Concord Orthopaedics, P.A.

PART II: WHY DO YOU HURT?

What is Pain?

Pain is a very complicated phenomenon which has two major aspects, ***nociception*** and ***suffering***. Each of these is subject to great individual variability, something we refer to as ***pain tolerance***. We understand that pain tolerance varies not only from person to person, but also varies within an individual depending on the circumstances in which the pain occurs. It is important that we make no value judgment on the complaint of pain.

Nociception is defined as the nervous system's response to tissue injury. When an injury occurs, chemicals, called ***algogenic substances*** are released. There are dozens of these chemicals. The net effect of their action is to stimulate a nerve ending called a "c-fiber." C-fibers which respond to pain are referred to as "silent nociceptors." Unlike most nerves in our bodies, these nerves are not constantly active. They have a "high threshold," which means it takes a lot of input to stimulate them. When these nerve endings are constantly stimulated by algogenic substances, their threshold to fire is lowered. This is referred to as ***peripheral sensitization.*** Once sensitized, the pain tolerance of that nerve ending is lowered.

The c-fiber, once stimulated, carries a nerve impulse to the spinal cord where it enters a relay area called the dorsal horn. Dozens of inputs from various parts of the body which share spinal nerve supply with the injured area converge on this area. This is the basis for ***referred pain.*** If a pain input is substantial enough, we can feel it in any area which shares the same nerve supply. This is why back pain can radiate down the leg. Organs which share the same nerve supply may also be affected. For example, thoracic disc injury can cause stomach upset, or lumbar disc injury can cause bladder problems. Low cervical disc injury can feel like a heart attack.

Once a signal reaches the dorsal horn, it may be suppressed, maintained, or amplified. We truly do not understand why in an individual circumstance the dorsal horn reacts in a particular way. If the response is suppressed, we feel nothing or only short term pain. If it is maintained, the pain persists at a specific level. If it is amplified, we develop accelerating and persistent (chronic) pain. If the dorsal horn is barraged with c-fiber input, it also becomes sensitized. This is referred to as ***central sensitization.*** When this happens, the pain tolerance for the parts of the body which share that spinal nerve input is lowered. When this happens, the dorsal horn sends neural signals back to the injured tissue, where it releases algogenic substances in the injured area and other areas which share the same nerve supply. In effect, this "fans the fire" of pain, aggravating inflammation in the injured area, and also causing it to spread to other areas. This is referred to as a "vicious cycle," something which becomes increasingly difficult to treat as it progresses.

This process of sensitization also occurs at various levels of the brain. Unfortunately, we do not understand why the nervous system chooses to react as it does, and we have limited understanding of how these processes work at the brain level. This is why persistent pain is so difficult to diagnose and treat.

Nociception creates ***suffering***. Suffering is the global psychological, emotional, functional and social response of the individual to nociception. This particular response is unique to each individual, and is dependent on many factors such as the perceived meaning of the pain, the setting in which occurs, past experiences with pain, etc.

[Over]

Why do you hurt? (continued)

Needless to say, persistent pain is much more complicated than a simple ñoff-onò switch. While consistently effective treatments are lacking, we do know that in managing pain, we need to address all aspects of the pain. Nociceptive treatments need to address central and peripheral aspects of pain. Treatments directed at suffering need to address the unique biological, psychological, functional, and social aspects of the individual. There is no ñmagic bullet.ò Cortisone injections have a role, but only as a part of a global strategy.

Fortunately, this sensitization process, and the vicious cycle of persistent pain is the exception, not the rule. More often than not, a persistent pain signal is not generated. If it is, it is often suppressed by the dorsal horn. Pain only occurs if the nervous system reacts. In most cases, it does not. That is why degeneration of the spine and other joints and, even herniation of discs, are usually not painful. Why the body chooses to respond at some times and not at others is a mystery.

While all injuries result in a change in body structure, when they produce pain, they also change the way the pain system functions. The role of the acute pain system is to alert us to this change. This is a helpful signal which tells us to change our behaviors so we may allow our body to fix the problem. Persistent pain is a signal ñgone awry.ò It serves no useful purpose. The goal of therapy, then, is to suppress this signal. If one likens the sensitivity of the pain system to a thermostat (a ñpain-statò), the goal is to turn the ñpain-statòback to normal. That is the role of cortisone.

Traditionally, treatment of pain has focused on ñfixingòthe structural problem. In reality, once damage occurs, we never really fix it. While some structural solutions are effective, many are not. The problem may not be in the structure, but, rather in the ñwiring,òwhich is the pain system. That is why treatments which address the pain system are not ñband-aids.ò Rather, they directly address the issue which causes the persistence of the pain.

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