



Congrès suisse de
Médecine d'urgence 2018

BURN CARE : STATE OF THE ART

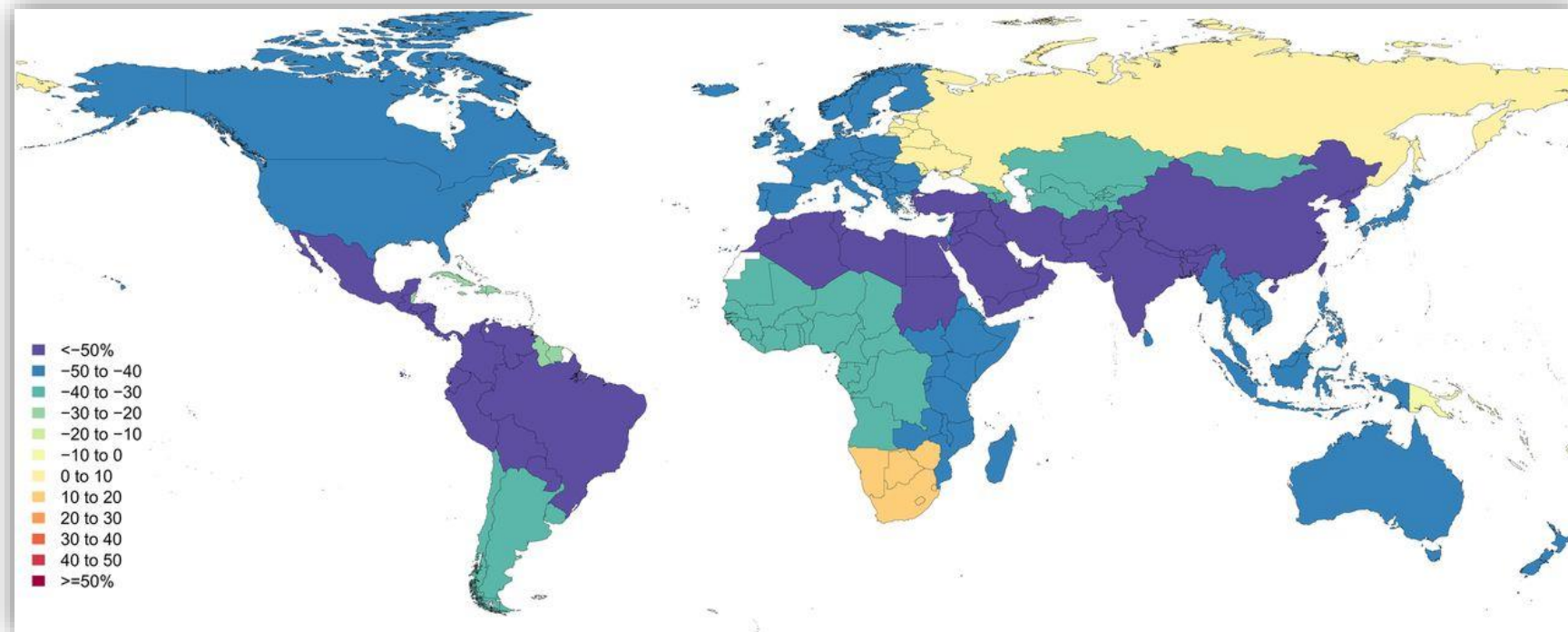
Berne, le 26 mai 2018

Dr. Ludovic Maudet
Service des Urgences



Epidémiologie mondiale

- 4^e rang des traumatismes
- ~ 11 mio de prises en charge / an
- Principalement dans les pays à bas et moyens revenus
- En majorité des brûlures non fatales
- > 270'000 décès / an
- Incidence en diminution dans les pays à hauts revenus



Haagsma JA, et al., *The global burden of injury 2013* / WHO Fact sheet Burns 06.03.2018

Epidémiologie européenne

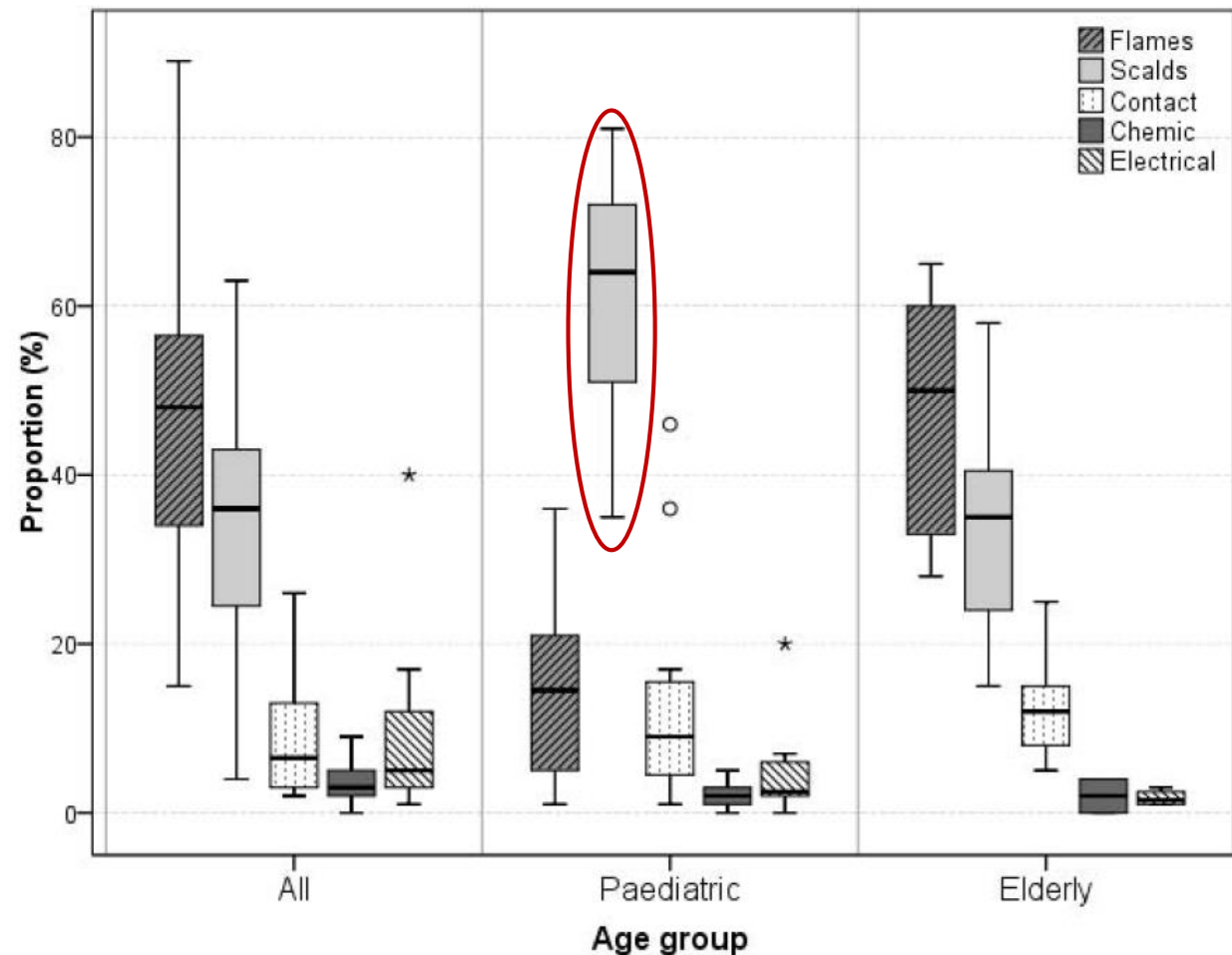


Figure 2 Etiology of severe burn injury, according to the age group (proportion of all burns). Forty-one studies provided sufficient data to compare the etiologies. In the 'All' group, two of the 19 studies consider only adults. The 'paediatric' box plots are based on 14 studies; the 'elderly' box plots, on eight studies.

Deux histoires parmi tant d'autres

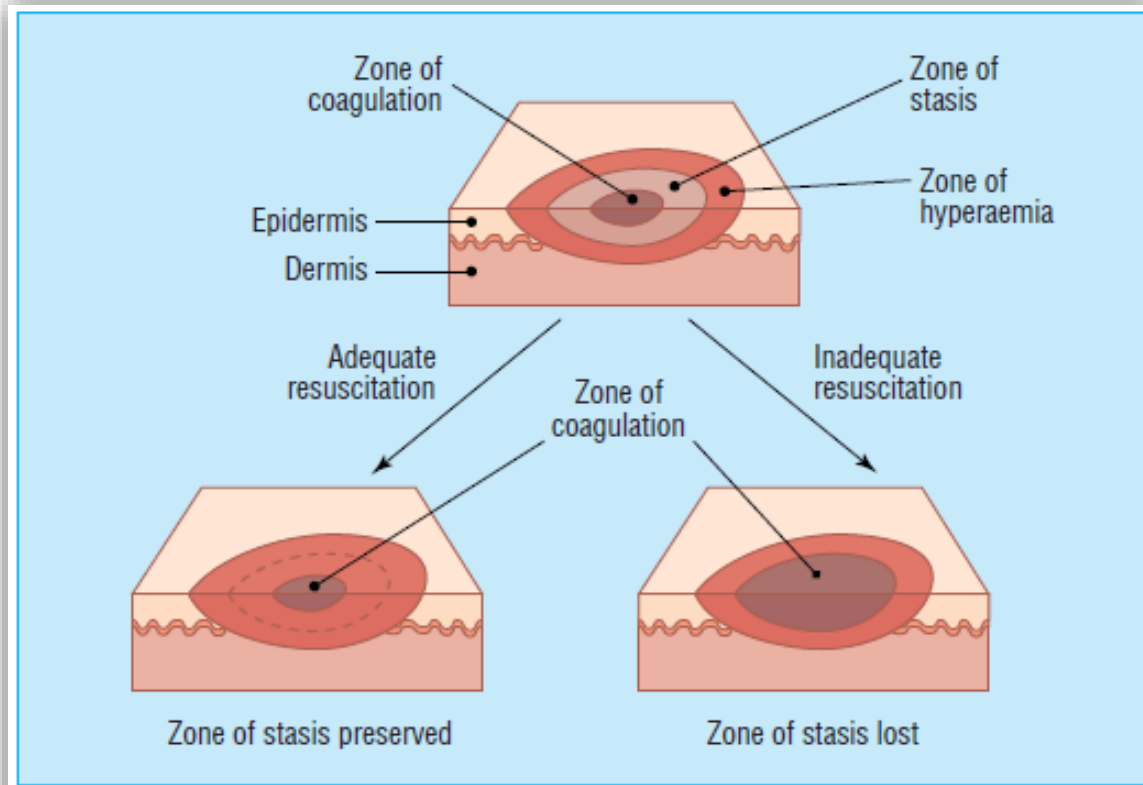


LA PRÉVENTION EST LE PREMIER TRAITEMENT DE LA BRÛLURE !

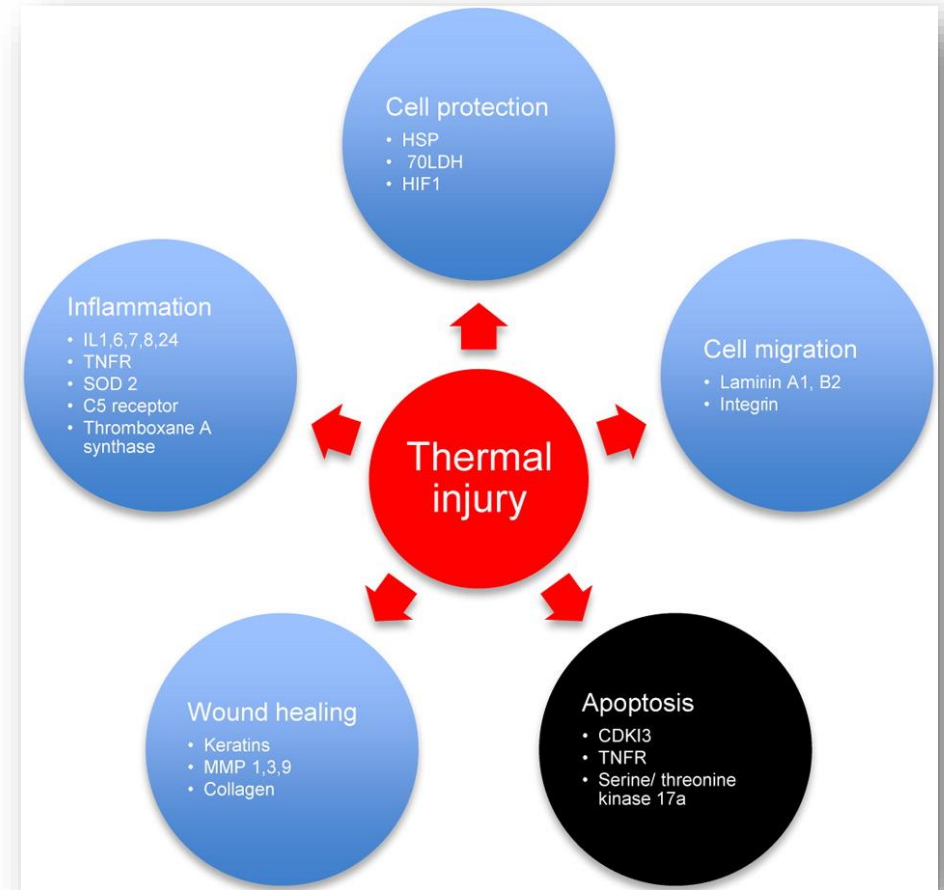


Généralités

- Théorie des 3 zones : coagulation, stase et hyperémie (Jackson 1947)



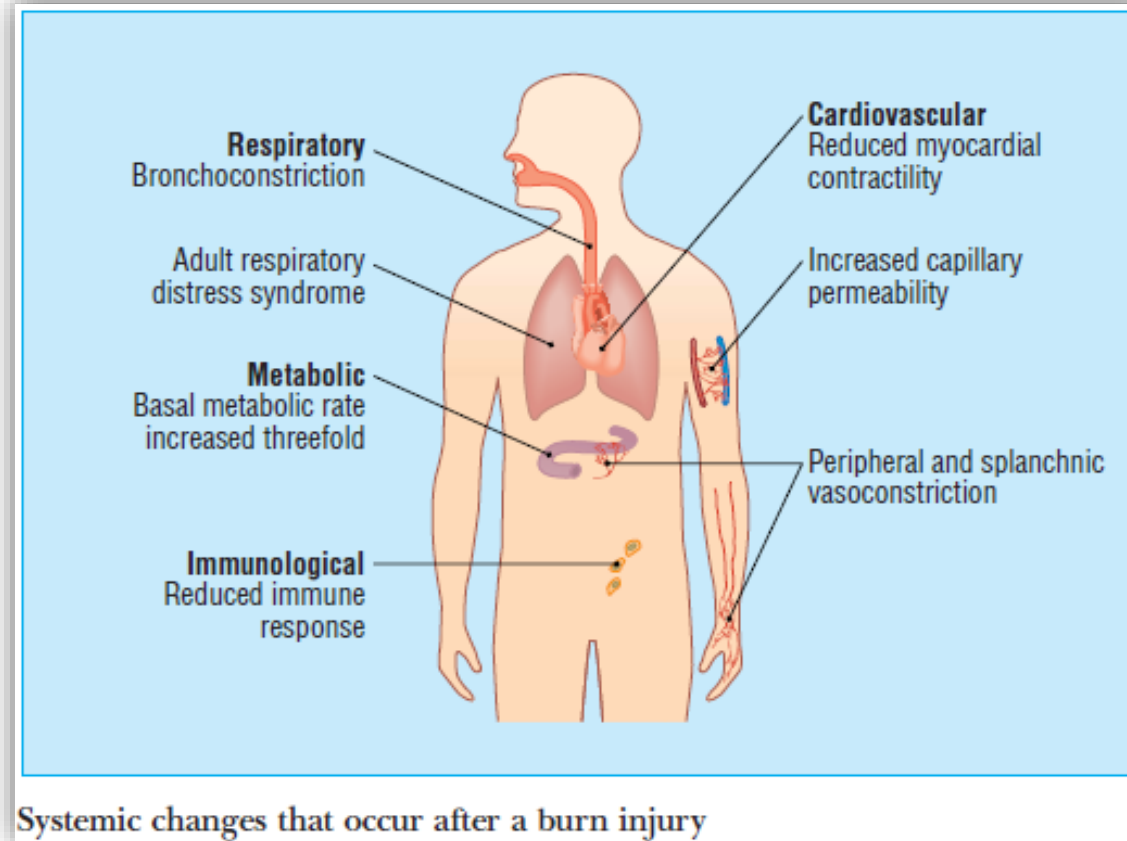
Jackson's burns zones and the effects of adequate and inadequate resuscitation



Hettiaratchy S., BMJ 2004
 Wright E.H., Burns 2015

Généralités

- Brûlures étendues → atteinte systémique → instabilité (délai)



- Brûlé = Traumatisé
- Lésions associés (inhalation, intoxications, traumas) → pronostic vital à court terme

LE GRAND BRÛLÉ EST UN POLYTRAUMATISÉ !



Prise en charge initiale - *ABCDEF*

- Prise en charge standardisée ATLS / PHTLS
- Immobiliser si nécessaire (y c. la colonne cervicale)
- Recherche active de signes/symptômes d'un syndrome d'inhalation :
→ si nécessaire : protection précoce des voies aériennes supérieures
- Anamnèse : autant d'informations utiles que possible avant d'intuber



LES LÉSIONS D'INHALATION TUENT !



Prise en charge initiale – ABCDEF



Avantages

Protection des VAS

Ventilation contrôlée/positive

Analgésie et sédation

Inconvénients

IOT difficile (risque CICO)

Détresse respiratoire préexistante

Instabilité hémodynamique



Prise en charge initiale – ABCDEF



- Gestion conventionnelle de la détresse/insuffisance respiratoire :
 - O₂, intubation oro-trachéale si nécessaire
 - décompression/mini-thoracostomie si pneumothorax sous tension (blast !)
 - drainage thoracique si hémithorax
 - escarrotomie si brûlure circonférentielle

- *Longitudinal incisions*
- *Axial planes*
- *Into normal skin*
- *Down to subcutaneous fat*

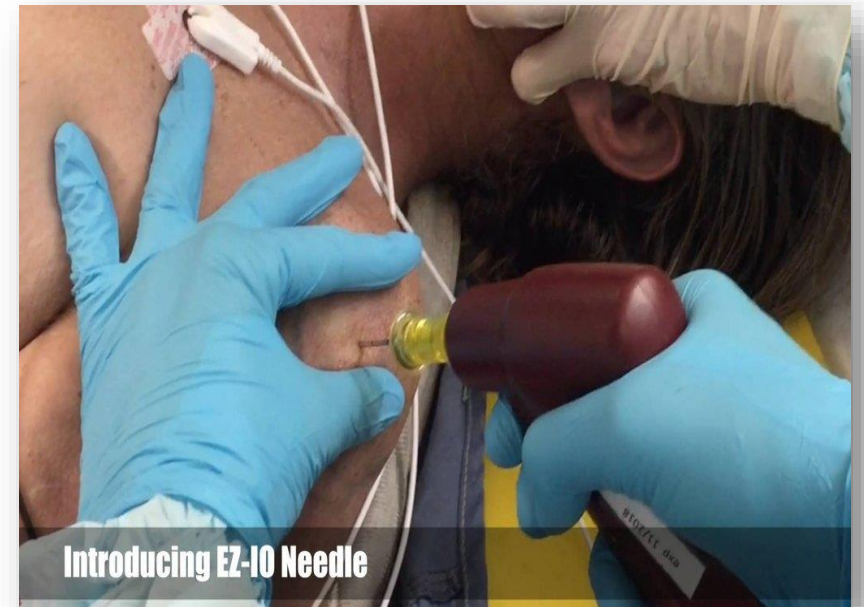


Prise en charge initiale – *ABCDEF*



- Gestion conventionnelle de l'hémodynamique :
 - Ceinture pelvienne si suspicion de trauma du bassin
 - Accès vasculaire périphérique (IV / IO) en zone saine
 - A. tranexamique, Fibrinogène et produits sanguins si besoin

- Syndrome compartimental :
 - Monitoring étroit et
escarrotomies précoces



Prise en charge initiale – ABCDEF



- Pathologie concomitante ? (AVC, crise convulsive)
- Recherche de co-intoxications (CO, CN)
→ Antidotes
- Antalgie puissante



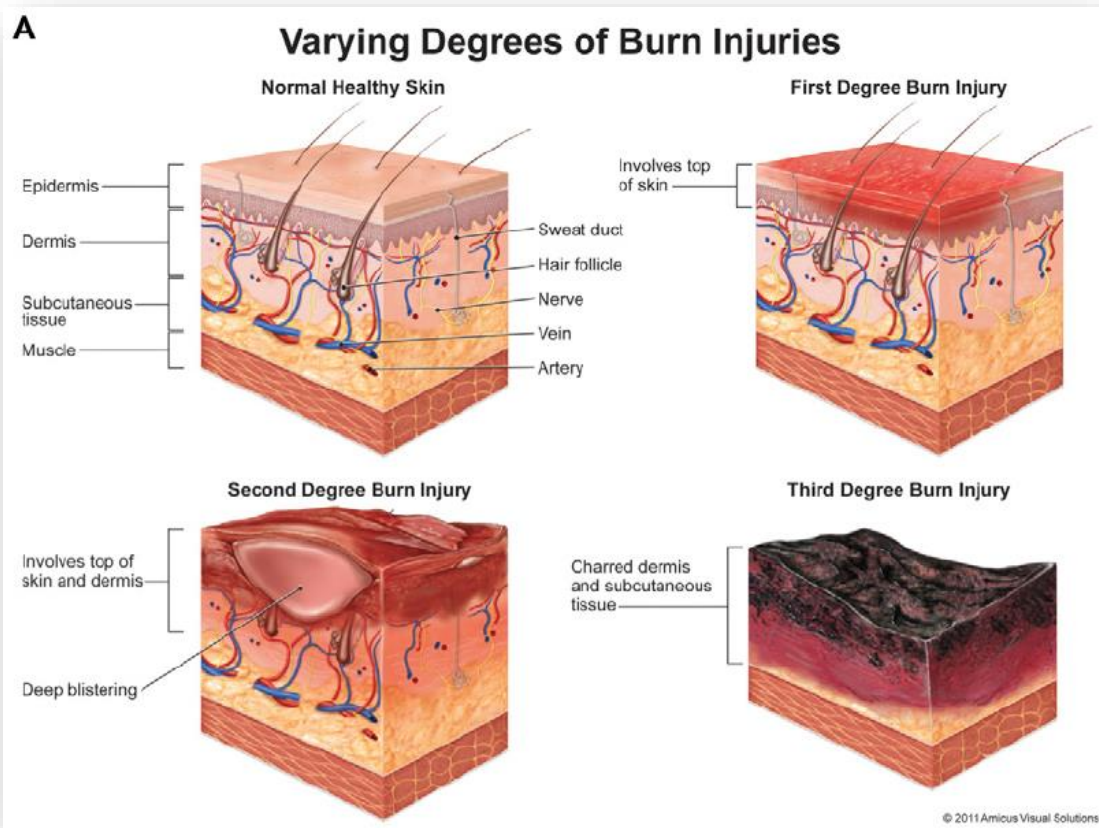
UNE ANTALGIE RAPIDE, PUISSANTE ET SURE !



Prise en charge initiale – ABCDEF



- Exposition et évaluation des brûlures : degrés et surface



Burn Depth	Epidermal (1 st degree)	Superficial partial thickness (2 nd degree)	Deep partial thickness (2 nd degree)	Full thickness (3 rd degree)	4 th degree
Skin Involvement	Epidermis	Epidermis and superficial dermis	Epidermis and deep reticular dermis	Epidermis and entire dermis	Involving underlying structure (subcutaneous fat, muscle and bone)
Signs	Blanch to touch and are erythematous, no blisters	Blanch to touch and tend to blister	Do not blanch to touch, appear pale with large blisters	Can appear white, black or cherry red. No blisters	Charred, skeletonized
Sensation	May be painful	Extremely painful	Maybe painful or reduced/absent sensation	No sensation	No sensation
Healing Capacity	Will heal spontaneously	Will heal spontaneously	Will not heal spontaneously, will need surgery	No healing capacity, will need surgery	No healing capacity
Healing Time	Within 7 days	Within 14 days	Over 21 days	Will not heal spontaneously	Will not heal spontaneously
Scar Formation	No scarring	Low to moderate risk of hypertrophic scarring	Moderate to high risk of hypertrophic scarring	Will scar	Usually requires amputation/ fasciotomy



Prise en charge initiale – ABCDEF



- Exposition et évaluation des brûlures : degrés et surface

Rule of Palm (1%)

Rule of Nines

Ignore simple erythema

Region	PTL	FTL
Head		
Neck		
Anterior. trunk		
Posterior. trunk		
Right arm		
Left arm		
Buttocks		
Genitalia		
Right leg		
Left leg		
Total burn		

Relative percentage of body surface area affected by growth

Area	Age 0	1	5	10	15	Adult
A = 1/2 of head	9 1/2	8 1/2	6 1/2	5 1/2	4 1/2	3
B = 1/2 of one thigh	2 3/4	3 1/4	4	4 1/2	4 1/2	4 3/4
C = 1/2 of one leg	2 1/2	2 1/2	2 3/4	3	3 1/3	3 1/2

Burned area 1: >1/2 **Burned area 2: 1/2-1/4** **Burned area 3: 1/4-1/8** **Burned area 4: <1/8**

Figure 1 Four mannequins are shown, marked with the rule of nine body area percentages. Example burns are also shown, in black, with the appropriate serial halving category for such an injury beneath.

Smith JJ, British Journal of Plastic Surgery 2005



SURFACE BRULEE : ESTIMATION 2.0 !

The application interface is divided into three main sections for patient input and three corresponding human figures showing burn estimations. The central panel provides patient details and calculated values.

Central Panel Data:

- Age: 40
- Poids(Kg): 83
- Taille(cm): 180
- Parkland(ml/kg/%SBT): 4
- Parkland table:

H0-H8 :	753 ml/h
H8-H24 :	377 ml/h
Soit :	12 052 ml/24h
- Indication du remplissage : surface > 15-20%
- Surface Brûlée Totale : 36.3 % / 7 365 cm² (SCT : 2.0279 m²)**
- 1er : 0.0% | 2ème : 36.3% | 3ème : 0.0%

Figure 1 (Left): Front view of an adult male with orange burn areas on the face, neck, chest, arms, and legs.

Figure 2 (Middle): Back view of an adult male with orange burn areas on the back, shoulder, and leg.

Figure 3 (Right): Front view of a child with red burn areas on the face, chest, and arms, and orange burn areas on the legs.

Bottom Panel:

- Left: Pinceau : [Slider] Surface Brûlée Totale : 36.3 % / 7 365 cm²
- Middle: Pinceau : [Slider] Surface Brûlée Totale : 36.3 % / 7 365 cm²
- Right: Pinceau : [Slider] Surface Brûlée Totale : 24.1 % / 1 268 cm²

Buttons and Controls: Includes 'Zones', '1er', '2ème', '3ème' selection buttons, 'Reset', 'Partager', and a 'Pinceau' slider at the bottom.

Prise en charge initiale – ABCDEF



- Irrigation (petites surfaces!) et protection contre l'hypothermie

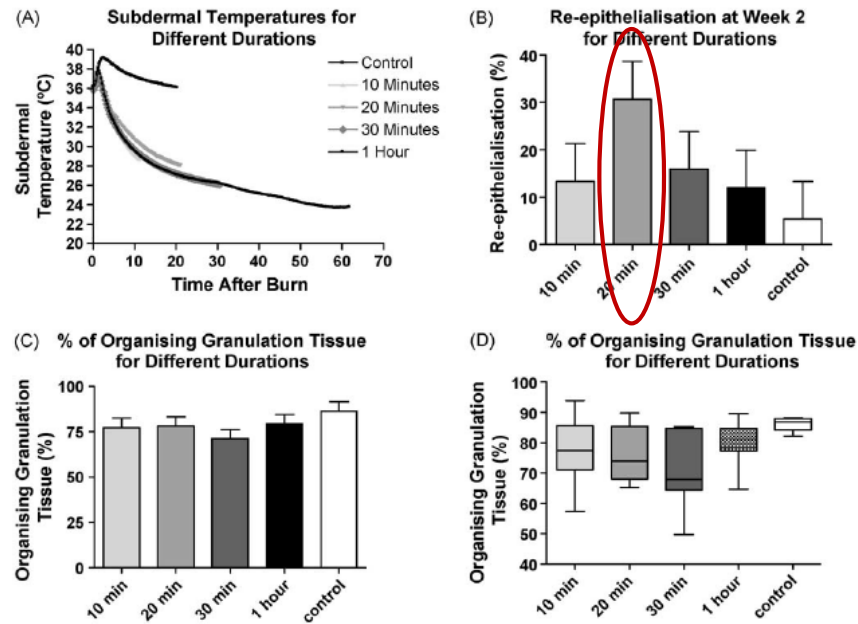


Fig. 1 – Clinical outcomes measured when first aid is applied to a burn wound for different durations (10 min, 20 min, 30 min and 1 h compared to an untreated control). (A) The subdermal temperature decreased more the longer the first aid was applied. (B) Re-epithelialisation was faster for the 20 min treatment at 2 weeks post-burn ($p = 0.05$ in comparison to the control). (C) There was no significant difference in the average % organising granulation tissue (scar tissue) between treatments, however the controls had higher median %OGTs ($p = 0.03$) (D).

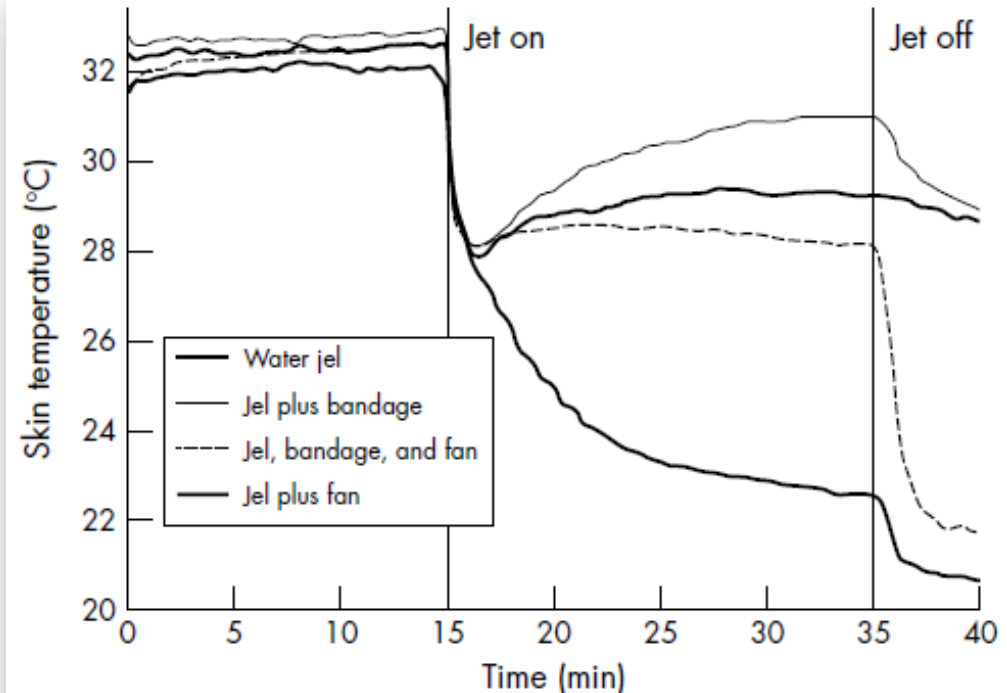


Figure 1 Change in median skin temperature with time.

REFROIDIR PARFOIS, EVITER L'HYPOTHERMIE TOUJOURS !



Prise en charge initiale – *ABCDE Fluids*



- Sous-réanimation *versus* surréanimation :
→ préférer le pragmatisme clinique (hémodynamique)
aux dogmes (règles de calcul) !
- Petits trajets (CH) préhospitaliers → petits volumes
- Expansion volémique contrôlée aux soins intensifs
(! 2e phase : fluid shift !)

Modified Brooke

1. $2 \times 70 \times 50 = 7000$ ml
2. $7000/2 = 3500$ ml
3. $3500/8 = \underline{438}$ ml/hr

Parkland

1. $4 \times 70 \times 50 = 14000$ ml
2. $14000/2 = 7000$ ml
3. $7000/8 = \underline{875}$ ml/hr

Rule of 10

1. $50 \times 10 = \underline{500}$ ml/hr

Figure 4. Comparison of initial fluid rate calculations for an adult weighing 70 kg with a 50% TBSA burn using the Modified Brooke, Parkland, and rule of 10.



Chung KK, *J Trauma*. 2010
Baxter CR, *Ann N Y Acad Sci* 1968

UNE EXPANSION VOLEMIQUE CONTRÔLÉE !



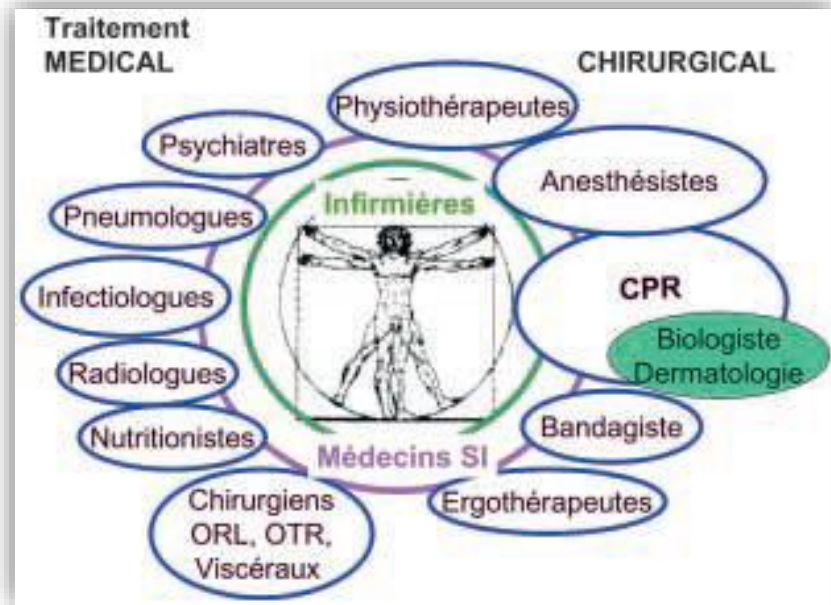
Orientation

Critères d'admission en Centre spécialisé de l'American Burn Association.

- brûlure de 2^e degré > 10 % BSA (enfant), > 20 % BSA (adulte);
- brûlure du visage, des mains, des pieds, des organes génitaux, du périnée, ou des grandes articulations;
- brûlure du 3^e degré quel que soit l'âge;
- brûlure électrique, y.c. foudre;
- brûlure chimique;
- syndrome d'inhalation;
- comorbidités importantes;
- traumatisme (fractures) associé aux brûlures;
- brûlure chez un enfant dans un hôpital sans facilités pédiatriques.

Suite de la prise en charge

- La brûlure est une lésion dynamique qui nécessite une prise en charge pluridisciplinaire.



A l'arrivée



Après 48h

Berger MM, BMS 2004

UNE PRISE EN CHARGE HAUTEMENT SPECIALISEE !



Pronostic

- Multiples scores intégrant le plus souvent : surface brûlée, âge, inhalation
- Score de Baux révisé à privilégier

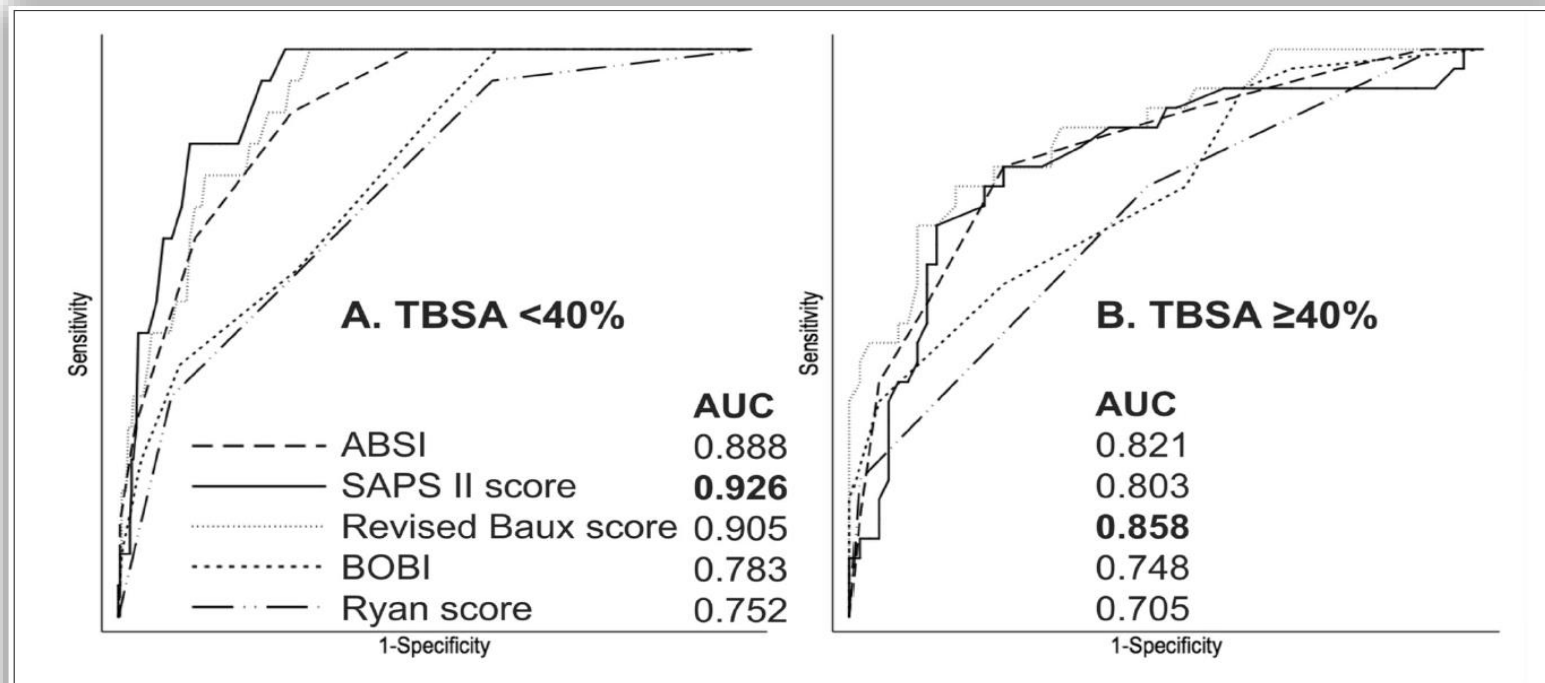
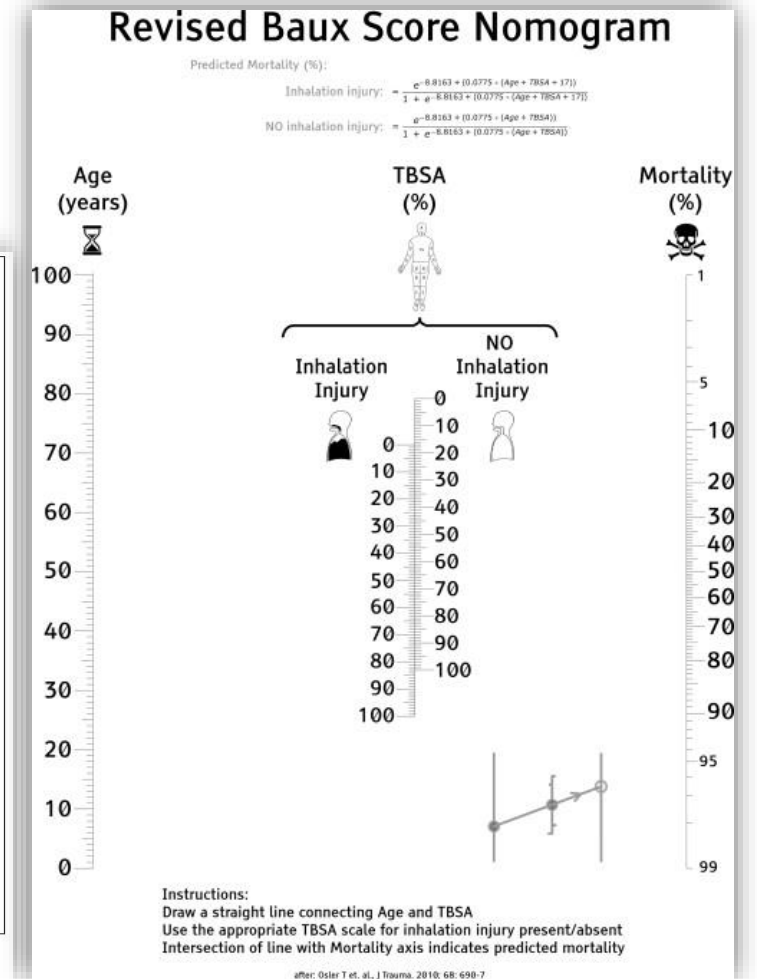


Fig. 2 - ROC curves of the severity scores according to burn size.



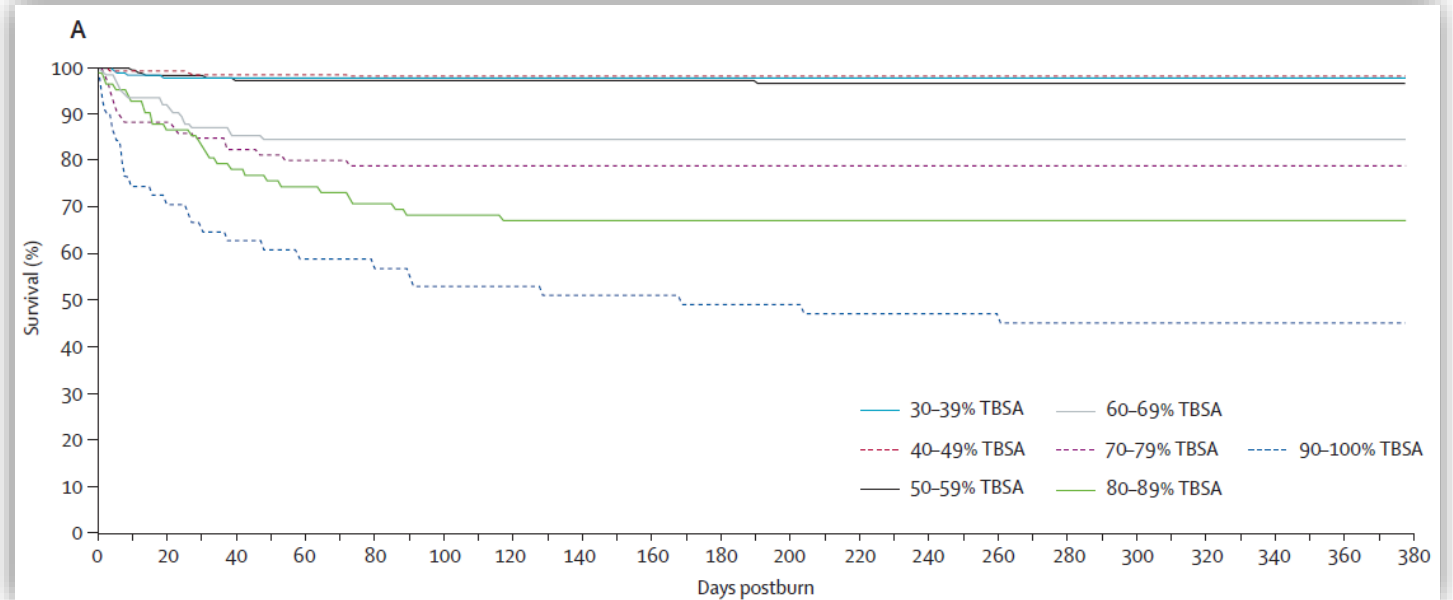
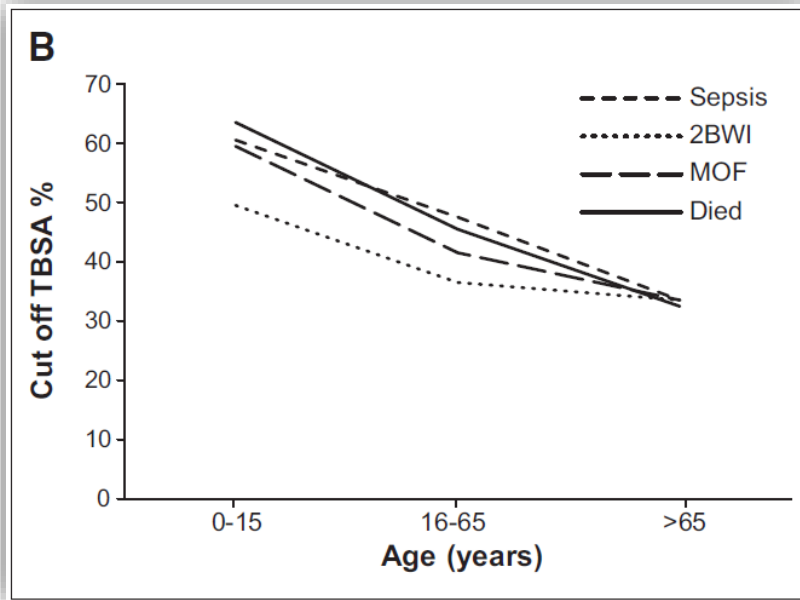
Pantet O., Ann Burns Fire Disasters 2016

Pronostic

- Seuils critiques de surface brûlée déterminant la mortalité :

→ adultes : ~ 40%

→ enfants : ~ 60%



Jeschke MG, Crit Care Med. 2015
Kraft R., Lancet. 2012

PERSÉVÉRER !





Prévention



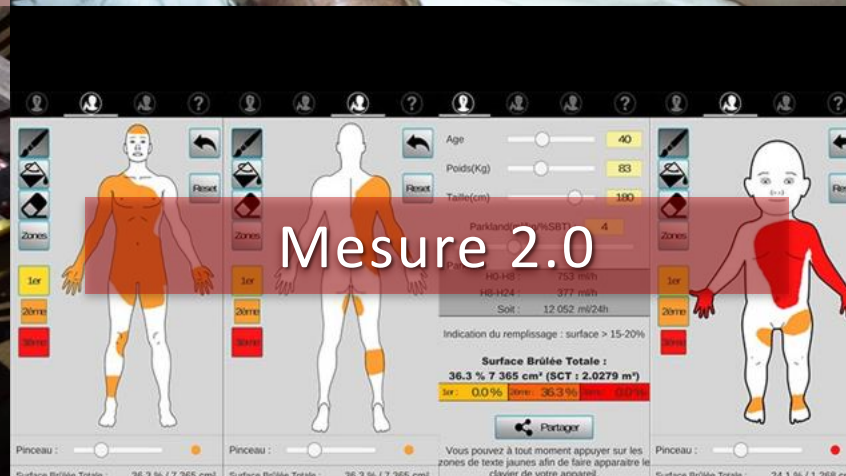
Polytrauma



Inhalation



Antalgie



Mesure 2.0



Hypothermie



Volume contrôlé



Spécialistes



Persévérer