



### H115 Burn Injury: A Case Report and an Experimental Approach

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After attending this presentation, attendees will appreciate the possibility of a simple experimental setting in their day-to-day casework.

This presentation will impact the forensic science community by reporting the effect of a burn injury inflicted in an experimental situation to illustrate the mechanism of a real-world case.

Burn injuries can be difficult to assess in daily forensic casework. There are a few experimental studies suggesting temperature and time frames for different depths of burn injuries, but most studies do not explore etiology and causality, but treatment, and only to a lesser extent they contribute to medicolegal judgments.<sup>1</sup> For obvious ethical reasons, it is not possible to make systematic prospective studies of burn injuries on humans. When dealing with a forensic case involving burn injury, one seldom finds a study, or even case reports, with the same background parameters as a disputed case. Different types of skin (different parts of the body), different injurious materials, and different forces of the heat object are examples of parameters that may differ from those of the disputed case. In suspected child abuse, the assessment of the forensic expert often is one of only a few evidences presented in court, which puts the forensic expert in a difficult situation.

A suspected child abuse case raised the question of whether a dropped fork used as a spatula during panfrying could cause a patterned burn injury with clear, striped, reddened marks with flaky brown epidermis and scabs. The injury was examined by the local general practitioner, photographed, and subsequently sent to the forensic doctor for assessment.

To improve the conditions of an accurate assessment, an experiment mimicking the stated precondition was conducted. An iron frying pan was heated on an electric stove. Apple slices were fried in the pan together with a small amount of olive oil. A stainless steel fork was used as a spatula and, when not used, placed with the convex side of the claws against the bottom of the frying pan. The fork handle was never uncomfortably hot to hold. The subject, a healthy middle-aged female volunteer, exposed the underside of her left forearm to the heated fork, which was placed with a slight pressure immediately against the skin with the convex side of the fork claws (trial 1) for less than one second and later dropped three times with the claw downward from a height of 20cm (trials 2-4). The fork was reheated between the trials as described. Due to pain, the forearm was held under cold running water during several episodes the hour after the trial.

Touching the fork against the forearm (trial 1) resulted in a striped formation indicating pale blisters surrounded by diffuse redness. Dropping the fork on the skin resulted in an irregular diffuse redness (trial 2) and diffuse redness in striped formations (trials 3 and 4). The diffuse redness successively turned sharply demarcated and intensely red during the following hour. After two days, the injuries were still intensely red, sharply demarcated, and one of the blisters collapsed on day two and was replaced with a red scab. The epidermis in the reddened areas successively dried up, turned brown and cracked, the redness faded, and was no longer visible after five days except in the area around the scab (trial 1). Approximately seven days after the exposure, the brownish epidermis started to peel. Even four weeks after the trials, the pale brown discoloration was visible in the previously reddened areas and discrete scarring replaced the blisters and scabs.

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## Pathology/Biology - 2017

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In conclusion, taking only the shape and character of the wound into consideration, it was not possible to exclude the suggested cause of the event in this case. This simple experimental setting contributed widely to the conclusion.

### Reference(s):

1. Moritz A.R., Henriques F.C. Studies of Thermal Injury. II. The Relative Importance of Time and Surface Temperature in the Causation of Cutaneous Burn. *Am J Pathol.* 1947;23:695-720.

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### Burn Injury, Child Abuse, Experimental Setting