

How Heat Relieves Pain.

Preliminary observations:

There are three sets of nerves in the body—motor, sensory and sympathetic.

To perceive a sensation we must have: First, a stimulation to a sensory nerve; second, an unimpaired nerve; and third, a nerve centre in the brain. As Kirke puts it, we must have under ordinary circumstances,

(a) A peripheral organ (or nerve endings) for the reception of the impression.

(b) A nerve for conducting the impression; and

(c) A nerve center for feeling or perceiving it.

Sensations are, first, common, and second, special.

Common sensations are fatigue, discomfort, faintness, hunger, thirst, etc. Special sensations are touch, taste, smell, hearing, sight. So much for the mechanism of pain.

The following phenomena are observed when heat is applied to the body; that is, in therapeutic quantities or degrees: Redness of the skin, increase of local blood supply (hyperaemia), swelling, increased activity of the sweat glands, and a feeling of discomfort or comfort according to the local or general conditions of the body.

What is pain? Physiologists take three (3) views:

First, that pain is a special sensation provided with a special conducting apparatus in each part of the body; second, that it is produced by overstimulation of the special nerves concerned with touch or temperature, or special sensation; third, that it is an overstimulation of the nerves of common sensation, which tell us of the conditions of our bodies and organs.

A special apparatus is not necessary for the sensation of pain, since this results from overstimulation of any sensory nerve; nevertheless, nerves may be so acted on that they convey sensation of touch and suppress those of heat, as in syringomyelia. The probability is, therefore, that the sensory nerves contain special fibres for common and special sensation. It is to be noted that our sensations of heat and cold are very fallacious; all that we can tell is that a given object is hotter or colder than the skin, and this latter varies from hour to hour.

Thus far we have established from the known facts of physiology:

First. The Nature of Pain.—Pain is a sensation, common or special, produced by irritation of sensory nerves or other endings in the skin, conveyed to the brain by these nerves, or special fibres of them, and perceived by nerve centres in the brain.

Second. The phenomena of heat applied to the body in therapeutic amounts, viz: Redness of skin, increase of local with a corresponding fall of general blood pressure, or supply, or swelling, increased activity of sweat glands, a general feeling of comfort, or the reverse, according to circumstances.

It now remains to connect these two sets of observations and furnish a reason why one reacts on the other.

But returning to our consideration of the cause of pain, clinical observation establishes the fact that there are two ways by which pain arises in the body (independent of external stimuli). One great cause is undue pressure either on the nerve endings or on its trunk. It is a furnished fact that tumors pressing on nerve trunks cause severe and constant pain; nerve fibres caught in hardening scar tissue give rise to painful sensations.

Another way is by congestion or inflammation, which really amounts to pressure. An inquiry into the nature of congestion would be profitable here, but we will keep to our theme, and simply take it as proven that congestion is a stasis of the

blood in a given part of the body, whether it be in the skin, muscles, lungs or other glands of the body.

How does this congestion cause pain? First by direct pressure. The delicate nerve endings are caught and pressed upon by the engorged tissue in which they lie. Second, by poisoning.

A nerve trunk or fibre which has its normal blood supply diminished or cut off, or its oxygen diminished, suffers in the same way that the whole organism does when breathing is suspended. The nerve fibre then becomes poisoned and therefore chemically as well as mechanically irritated.

Reverting to our proposition that irritation of a sensory nerve produces pain, we have now established the connection between pain and congestion.

Now the final step will be to establish a connection between congestion and the phenomena of heat therapeutically applied. We found that heat increased the flow of blood on the one hand, and engendered local depletion (sweating) on the other. That is to say, congestion is relieved by, first, bringing a fresh supply of blood to the part; second, by withdrawing a certain amount of fluid from the affected area; third, by relieving tension on the nerve endings by temporary increased relaxation of the tissue or swelling. So that we have our irritated nerves fed with new, fresh food and relieved from pressure and poisonous absorption with a consequent return to normal and relief of the morbid sensation of pain. And as soon as the parts return to their normal circulation, the temporary swelling goes down.

The deeper seated pains are similar in their origin, but are relieved reflexly or indirectly. A dull pain over the lungs or pleura may be relieved by the application of heat, which acts by withdrawing a certain amount of sluggish blood to the surface, thus relieving the congestion. It also acts by stimulating the nerve supply reflexly, giving tone to the paralyzed arterial wall and squeezing out the excess blood in this way.

The whole subject of reflex pains and their relief might be gone into. But I will not dwell or take up your time with it, as the general mechanism is the same all over. It would involve a study of the sympathetic system of nerves, their control of the arteries and circulation in general and their connection with the motor and sensory sets of nerves, and which is altogether too big a subject for us to handle in a short paper.

This paper refers simply to heat as an agent for the relief of pain. But as you all know, the indications for the use of heat and cold are quite distinct and different. Cold may be used early in an inflammation to relieve pain and prevent exudation. It benumbs or anesthetizes the nerve endings, contracts the blood vessels, and thus prevents many of the phenomena of inflammation. After exudation has occurred, however, heat is better, since as we said before, it depletes the tissue, stimulates the circulation and therefore absorption of inflammatory exudates and hastens resolution.

For example, the treatment of a sprain is immediate rest, elevation of the part and applications of cold in the form of iced cloths or pack; in order to prevent the rush of blood to the part with consequent swelling and pain. Here pain is relieved simply by rest to the torn or stretched tendon. But if early treatment is neglected and swelling and inflammation, etc., have already taken place, heat will hasten resolution and relieve the symptoms.

Show me a misogynist and I'll show you a man with some woman's scornful or tender face pyrographed upon his heart!—William Reedy.

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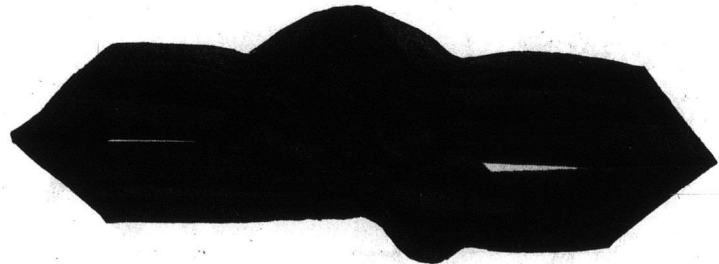


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