A review about Previn® (Diphotérine®)
A solution for first aid emergency decontamination of eye/skin chemical splashes

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1. INNOCIVITY OF PREVIN® IN HEALTHY HUMAN SUBJECTS
- 10 healthy human subjects age 31 ± 4.5 years
- solutions : phosphate buffer, Previn®
- examination : visual acuity, slit lamp examination, confocal microscopy of the cornea
  (Wild-Leitz flying-slit), tonometry (Goldmann) before, immediately after the rinsing and after 3 days
- rinsing : 500 mL of 20°C solution over five minutes.

2. pH MEASUREMENTS IN VIVO
- 3 groups of 8 rabbits
- 3 rinsing solutions : phosphate buffer, saline solution (0.9%), Previn®
- 1% NaOH for 30 seconds in a 12 mm diameter plexiglas ring
- prompt irrigation with 250 mL of the three solutions
- pH-measurements for the corneal surface and the aqueous humour.

3. EPIDEMIOLOGICAL RESULTS WITH THE USE OF PREVIN®
The Medical and Health and Safety Services of the Mannesmann and Martinswerk factories have introduced Previn® for the rinsing of chemical splashes. The previous protocol for the rinsing was water or specific neutralizing solution and did not achieve good neutralization in acid and basic pH allow a quasi polyvalent rinsing of chemical splashes with quick return to a physiological state. Previn® stops the penetration of the chemical product1,2. This is due to its hyperosmolarity. Three experiments were performed. The first one was performed to prove the compatibility of Previn's high osmolarity components with the human eye. The second experiment tested the neutralization-capacity of Previn® in vivo in rabbit eyes after alkali eye burn. In a third step, Previn®'s efficacy was tested in an epidemiological study.

Results: no SEQUELAE, no secondary care, no loss of work

A SERIE® OF 24 CHEMICAL SPLASHES
rinsed with Previn® in the MANNESMANN factory, in Germany, 1994-1998

Results : no DAMAGE, no secondary care, no loss of work excepted two accidents with one day lost from time

A STATISTICAL STUDY7 ABOUT 42 SODIUM HYDROXIDE (40-600 g/L) SPLASHES
rinsed with different rinsing solutions in the MARTINSWERK factory, Germany, 1991-1993

References
(2) Kuckelkorn-R, Schrage-N, Redbrade-C Deutsches Ärzteblatt 97 104-109
(6) hall-AH, Blomet-J, Mathieu-L oral presentation to the American Hygiene conference and Exhibition, 2000 may 19-26th, Orlando, US
(7) Oral presentation First International Congress Evolution of the Knowledge of Chemical burns 1997, Oct 16-17, La Baule, France

Conclusion
The emergency use of Previn® is efficient in decontamination of ocular and cutaneous splashes. It is innocuous to the human eye. Although, it is highly hyperosmolar to the cornea, it is very well tolerated. Neutralization of corrosives stops the biological damage. A reduction of time off work and secondary care in all cases is achieved, sequela are avoided.

Introduction
First aid in chemical splashes should consist in emergency rinsing of eye or skin to remove the corrosive substance and prevent its penetration to the tissues2. To achieve this, polyvalent binding and stopping of acid/basic/toxid-reductive reactions in the tissue is required. This study presents Previn® (German version of Diphotérine®) as an eye/skin decontamination solution. Its chemical3 and physical4 properties like chelation and neutralization in acid and basic pH allow a quasi polyvalent rinsing of chemical splashes with quick return to a physiological state. Previn® stops the penetration of the chemical product1,2. This is due to its hyperosmolarity. Three experiments were performed. The first one was performed to prove the compatibility of Previn's high osmolarity components with the human eye. The second experiment tested the neutralization-capacity of Previn® in vivo in rabbit eyes after alkali eye burn. In a third step, Previn®'s efficacy was tested in an epidemiological study.

Materials and methods
Previn® is a non toxic solution (Oral Toxicity LD50>2000 mg/kg, Test 990479 ST, CERB, France, 1999). It is not irritant on the eye (test 133/1, Safepharm Laboratories, UK, 1987) and non irritant on the skin (test 133/2, Safepharm Laboratories,UK, 1987).

Rinsing solution

<table>
<thead>
<tr>
<th>Material</th>
<th>Concentration (mOsmol/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>0</td>
</tr>
<tr>
<td>Mixture-acid</td>
<td>1.6%</td>
</tr>
<tr>
<td>Previn®</td>
<td>270</td>
</tr>
<tr>
<td>Healthy cornea</td>
<td>1.270</td>
</tr>
<tr>
<td>Burned cornea</td>
<td>1.270</td>
</tr>
</tbody>
</table>

pH titration with 10 mL NaOH/mL

<table>
<thead>
<tr>
<th>pH</th>
<th>pH titration with 10 mL Previn®</th>
<th>1 N acid or base</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>4.25±0.44</td>
<td>9.25±0.44</td>
</tr>
<tr>
<td>8</td>
<td>7.5±0.6</td>
<td>12.0±0.6</td>
</tr>
</tbody>
</table>

Results

1. INNOCIVITY5 OF PREVIN® IN HEALTHY HUMAN SUBJECTS
Visual acuity was diminished after irrigation with both kind of solution (2/5 and 3/5). It returned to normal after the third day after irrigation. Conjunctival hyperemia was significantly increased and pronounced after rinsing with phosphate buffer (2/5 against 0/5 for Previn®). Confocal microscopy showed an increased tear film and a number of wing cells in the epithelium after irrigation with both solution. This returned to normal after 3 days.

2. pH MEASUREMENTS IN VIVO
A pH-decrease was observed after the rinsing with Previn® and phosphate buffer. No statistical difference in the neutralization effect was measured for these solutions.

3. EPIDEMIOLOGICAL RESULTS

CASE REPORTS : corrosive splashes rinsed with Previn®

Previn® is innocuous to the human eye. Although, it is highly hyperosmolar to the cornea, it is very well tolerated. Neutralization of corrosives stops the biological damage. A reduction of time off work and secondary care in all cases is achieved, sequela are avoided.

A SERIES® OF 24 CHEMICAL SPLASHES rinsed with Previn® in the MANNESMANN factory, in Germany, 1994-1998

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Results : Using Previn® resulted in a noticable decrease in sick leave average and a standard deviation. No secondary care was necessary. There is a significant difference (p<0.05) between Previn® and water concerning secondary care and loss of work.