Finite element approach with unsteady bioheat equation for human skin burn injury

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The burn on the human skin may be caused by the contact of a hot plate, flame, water or in vehicle accidents. The recovery of the burn injury actually depends on the seriousness of the burn. It is important to understand the thermal behaviour of the human skin when subjected to heat injury.

In this research, a model of the human skin is developed where the unsteady state temperature distribution during the burn is simulated using the finite element method. Burning is applied via heating disk with constant temperature as well as constant heat flux. Burning with a hot flame is analysed. The Pennes bioheat equation is considered as a basic equation which represents the heat transfer through the biological tissue. The Crank-Nicolson method is used to solve the time discretization problem. A sensitivity analysis is carried out. The effect of different skin parameters, properties of cooling medium, duration of the burn on the temperature distribution is studied. The seriousness of the burn injury may differ from a minor first degree burn to a sever third degree burn. The burn which depends on the temperature also is measured. The outcome of this research may help the physician in the treatment of burn injury.

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