Pain and physiology of cold
The main physiological effects of the application of cold are the following: analgesia, decrease in metabolism, vascular response

ANALGESIA

- The application of cold at repeated intervals leads to an analgesic effect on the parts of the body treated (1-8). It has been demonstrated that nerve conduction decreases constantly with a decrease in temperature until conduction within the nerve fibers ceases completely. The myelinated fibers are the first ones to be affected (9). This slowing of the conductivity of the peripheral nerve fibers is found when the temperature drops to below 80.6°F (10). Other mechanisms are also involved: cold has a specific 'anti-irritant' function that protects from pain stimulus (11-13). Cold can also remove the causes of pain by reducing muscle spasm of the traumatized area, thus reducing the effects of ischemia secondary to the trauma (14).

[RÉFÉRENCES]

DECREASE IN METABOLISM

- Recent studies have suggested that the decrease in inflammatory response due to hypometabolism is just as important as vascular response in limiting the extension of the trauma (15). The description of the time needed for change in muscle tissue caused by the trauma (16), shows that the damage in terms of the muscle fibers reaches its maximum during the first two hours after the trauma, whereas cell damage and cell death continue to occur over the next 22 hours. Other studies have shown that metabolic enzyme activity decreases by 50% when temperature is lowered by 50°F (17-18). In a study with experimental model, the beneficial effects of cold on inflammatory response are explained (15): the decrease in enzyme activity allows the cells of the area damaged by the trauma to survive with low oxygen supply. The inflammatory response is caused by the content of the damaged cells, inflammatory mediators increase the permeability of the capillary walls, one of the reasons why edema develop. Also, the intra-cellular proteins are released from the damaged cells, thus favoring an increase in osmotic pressure in the extracellular space (19). This extracellular pressure can lead to compression of the capillaries, causing hypoxia leading to the death of other cells, thus creating a vicious circle.

[RÉFÉRENCES]


VASCULAR RESPONSER

- The physiology of vascular response to cold is complex. Six factors or mechanisms can account for the complexity of the vascular response. These are: neuron activity, mechanical receptors, contractile elements of the smooth muscle, platelet activity, the endothelial mechanisms and rheological factors (19). Several studies have shown a decrease in peripheral blood flow caused by different methods of application of cold (20-31). The reasons put forward to explain this decrease in blood flow are vasoconstriction caused by the sympathetic nervous system reflex and the affinity caused by the cold of the postjunctional alpha-2 receptors of the vessel walls (32). The result of the two factors referred to above is a reduction in the activity of the noradrenaline enzymatic metabolites, an increase in blood viscosity, the activation of the platelet aggregates that release 5HT and thromboxane A2.

[RÉFÉRENCES]


CONCLUSION

Cryotherapy has proven its efficacy in the treatment of pain after surgical intervention and after trauma, by a decrease in the conduction of nociceptive nerve inflow and by an increase in the pain sensitivity threshold. The application of cold significantly decreases post-surgical and post-trauma inflammatory reaction and edema.