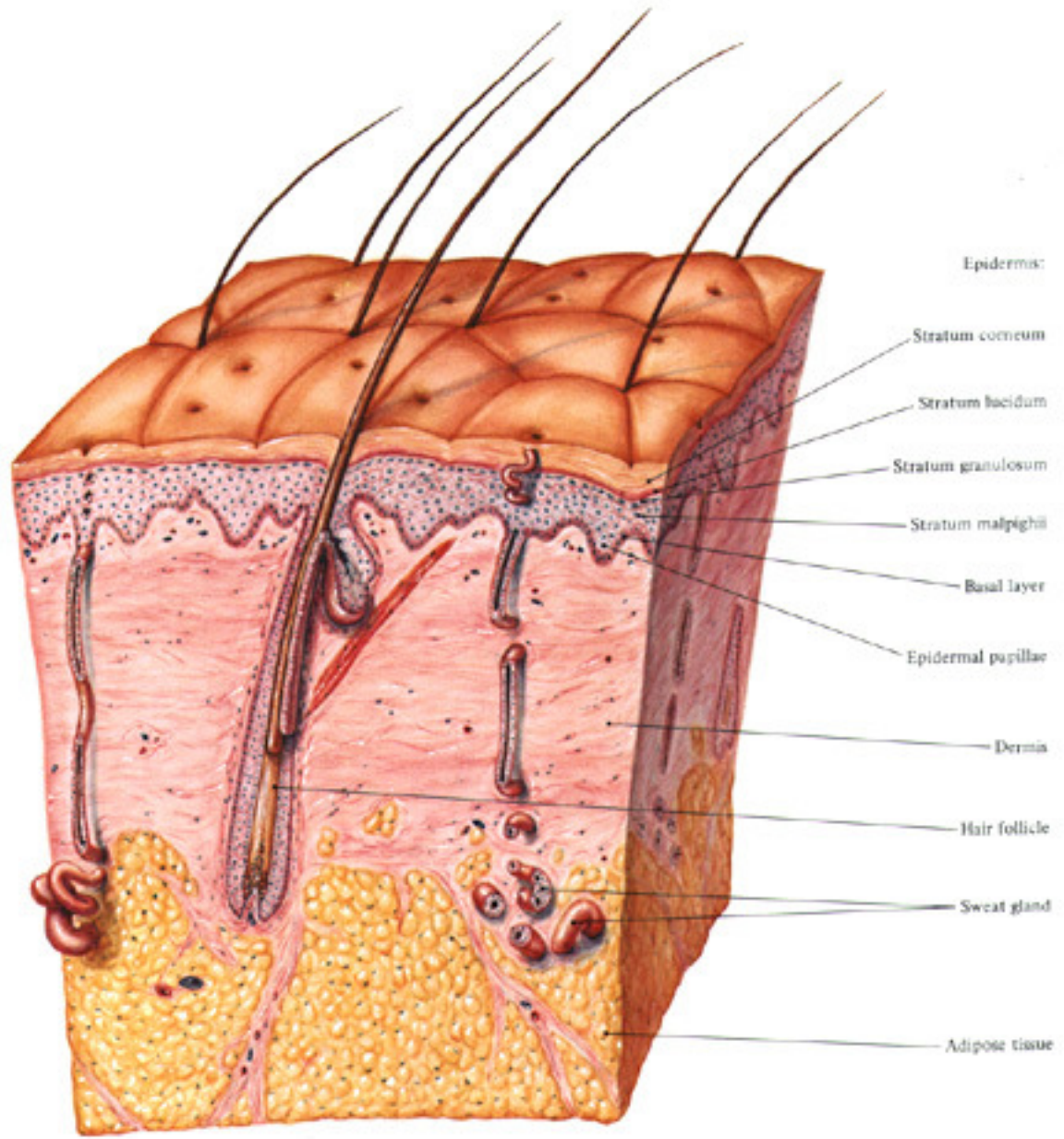
**Time Surface Temperature Relationships**

# Hot Tap Water

## Time/Temperature Relationships in Scalds

<u>Temperature</u>	<u>Time to Produce Serious Burn</u>
120°F	More than 5 minutes
125°F	1.5 to 2 minutes
130°F	About 30 seconds
135°F	About 10 seconds
140°F	Less than 5 seconds
145°F	Less than 3 seconds
150°F	About 1.5 seconds
155°F	About 1 second





Epidermis:

Stratum corneum

Stratum lucidum

Stratum granulosum

Stratum malpighii

Basal layer

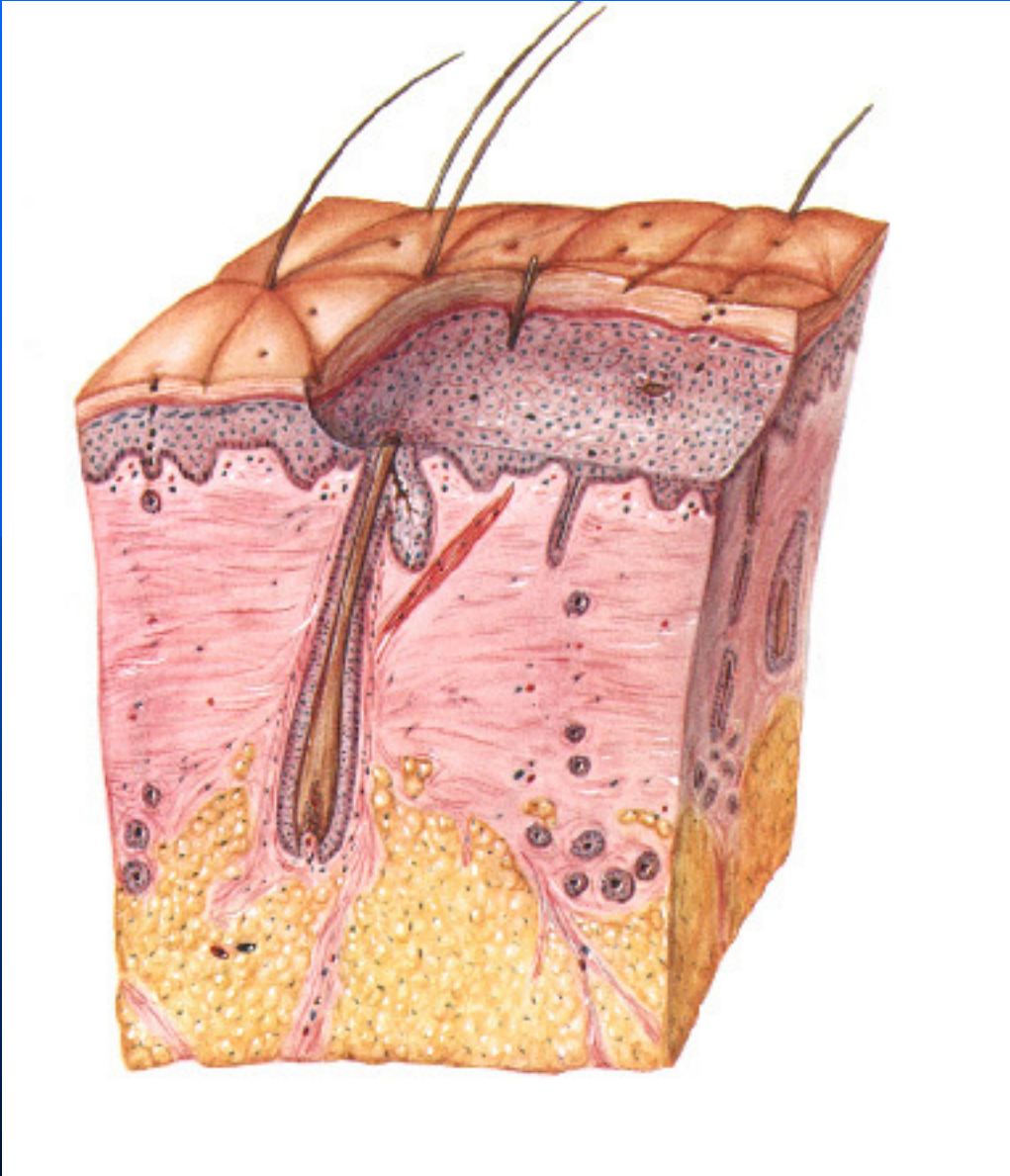
Epidermal papillae

Dermis

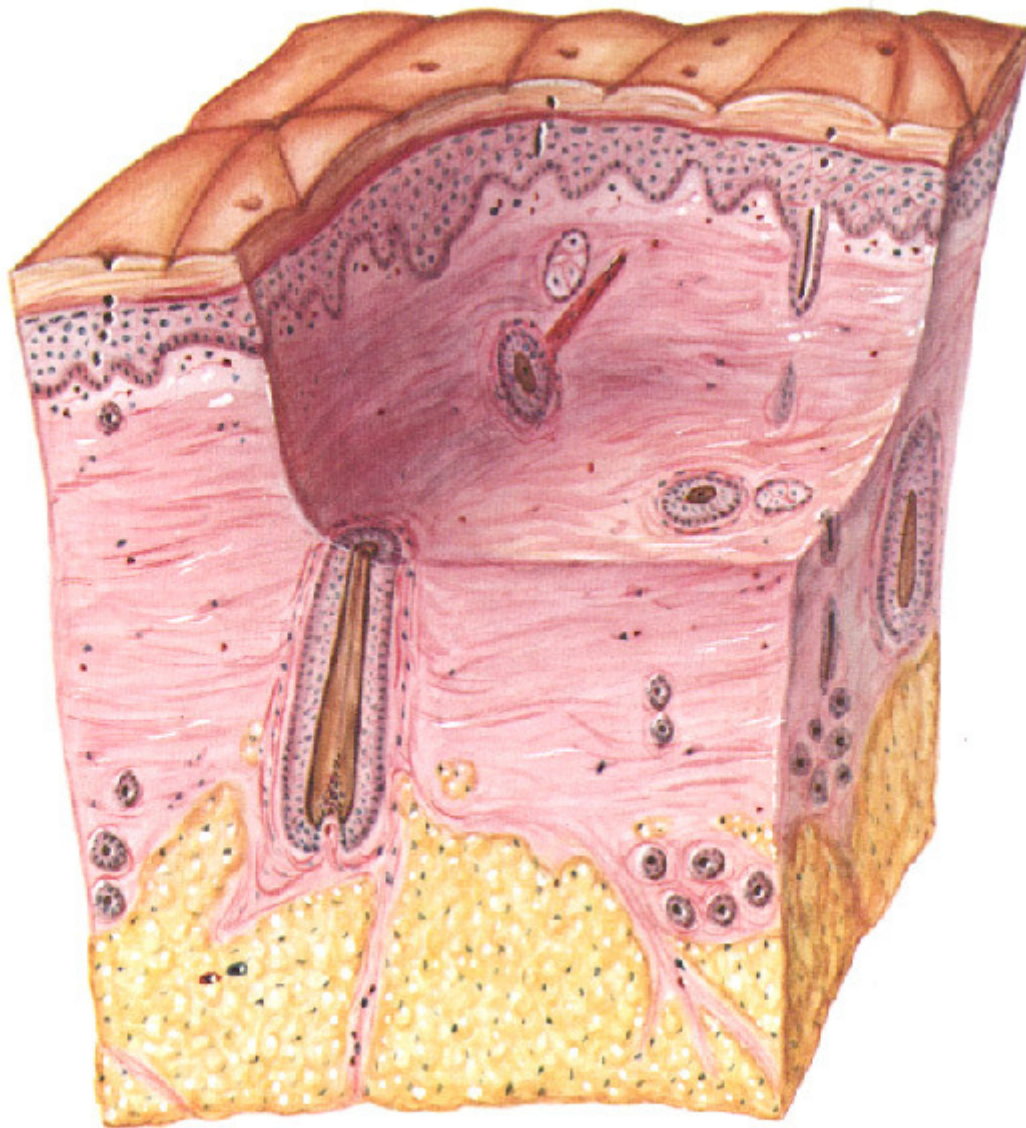
Hair follicle

Sweat gland

Adipose tissue



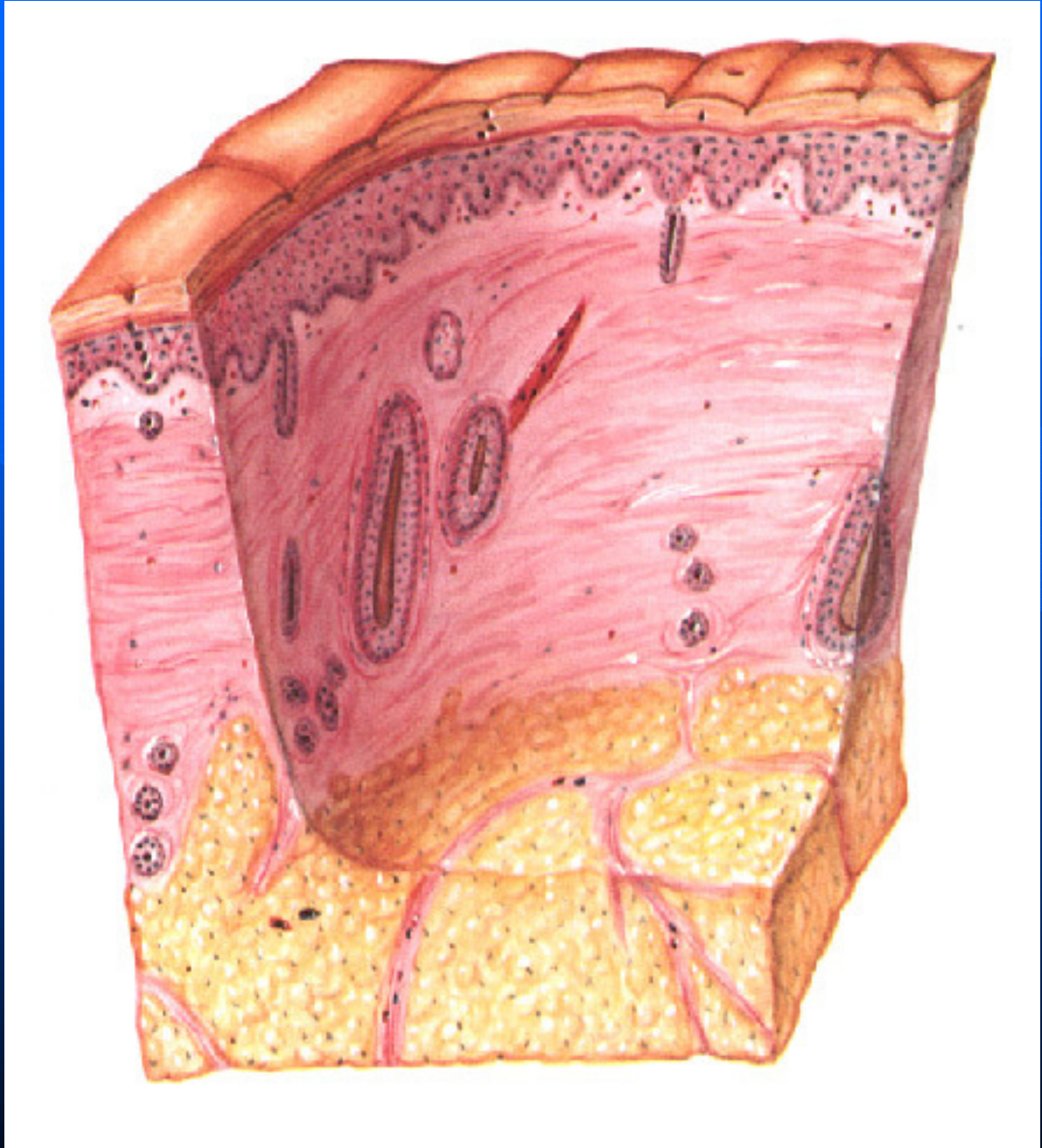
















# Depth of Injury

First Degree

Second Degree

Third Degree

Partial  
Thickness

Full  
Thickness

# BURNS: QUESTIONS

- Assuming that the patient weights 80 kg, calculate the estimated fluid requirements for this patient:
  - in the next 2 hours
  - in the following 16 hours
  - in the second 24 hours

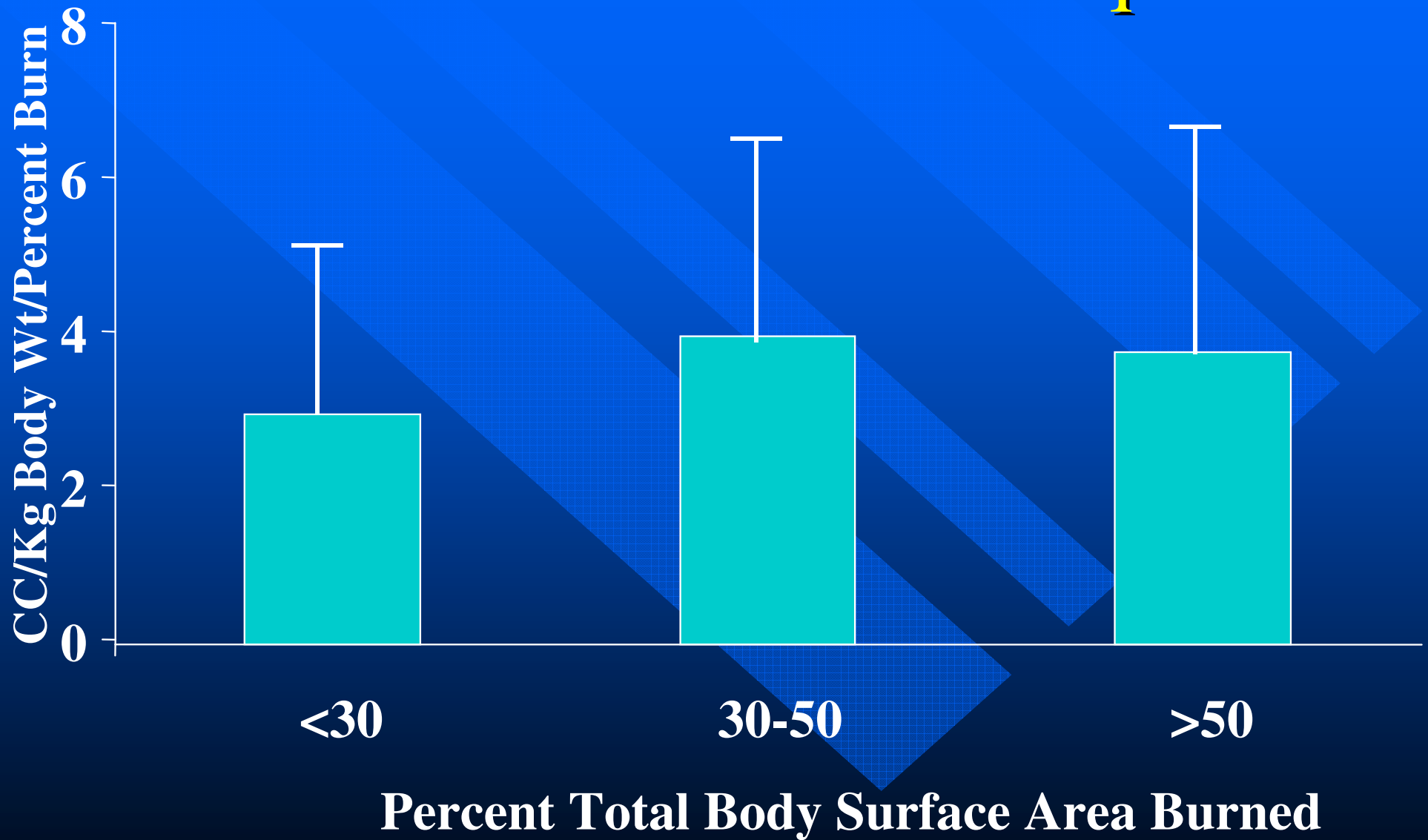
# Fluid Support

- A. Required in patients with  $> 20\%$  TBSA burn.
- B. Crystalloid 1<sup>o</sup> fluid – first 24 hours.

# Fluid Support

- C. Volume requirements related to % TBSA burn & depth.
- D. 50% Administered first eight hours post-burn.

# Resuscitation Volumes Required



Lactated Ringer's Solution  
4 ml/kg body weight/% TBSA



Hours

Plasma  
0.35 to 0.5 ml/kg body weight/% TBSA



Hours

# Fluid Requirements

- $80 \text{ Kg} \times 60\% \text{ TBSA Burn} \times 4 \text{ cc/Kg/\% Burn}$
- $19,200 \text{ cc/First 24 hours post-burn}$
- $\text{First 8 hours} = 9600 \text{ cc} = 1200 \text{ cc/hr}$
- $\text{Second 16 hours} = 9600 \text{ cc} = 600 \text{ cc/hr}$



## Second 24 hours

.3 - .5 cc/Kg/% TBSA Burn as Colloid

+

Maintenance Fluids

# Pediatric Burns

Maintenance + 2 – 4 cc/kg/% TBSA

# Burns: Questions

- How would you monitor fluid therapy?

# Fluid Support

E. Titrate total based on indices of adequate volume.

- Urine Output 0.5 – 1 ml/kg/hr
- Cardiac Output
- SVR
- Acidosis

# Burns: Questions

- How would you manage the burn wound?

# Wound Management

- Initial Care
- Removal of Eschar
- Reconstitution of Skin Surface

# Tropical Chemotherapy

- Prevent progressive infection
- Preserve viable tissue
- Prevent systemic sepsis







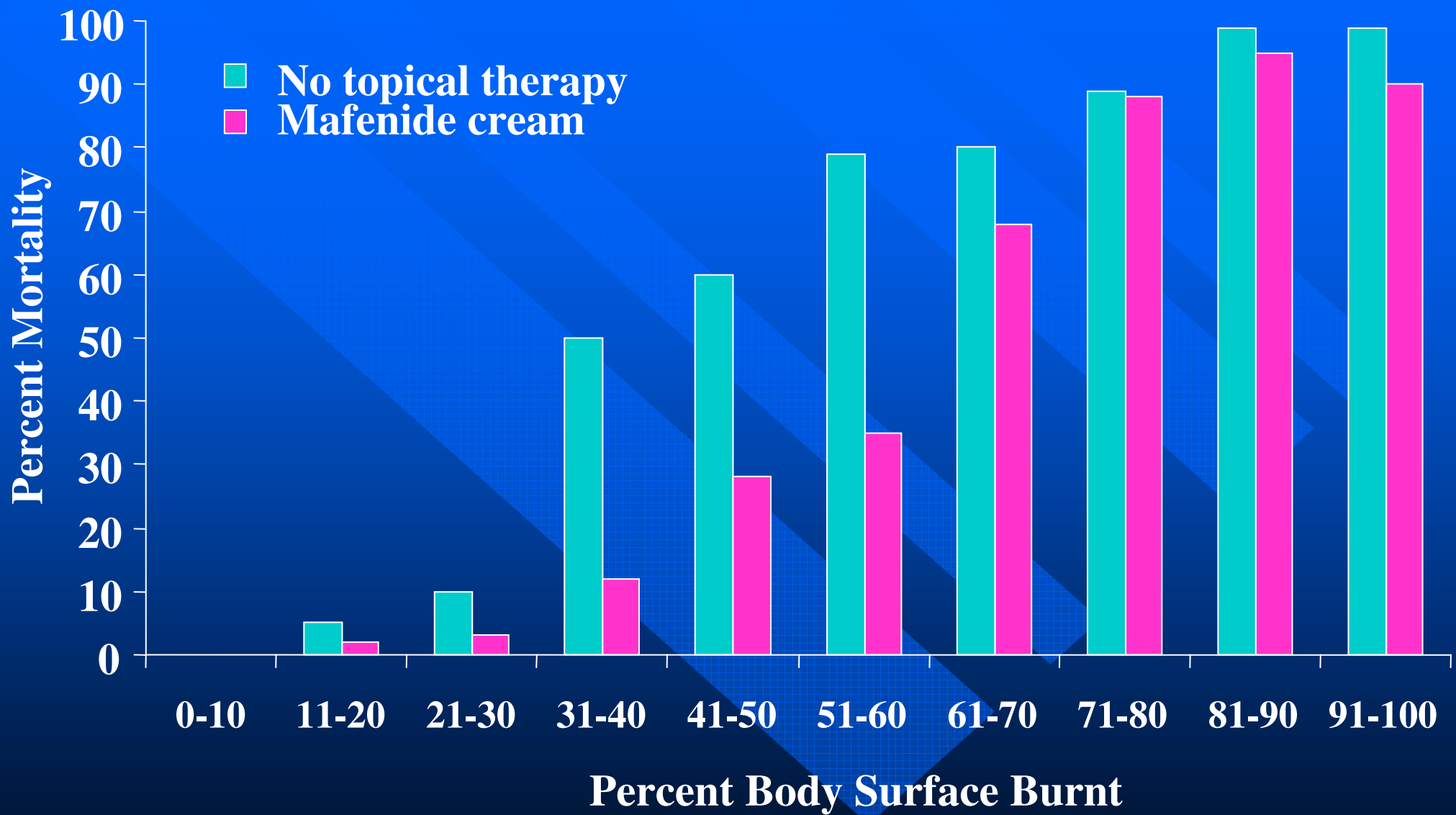






# Burns: Questions

- Discuss the prevention and management of sepsis in the burn patient.

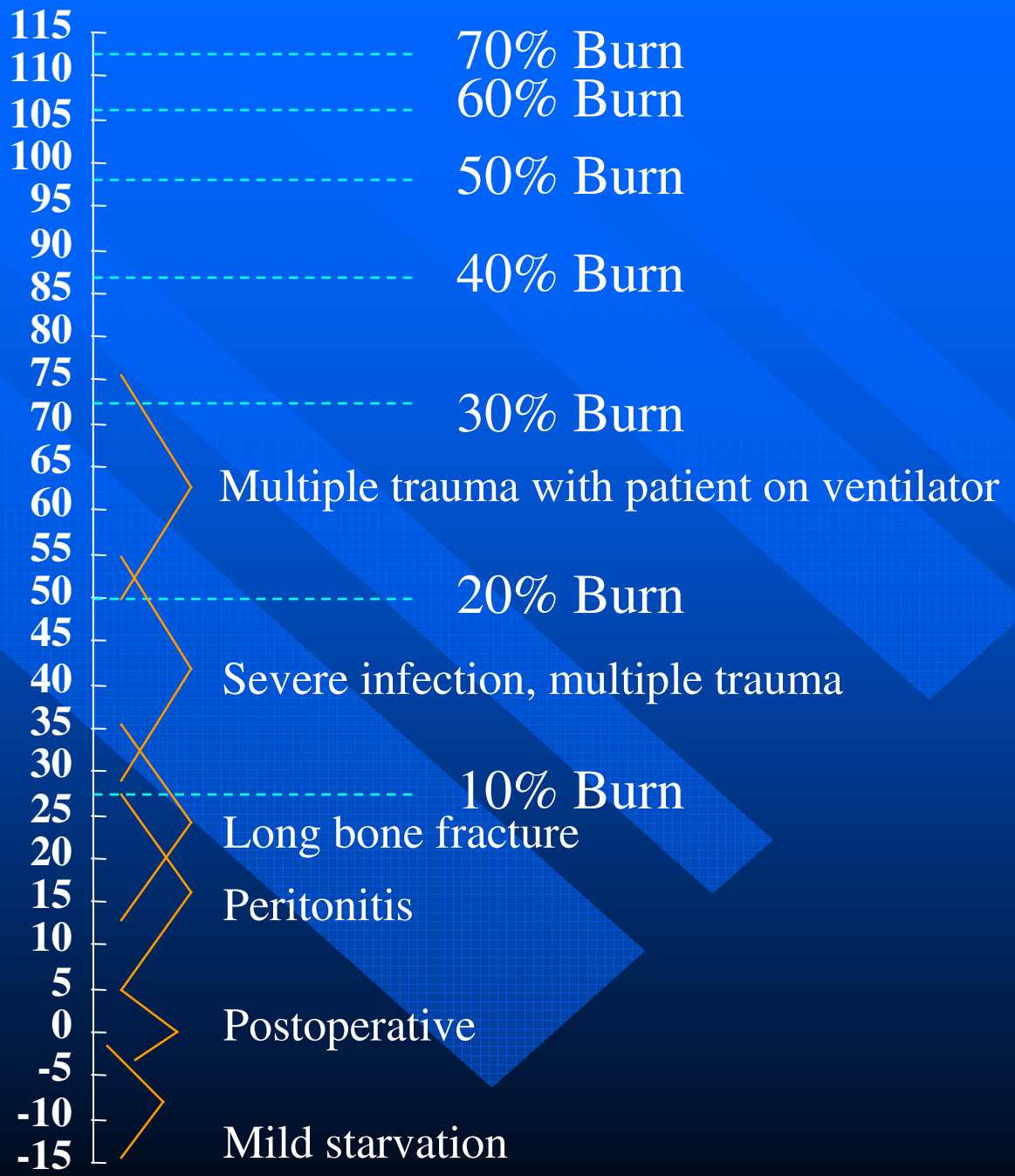


\*Burn mortality in adults and children before and after use of topical mafenide

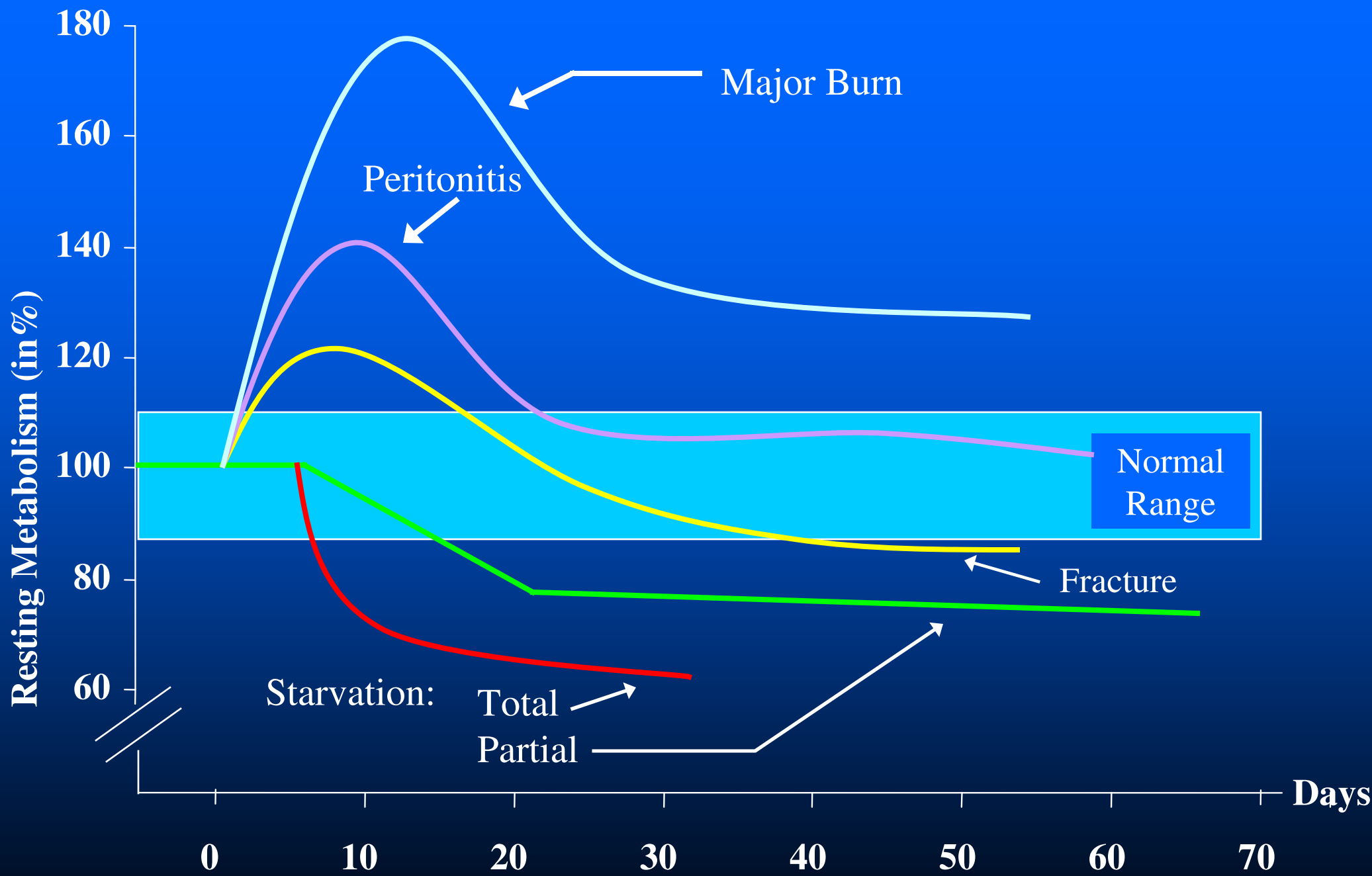
# Burns: Questions

- What are the nutritional requirements in this patient?
- How are you going to manage his or her nutritional support?

# Metabolic Activity With Injury







# Nutritional Support Burn Patient

$$\begin{aligned} \text{Calories} &= 25 \text{ KCAL/KG B.W.} \\ &+ \\ &40 \text{ KCAL \% TBSA Burn} \end{aligned}$$

# Burns: Questions

- In contrast to this complicated case, how would you manage a minor (less than 5% body surface area) burn?

# Wound Management

- Tetanus Prophylaxis
- Initial Burn Wound Care
  - Debridement & Topical Therapy
  - Systemic Antibiotics???

# Burns: Questions

- What are the differences between a thermal burn, an electrical burn, a chemical burn, and a radiation burn?

# Stop Further Injury

## ■ Chemical Injury

- Copious Water Lavage
- Prolonged Eye Irrigation
- Remove Contaminated Clothing
- Dry Chemicals – Brush, Do Not Lavage











# Burns: Questions

- Describe the composition of the medical care team needed for the care of this patient.

# Multidisciplinary Burn Quality Assurance Committee Members

- Medical Director
- Nurse Manager
- Clinical Nurse Specialist
- Administrative Director
- Occupational Therapist
- Physical Therapist
- Blood Bank Representative
- Dietician
- Infection Control RN
- Quality Assurance RN
- Social Work
- Outpatient Representative
- Pharmacy Representative

# Burns: Questions

- Discuss the modifications of management necessary to care for large numbers of burns that might occur in a disaster.

# Triage Decision Table

## Benefit-to-Resource Ratio Based on Age & Total Burn Size

### CAVEAT

This grid is intended only for mass burn casualty disasters where responders are overwhelmed and transfer possibilities are insufficient to meet needs.

This table is based on national data on survival and length of stay.

Age/ years	Burn Size (%TBSA)									
	0 – 10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91+%
0-1.99	High	High	Medium	Medium	Medium	Medium	Low	Low	Low	Expectant
2-4.99	Outpatient	High	High	Medium	Medium	Medium	Medium	Low	Low	Low
5-19.9	Outpatient	High	High	High	Medium	Medium	Medium	Medium	Medium	Low
20-29.9	Outpatient	High	High	High	Medium	Medium	Medium	Medium	Low	Low
30-39.9	Outpatient	High	High	Medium	Medium	Medium	Medium	Medium	Low	Low
40-49.9	Outpatient	High	High	Medium	Medium	Medium	Medium	Low	Low	Low
50-59.9	Outpatient	High	High	Medium	Medium	Medium	Low	Low	Expectant	Expectant
60-69.9	High	High	Medium	Medium	Medium	Low	Low	Low	Expectant	Expectant
70+	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant

Table provided by Jeffrey R. Saffle, MD, Director, Intermountain Burn Center, Salt Lake City, Utah