The **DIPHOTERINE** solution CAPTURES THE CORROSIVE AND ELIMINATES IT

PREVOR
ANTICIPATE AND SAVE
Toxicology Laboratory & Chemical Risk Management

In accordance with the Standard EN 15154
The aggressive chemicals

Two categories of chemicals can provoke a burn by a direct contact: corrosives and irritants. The seriousness of the chemical burn depends on the number of cells destroyed and will be more significant in the case of corrosives. In some cases, the aggressive product can also have toxic or harmful effects, the consequences of which should not be neglected.

The mechanism of a chemical burn

The action of soda NaOH:

- CORROSIVE
  - Concentrated acids and bases
  - IRREVERSIBLE EFFECTS

- IRRITANT
  - Solvents, oils...
  - REVERSIBLE EFFECTS

Specific danger if combined with toxic risk (example - Hydrofloric acid)

A chemical burn is caused by the capability of corrosives and irritants to create an exchange (ion, proton, electron...) with the tissues of the skin or the eye. The degree of the burn will depend on the number of molecules destroyed and on the type of modification (reversible or irreversible).

* Picture source: ACTO, Prof. Norbert Schrage, Aachen.
To be effective regardless of the type of accident and to avoid the risk of error for the victim, it is necessary to be able to stop these 6 aggressive reactions.

There are 6 types of aggressive chemical reactions:

- Acid
- Basic
- Oxidising
- Chelating
- Reducing
- Solvent

A POLYVALENT PRODUCT IS ESSENTIAL

To stop the evolution of the burn

A chemical burn is initiated by the contact between the aggressive product and the skin or the eye. Following this contact, a part of the aggressive chemical will penetrate into the tissue and cause destruction of the cells.

To effectively decontaminate the splash, it will be necessary, not only to decontaminate the product on the surface, but also to control its penetration inside the tissue.

A PRODUCT ABLE TO STOP THE AGGRESSIVE CHEMICAL IS ESSENTIAL

Factors influencing the penetration

- The type of product and its concentration
- The temperature
- The length of exposure time
First-aid treatment: From water...

- The principles of washing with water
  - a washing of the surface to remove quickly the aggressive product
  - the dilution of the chemical to reduce its aggressiveness
  - a universal product avoids the risks of error at the time of the accident

- What are its limitations?
  - the concentrated products which penetrate very quickly
  - the intervention time of 10 seconds which is not always achievable
  - the washing comfort: risk of hypothermia under a water shower difficulty to open the eye

Ex vivo test on the eye

Efficacy of the active washing with the DIPHOTERINE® solution:
Ex Vivo EVEIT Model - OCT

Rabbit corneas, 16 minutes after an application of 500 µL 1M NaOH for 20 s.

a) without any washing
b) with a DIPHOTERINE® solution washing

Corrosive penetration is stopped. The structural changes in the stroma are negligible. The endothelium is completely preserved.

Sources: Burgher, Mathieu, Fosse, Rihawi, Gérard, Merle, Schrage, Ocular chemical burn: Experimental proof of the influence of key parameters on the diffusion and the decontamination. 114th Congress of the SFO Paris May 2008.

The DIPHOTERINE® solution is recognized as a reference solution by the SFO, DOG, French Society of Ophtalmology and the Deutsche Ophtalmologische Gesellschaft.

The ideal product in case of a chemical splash must:

- Retain the advantages of water:
  - Fast washing of the surface
  - Single protocol

EXPERIENCE FEEDBACKS:
Result on the eye with a delayed washing

The DIPHOTERINE® solution for a better healing

> Ammonia ocular burn, wash
  - Assessment before washing with a Roper-Hall scale, which usually
  - After a washing with 1 litre splash and 6 months of approval without requiring a corneal burn. Burn 2002;18:70-3.

*photo: ACTO, Pr. Norbert Schrage, Aix la Chapelle
The principles of washing with the DIPHOTERINE® solution

- It is a liquid which enables it to obtain the same effect as water on the surface of the skin or eye.
- The DIPHOTERINE® solution is an amphoteric chelating agent, which enables it to stop the aggressiveness of the chemicals in a polyvalent way (for HF and its derivatives, use the HEXAFLUORINE® solution).
- The DIPHOTERINE® solution mechanism can be illustrated as follows:

![Diagram](image)

- The DIPHOTERINE® solution, unlike water, will stop the penetration of the chemical.

Healthy cells as seen under a microscope.

Beginning of the washing with the DIPHOTERINE® solution: the cells contract slightly.

End of the washing: the cells are preserved.

of a chemical splash must:

Bring improvements to compensate for the limitations of water:

- Guarantee a total efficacy whatever the product
- Increase the intervention time
- Improve washing comfort to increase the effectiveness

EXPERIENCE FEEDBACK:
Results on the skin in emergency

Independent retrospective study conducted by Dr Donaghue, chief medical officer of Alcoa Australia (alumina refineries). It covers 180 cases studied from May 1st 2005 to April 30th 2008, specifically on the skin.

<table>
<thead>
<tr>
<th>Severity scale and associated signs</th>
<th>First aid emergency solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>First washing with a DIPHOTERINE® DAP</td>
<td>First washing with water</td>
</tr>
<tr>
<td>1 (no sign)</td>
<td>52.9% (73 cases)</td>
</tr>
<tr>
<td>2 (erythematous)</td>
<td>39.1% (54 cases)</td>
</tr>
<tr>
<td>3 (blisters)</td>
<td>7.2% (10 cases)</td>
</tr>
<tr>
<td>4 (more serious)</td>
<td>0.7% (1 case)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100% (138 cases)</td>
</tr>
</tbody>
</table>

Criteria used:

1: Time elapsed between the chemical splash and clinical evaluation.
2: Time elapsed between the chemical splash and application of the DIPHOTERINE® solution.
3: Percentage of skin surface affected by the chemical.
How to use
A sterile washing solution

Dispensers for the skin, in the form of micronised sprays (optimising the surface of contact)

DAP

MINI DAP

MICRO DAP

> To decontaminate an entire body
Typical equipment for locations where there are large quantities of chemicals:
- Production areas
- Warehousing areas
- Off-loading and decanting areas

> To decontaminate a face or an arm
An ideal complement for a Wall Mounted Eyewash, where the quantities of chemicals are limited:
Laboratories

> To decontaminate a hand
Ideal personal equipment for small splashes:
Workshops
Maintenance personnel

Washing must begin within the first minute following the splash

Protocol for the first aid intervention with the DiPHOTerine® solution in the event of a chemical splash

1/ Go away from the danger
2/ Get undressed

ALL THESE PACKAGES MEET THE NEW EUROPEAN STANDARD EN 15154 Parts 3 and 4
the DIPHOTERINE® solution?

To be used immediately after the accident

Dispensers for the eyes, equipped with an ergonomic eyecup, which assists the opening of the eye for a more effective washing.

**Protocol for the first aid intervention with the DIPHOTERINE® solution in the event of a chemical splash**

1. Wash as quickly as possible, respecting the instructions for use of the DIPHOTERINE® solution
2. Alert
3. Wash as quickly as possible, respecting the instructions for use of the DIPHOTERINE® solution
4. Seek medical advice
5. Alert

**Steps**

**Washing must begin within the first 10 seconds following the splash**

**Personal equipment to decontaminate an eye**

Ideal for the maintenance personnel.

Imperatively worn by individual.

**Kit for chemical splashes**

In areas where fixed equipments are appropriate:
- Laboratories
- Production areas
- Warehouse areas
- Decanting areas

**To decontaminate an eye**

To carry on oneself or to put in the work area:
- Laboratories
- Warehousing areas

Portable eyewash: when the equipment must be mobile: first aid kits, emergency vehicles, infirmaries.

**OPEAN STANDARD EN 15154 PARTS 3 AND 4**
Prevor
Science to improve
the safety

Our Missions

> 1/To understand the chemical products

Research on the toxicity of the products
Studies on the mechanism of the burn

> 2/To find solutions

=> The DIPHOTERINE® solution
=> The HEXAFLUORINE® solution (HF)
=> The TRIVOREX® absorbent
=> Solution for decontamination of equipment

> 3/To advise

- Our customers for a more effective use (advice on site, training of the users and prescribers, edition of informative works regarding our knowledge)
- Institutions involved with the chemical risk

Reference organisations
They trust us