Acid induced injuries, comprehension of the lesions mechanism: the Sulfuric Acid Example

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Understand concentrated acid lesions to the skin, such as injuries induced by 98% sulfuric acid, using a simple efficient skin model.

MATERIALS & METHODS

- **Tested substance: 98% sulfuric acid** (from VWR RECTAPUR Ref. 20692)
- **Application of sulfuric acid:** deposit of 30 μL soaked on a disk of Ø 0.9 mm filter paper.
- **Preparation of the explants:** 39 explants (Ø 1 cm), prepared from abdominoplasty. Survival: BEM medium of Bio-EC at 37 °C in a wet atmosphere, enriched by 5% of CO₂.

RESULTS

- **Continuous exposure to Sulfuric Acid**

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<tr>
<th>Time of exposure</th>
<th>Histological lesions due to 95% H₂SO₄</th>
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| 25 seconds       | Strong alteration of Epidermis (suprabasal blisters at the base of Stratum Corneum and nuclear and cytoplasmic lysis of keratinocytes with acidophilic cytoplasm)  
In Papillary Dermis, weak alteration with lightly acidophilic cytoplasm |
| 3 minutes        | Epidermis and cellular structure of Papillary Dermis are altered in their entirety (Sharply acidophilic cytoplasm and pyknotic nuclei)  
Collagen hyalinization shows weak alteration in Papillary Dermis (near dermoepidermic junction) |
| 4 hours          | Strong alterations on Epidermis  
Net alteration of collagen hyalinization and cellular structures in Papillary Dermis and Upper Reticular Dermis  
Moderate alteration of cellular structures (acidophilic cells) in Lower Papillary Dermis |

After 25 seconds exposure to Sulfuric Acid

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<tr>
<th>Time of observation</th>
<th>Histological lesions due to 95% H₂SO₄</th>
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| 48 hours            | Strong alteration of Epidermis¹  
Weak alteration of Papillary Dermis² |
| 6 days              | Strong alteration of Epidermis¹  
Weak alteration of Papillary Dermis² |
| 11 days             | Strong alteration of Epidermis¹  
Weak alteration of Papillary Dermis² |

¹: suprabasal blisters at the base of Stratum Corneum and nuclear and cytoplasmic lysis of keratinocytes  
²: lightly acidophilic cytoplasm

No spontaneous healing with only a 25 seconds contact

CONCLUSION

- **Reproducible model**
- **Contamination study:**  
Apparition of the injury: < 25 s  
Upper Dermis affected within 3 min.  
Deep Dermis: delay of some hours before injury appearance
- **Spontaneous Healing:**  
None even with 25 s contact only.  
Explanation of the bad scarring in case of H₂SO₄ injuries
- **Decontamination:**  
Further studies with shorter contact time are needed to study the impact of decontamination with different solutions.