

ACUSCEN & PAIN

There are primarily two main types of pain

Acute pain lasts for a short time. When the cause is treated the pain goes away.

Chronic pain does not usually go away and is experienced most days of the week for at least three months. Tests may not find an explanation for the pain. This does not mean that chronic pain is not real. The nervous system, which sends pain signals, may have become disturbed. The pain itself, however it began, has become the problem.

Chronic Pain

Chronic pain results when nerve signal propagation is reduced between adjacent nerve cells due to insufficient oxygen being available to support nerve cell metabolism. This is responsible for 90% of all chronic pain cases. The remaining 10% is caused by physical trauma. Thus it appears that the main precipitating factor for chronic pain is hypoxia and demineralisation of the synaptic fluid which creates shrinkage of the nerve cells, which widens the gap between these cells, making it more difficult for normal sensations to propagate, and loss of electrical conductivity in the synaptic fluid itself.

A temporary hypoxia of nerve tissue can be traced to most causes of chronic pain. The primary negative effects of this hypoxia are:

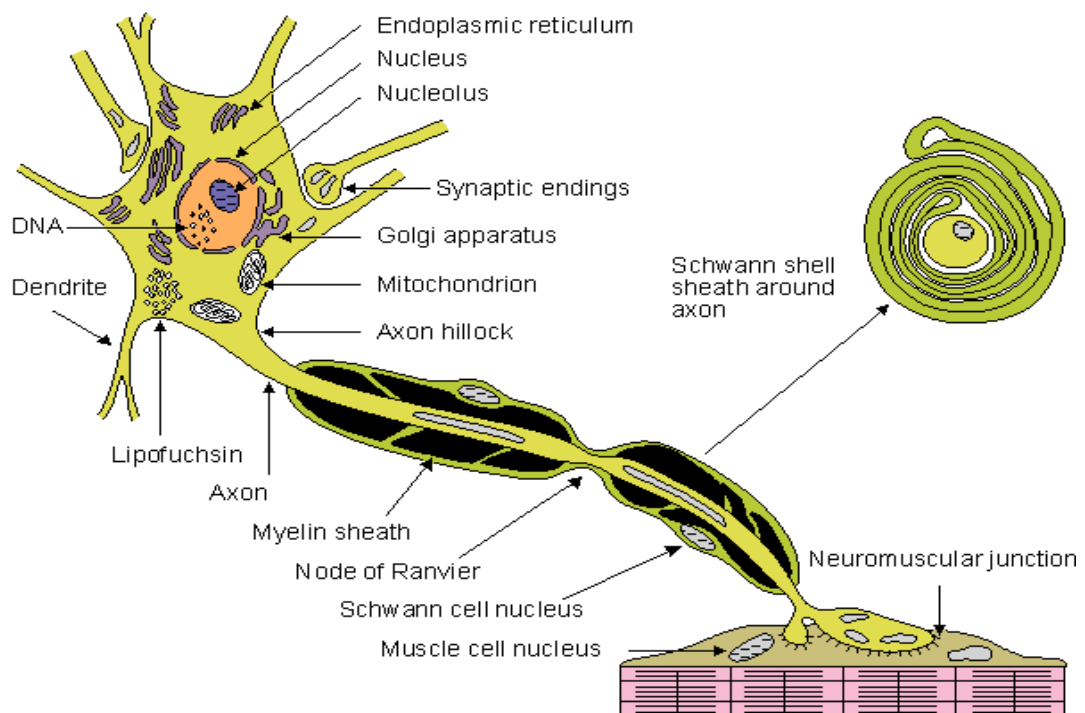
A defensive contraction of the nerve cell resulting in oversized synaptic junctions

A loss of electrical conductivity of the synaptic fluid between nerve cells

A defensive change in the electrical potentials of the cell membrane resulting in a higher resting state of the trigger level which effectively limits the sensitivity to incoming signals

For example, when the lumbar area experiences a muscle spasm, blood flow is restricted through that muscle resulting in reduced oxygen availability to the surrounding tissue, including nerve cells. Because muscles can use either oxygen or glucose metabolic pathways, they can recover quickly from a temporary reduction in the level of available oxygen. Nerve cells, on the other hand, are limited to the Krebs oxidative reductive metabolic system and must take immediate defensive steps to assure survival during this hypo oxygen state. One of the ways they accomplish this is to contract along their longitudinal axis like a rubber band, reducing their surface area and thus lowering their need for oxygen. (This also occurs when a harsh agent in the blood such as chemotherapeutic drugs, environmental toxins, insecticides, etc attacks these cells.) The synaptic junctions between the axons of one nerve cell and the dendrites of the next nerve cell widen. Normal nerve transmission is now compromised because a nerve signal of normal intensity cannot jump this newly widened gap. The synaptic fluid between the nerve cells must be electrically conductive. Pure water does not conduct electricity, so this conductivity relies on minerals and specific neurotransmitters such as serotonin in the synaptic fluid to enable the propagation of the nerve signal.

These minerals are delivered via the perfusion of adjacent tissues with fresh blood and kept in suspension by the periodic ionization of successfully transmitted nerve signals across the junction. When nerve signals are reduced because of these larger dimensions of the synaptic junction, necessary minerals are no longer held in place by electrical tension and are slowly leached out. This adds to the impairment of effective nerve transmission.



A common short-term remedy, with prescription drugs, only palliates the pain temporarily and does little or nothing to mitigate or cure the underlying condition. They may provide some level of temporary relief, but as the disease progresses, the effective dosage of the drug needed, to continue suppressing the pain, increases concurrently. The side effects of these types of drugs are difficult to deal with and add to the patient's discomfort. When the increased drug dosage reaches a threshold level, the patient can become confused, ataxic, constipated, confined to a wheelchair or may become bedridden. Symptoms similar to Alzheimer's may soon follow.

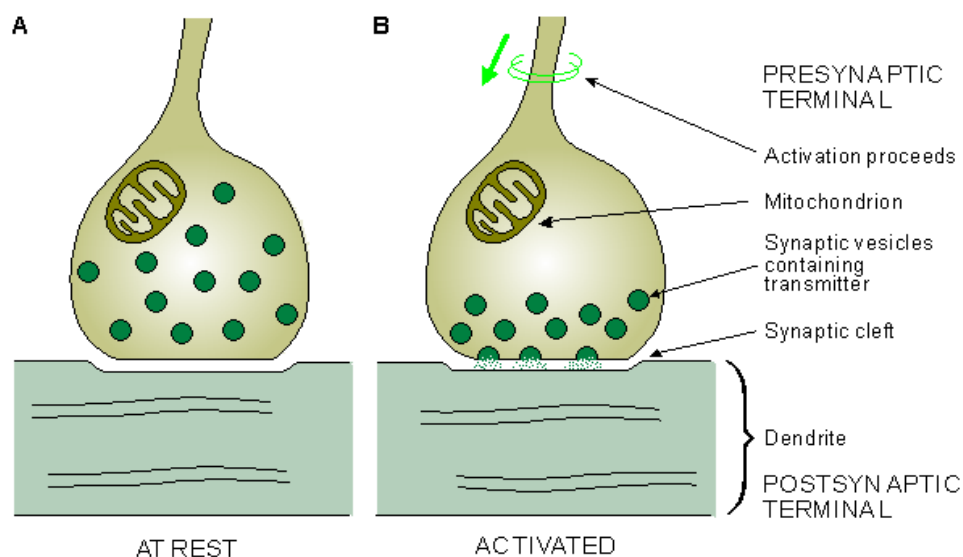
When nerve signals can no longer jump the enlarged synaptic gap, the electrical tension that normally holds these minerals in place is absent, causing the synaptic fluid to leach out its mineral content. Electrical conductivity is reduced, thereby inhibiting the transmission of the normal nerves' electrical signals across this gap.

Causes of Chronic Pain

Trauma: Actual trauma is one of the major causes of chronic pain, and results when the myelin sheath is cut or etched away by chemotherapeutic agents, environmental toxins, poorly performed injections, or from amputations and accidents. Removing the cause as in drug therapy, chemotherapy, physical entrapment, and environmental poisons must obviously mitigate traumatic causes. Permanent tissue damage may be beyond the scope of any therapy. When these conditions are removed, the AcuScen may be a helpful adjunctive therapy in the healing process.

Diabetes: Diabetes can also trigger chronic pain by affecting the levels of glucose and/or insulin in the blood stream. When this occurs, minerals are driven out of the fluid in the synaptic junction thereby reducing conductivity and impairing nerve impulse transmission. Nerve signals propagate from the cell body unidirectional over the synapse, first along the axon and then across the synapse to the next nerve or muscle cell. The synaptic cleft, the gap between pre-synaptic terminal and postsynaptic terminal, has a thickness of 10 – 50 nm. The fact that the impulse transfers across the synapse only in one direction, from the pre-synaptic terminal to the postsynaptic terminal, is due to the difference in electrical polarity between the sending axon and the receiving dendrite. The AcuScen's effect may be that it resets the relative potential in each gap properly so that it forces the signal to jump correctly, always toward the central nervous system and not jump the wrong way, perhaps to a sending axon that can lead to the periphery.

Simplified illustration of the anatomy of the synapse



(A) At rest synaptic vesicles.

(B) Activated synaptic vesicles (when activation reaches the presynaptic terminal, electrical signals jump across the synaptic cleft to activate the postsynaptic terminal).

As a result of hypoxic cellular atrophy, nerve signals must now try to jump a larger gap through a less conductive medium. This loss of nerve transmission is first perceived as tingling, then burning, and finally as pain when the demineralisation and gap widening process progresses. The initial perception associated with atrophied nerves and an enlarged synaptic gap is tingling, as some of the normal signals are misdirected to nearby nerves. As the condition progresses, it happens more often until more signals are miss-directed than properly propagated, and the resulting sensation is one of pain. Finally, after the nerve signals can no longer be transmitted at all, numbness is the primary complaint. This secondary effect of chronic pain reduces the strength of the muscles, which, in turn, reduces the blood flow to the extremities. This condition often results in poor tissue perfusion.

Electro Stimulation of tissues

The AcuScen signals have a slightly different waveform, with a smaller voltage. Tissues are most responsive to this waveform, overcoming any residual inflammatory or oedematous resistance to blood flow, causing a complete relaxation of the muscles between each contraction stimulus. In order for the venous pressure to move the blood through the muscles, bringing oxygen and nutrients and taking away accumulated lactic acid and other accumulated toxins. It is not the contraction but primarily the time interval between the contractions that contribute to the increased perfusion of blood through the oxygen starved tissue. Blood flow is increased with mineral enriched blood, which results in a flushing of metabolic by-products. This not only offers relief of pain from the build up of excessive toxins, but it also triggers the creation of new tissues. The synaptic junctions, bathed with this mineral rich blood, are now able to permanently conduct the nerves signals more effectively and efficiently.

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