

RESEARCH HIGHLIGHT

Does corticosteroid affect the initial treatment of burns?

Research examines the complications behind corticosteroid's inflammatory responses and the factors influencing recovery

Japanese researchers has shared new insights into corticosteroid therapy in burn injury treatment with an investigation of inflammatory cytokines and inflammatory cell infiltrations, recently published in the inaugural issue of the journal *Trends in Immunotherapy*.

Burns cause serious trauma to the victims, with around 265,000 deaths every year from fire alone. According to the World Health Organization, skin or other organic tissue burns can be caused by heat, electricity, chemical-contact, radiation, and radioactivity. “Burn injury causes direct destruction of epidermal and dermal tissue and accompanying increases in inflammatory cell infiltration and cytokine expression, resulting in swelling, pain and fever known as the inflammatory triad,” according to researchers Dr. Naotaka Doi and his colleagues from Wakayama Medical University, Wakayama, Japan.

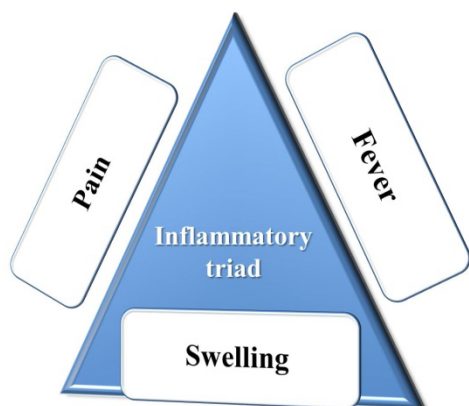
The National Institutes of Health reported that there have been remarkable improvements in the burn injury treatment as most hospitals have developed trauma teams which specialize in treating burn patients. According to Medical Encyclopedia of Medline Plus, there are three degrees of burns: first-degree burn, which is the superficial burn characterized by redness, pain, an absence of

blistering and minor swelling; second-degree burn, which is characterized by blistering; and third-degree burn, which is characterized by white or blackened burned skin and accompanied by numbness due to damages to the dermis and surrounding nerves.

Dr. Naotaka Doi and his colleagues reported in their research paper on an assessment of burn injury immunotherapy by using corticosteroid. “We aim to evaluate the effects of corticosteroid application on each grade of burn, and to clarify the underlying mechanisms of the effects, especially in its acute inflammatory phase,” they explained.

Corticosteroid is a common anti-inflammatory drug used for initial care of burn injury, and it is present in different forms including liquid, tablet, inhaler, lotion and cream, and corticosteroids are also used for treatment of asthma, hay fever, arthritis, sciatica, lupus, multiple sclerosis and other conditions. Dr. Doi and co-authors conducted in-depth immunological studies on the effect of corticosteroid ointment on burned mice models with regards to changes in the lesional mRNA expression of inflammatory cytokines and inflammatory cell infiltrations.

With approval from the Animals Care Committee of Wakayama Medical University, Dr. Doi and colleagues demonstrated the generation of experiment models of three different types of burns—epidermal burn, dermal burn and subcutaneous



Inflammation triad

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burn—by applying hot water with a cotton sponge on the mice models. Immediately afterwards, corticosteroid ointments were applied locally or systemically on the models. The authors then counted the number of infiltrating inflammatory cells and investigated the mRNA expression of cytokine level.

The authors observed decreasing inflammatory cells in the dermal burn model but increasing of inflammatory cells in the epidermal burn and subcutaneous burn models. The results of the experiment indicated that while corticosteroid application on burned skin does decrease inflammatory responses, it also induces more complicated responses which are dependent on the depth of burn injury, the method of steroid application and the period after burn.

“Our results suggested that the prolonged inflammation as an adverse effect of corticosteroid application on epidermal burn with least skin damage,” Dr. Doi and his co-authors described. “In spite of the decreased number of infiltrating inflammatory cells in the case of the dermal burn model, increased

expression of inflammatory cytokines was observed in most of the same species.”

They concluded, “The anti-inflammatory effects of corticosteroids are not simple inhibitory effects on inflammatory cell infiltration and cytokine production, but exert more complicated effects *in vivo*.” For further study, Dr. Doi and colleagues explained, “We will further research on different applications to determine precision of therapeutic effects of corticosteroids on wound healings and then elucidate the directions of usage of corticosteroids on burn injury treatment.”

To learn more, please refer to article entitled “[Acute-phase effects of single-time topical or systemic corticosteroid application immediately after hot water-induced burn injury of various grades](#)” which is authored by Naotaka Doi, Yumi Nakatani, Yutaka Inaba, Toshikazu Kondo, Fukumi Furukawa, and Nobuo Kanazawa on page 19 of *Trends in Immunotherapy*.

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