PAIN and the ADAM BOMB

PATRICIA L. SPECK, D.V.M.
64575 Siverly Creek Road
McArthur, OH 45651

KEY WORDS:

central nervous system (CNS)
communication network
ion transport
threshold
habituation
nonequivalence of neuronal specificity
gated channels
glial cells
myelin
voltage potential
facilitation
axon
dendrites
nociceptors
atsab
rah
hebel
chiyl

ABSTRACT

Pain is an inescapable part of life. The Creationism paradigm, must include an understanding of the "Adam Bomb" of pain. Pain perception is a created sensory attribute. The nervous system evinces supernatural design with a complex structure and function. An irreducible, complex relationship exists between the nervous system and the other tissues and organs in the body. The sensory pathways of pain, with all the attributes of the nervous system, are unique. God endowed humans with pain perception so they might enjoy life in a universe with electrical, magnetic, heat and gravitational energies. Even though the natural forces in the universe are gradually decaying, God-created controls can offset the chaos caused by pain. Humanity causes much of its own pain and sorrow by its foolish ideas, selfishness, greed, and lack of self-control.

The Bible contains many words for pain. The Hebrew word, *atsab*, found in the first chapters of Genesis, depicts grief and sorrow. The Book of Genesis relates many human-to-human and God-to-human relationships. Bible study reveals that the original "Adam Bomb" was an awareness of mankind's conflict with God, inspired by selfish motives and severing the relationship between humans and God. All humans create "Adam Bombs" by their failure to understand their human nature and their value to God, and their failure to seek a relationship with God.

INTRODUCTION

Pain has been a part of human existence throughout history. No culture records any time without pain and no culture regards pain with joy. Cultural bias defines pain and provides coping strategies, often seeing pain as either a "whim of the gods" or as proof of the gods' displeasure with human sin, misbehavior or waywardness. Pain is regarded by some cultures as inevitable, with relief only by death or psychological separation from the physical world through meditation. In these cultures, pain is seen as a condition to be overcome by eliminating evil thoughts or actions, and striving for spiritual purity. Christian culture regards pain as punishment. Priests, nuns and friars in the early Catholic Church inflicted pain on themselves in the belief that by punishing themselves for sin they made themselves

more acceptable to God.

Current Western thought regards pain as an evil force to be destroyed. Technology and so-called naturalism determine Westerners' perspectives regarding what is valuable and true. These cultures live in a human-engineered environment and have very limited knowledge of the natural world. They want technology to solve all their problems. Western culture's strategy is to avoid pain at all cost. Consumers in Western cultures buy, at great cost, enormous amounts of medications that numb the brain or the peripheral nerves. They give little regard for the effect these have on the physiology of the nerves, the individual's general health, or the environment. This unworkable remedy has created a culture with a poor understanding of pain, poor coping strategies, and antisocial attitudes.

THE NERVOUS SYSTEM IS A COMPLEX NETWORK OF INTERACTING COMPONENTS

The design of the nervous system shows evidence of supernatural design. God created the human body according to the biotic law. The cells of the nervous system are unique, complex and irreducibly interactive with other cells and tissues. Specialized nerve cells called nociceptors provide pain perception. According to the biotic law, such conditions imply a creator. Pain, therefore, is a created gift from God.

The nervous system consists of the central nervous system, including the brain and spinal cord, and a maze of peripheral neurons linked to every tissue and organ in the body via a complex communication network. It provides information about what is happening in the body and in the outside environment. Sensory information from remote peripheral terminals transfers to the intermediate neurons in the spinal cord. From here, signals go out to other spinal cord pathways that lead to the brain or back to the peripheral regions. Central neural pathways provide a check and balance for signals, ignoring some in favor of others. This phenomenon is significant in the transmission of painful stimuli. It provides a feedback system allowing other signals to override those of pain.

Medical research teams mapped neural pathways in the brain and spinal cord and divided them into precise regions related to function. These various regions connect to make up a complex system of interneurons. Pain signals from individual neurons have little meaning without interaction with surrounding tissues and interpretation by the brain. The brain sorts, interprets, stores and responds to these signals, though isolated in a dark prison with no direct knowledge of the outside environment. The brain's metabolic environment changes very little, nor does it move or feel pain. It receives all signals equally and interprets them. The result is what humans perceive and is their consciousness.

THE ANATOMY OF A NEURON

All neurons share certain anatomical features. Every neuron consists of a cell body, several short dendrites, and usually one long axon. The many-branched dendrites of one neuron can receive up to I 00,000 signals from the axons of other neurons. Each axon branches at its peripheral end so it can send impulses simultaneously to many target cells.

The cell body contains numerous ribosomes crowded together within the cytoplasm, either alone or attached to the endoplasmic reticulum. Because of the elongated structure of neurons, there is a high ratio of cytoplasm to DNA. All cellular activities take place in the cell body, from which materials are sent to the terminal portions of the neuron through microtubules, neurofilaments and actin filaments. These transport organelles make up most of the axon structure. Materials sent out from the cell body go by either slow or rapid axonal transport. Rapid axonal transport occurs in both antegrade and retrograde directions, which balance each other.

Neurons send and process electrical signals. Specialized glial cells form an insulating layer around the neuron, reducing axon membrane capacitance and preventing current leakage. In the peripheral nervous system the plasma membrane of a single glial cell, called a Schwann Cell, wraps around an axon in many layers. A single Schwann cell forms a sheath about 1 mm long with one to three hundred tightly-compacted, concentric rings. The .5µm space between one Schwann Cell and the adjoining one is called a Node of Ranvier. Here, the electrical activity takes place.

The space at the peripheral end of an axon is called a synapse. This space isolates cells electrically from each other. The electrical signal moves indirectly from the presynaptic cell to the postsynaptic cell. A change in the electric potential of the presynaptic cell membrane triggers the release by exocytosis of

a neurotransmitter. This is a specialized chemical assembled in the cell body and transported to the synapse where it is stored in membrane-bound vesicles. The neurotransmitter diffuses across the synaptic space and stimulates an electrical charge in the cell membrane of the postsynaptic cell.

Sensory neurons terminate within various tissues such as epithelium, various organs, or muscle. Depending on the function of the neuron, terminals may be free or encapsulated, coiled or straight, branched or unbranched. Sensory neurons vary in their threshold of firing. Terminals of tactile neurons are thinly myelinated and constructed to sense light pressure in either a vertical or tangential plane, depending on the shape of the terminal. Specific neurons respond to gentle heat or cooling, and gentle pressure. Each of these neuron types possesses a definitive kind of terminal. Nociceptors possess unmyelinated terminals and have high thresholds of firing.

Neural development follows specific distinctive pathways according to the type of neuron, and the specific positional and chemical characteristics of the target tissue. This we call nonequivalence of neuronal specificity. Axons and dendrites grow outward from the cell body along precisely specified routes by means of a growth cone. The cell body produces and assembles the components for nerve growth and transports them through microtubules to the growth cone at the peripheral tip of the growing neuron. Microspikes project out from the growth cone, attracted by specific adhesion factors and electric fields in the area through which they grow by design. Signals sent out from the target tissue also attract axons destined to innervate them. After the first axon forms a path to the target tissue, other axons follow the same route forming a bundle called a fascicle. Each individual axon in a fascicle is wrapped in its own myelin sheath. Most growth occurs during the embryonic stage but even mature neurons grow and retract. After injury, the target tissue secretes a sprouting factor that stimulates new neuronal growth from surviving axons to denervated target cells.

NEUROPHYSIOLOGY: A PRECISELY-DESIGNED ROLE, SPECIFICALLY FOR THE CHARACTERISTICS OF NEURONS

The task of neurons is to provide communication between cells a great distance apart. Most neurons, therefore, are comparatively long. The long axons of these neurons generate electrical signals and pass them to other neurons or to specific target cells. Myelin sheaths prevent scatter or loss of electrical signals. Without this feature, neuronal activity would be chaotic. The form of nerve signals is the same despite the significance of the signals. A change in the action potential of the plasma membrane at a nerve terminal or synapse generates an electrical impulse. This impulse is carried along the neuron by waves of electrical change in the plasma membrane. This wave is passive in short neurons, but in long neurons the potential is sustained by automatic amplification. The flow of ions across the cell membrane changes the membrane potential in an orderly and regulated manner, much like the opening and closing of a gate; hence, they are named "gated ion channels." When membranes depolarize beyond the threshold value specific for each neuron type, voltage-gated Na^{+} or Ca^{++} channels open, causing an influx of ion, until the membrane again reaches equilibrium. At this point, the gates revert to inactive, or closed; and, in some cases, voltage-gated W channels open, driving the ion balance back to the initial level. At synapses, neurotransmitters carry the electrical impulse. These neurotransmitters are specialized enzymes assembled at the cell body and transported to the synapses. Upon arrival of the electrical signal, the neurotransmitter, released from the synaptic cell membrane by exocytosis, carries the charge in chemical form across the synapse. In the post- synaptic neuromembrane it is again converted into an electrical signal and sent along the membrane of that neuron.

All neurons have the same basic anatomy and physiology. Differences are categorized according to thousands of variables; such as the type of ion gate, the length of axon and dendrites, the amount and thickness of myelin, the number of axons in a fascicle, the type of nerve ending, and the number and type of inter-connecting neurons. When injury occurs, the first impulses to reach the central nervous system are low threshold pulses. These inhibit pain. Next, high threshold neurons activate, causing intense and long-lasting pain. The CNS receives a large quantity of impulses from the area of injury and all other regions of the body. The brain responds according to its programming from past experiences, state of excitability, and interaction of current signals. Since each of us has a unique history, we do not feel pain the same way.

This makes pain basically a lonely experience.

A SAMPLE OF NEURAL ACTIVITY FOLLOWING INJURY (See figure 1)

Immediately following injury, low level electrical stimulation creates an intense action potential in large myelinated fibers. These fibers do not transmit a sensation of pain- rather, they send signals inhibiting pain. With more intense stimulation, smaller myelinated fibers fire, then facilitation replaces inhibition. Pain messages travel to the brain along the Ca^{++} gates of the neuron cell membrane. Ion leakage from the injured tissue travels slowly into the surrounding area. This activates unmyelinated fibers to send information about the metabolic status of the tissue. After the initial injury, during the healing stage, stimulated low threshold sensory neurons fire with quick bursts, then quickly return to normal. These serve as a warning to avoid further injury to the tissue. High threshold neurons respond slowly to stimulation. Some become more sensitive and fire at lower thresholds, causing hypersensitization. Others become less sensitive. Signals from neurons in the area of injury, as well as other peripheral areas, and those descending from the brain, interact and combine. Some inhibit and some facilitate the pain signal. How a human perceives the pain depends on the individual's state of consciousness, whether or not the person is distracted or paying attention, apprehensive or accepting.

THE CURSE OF PAINLESSNESS

Pain is regarded as the great enemy of happiness. Yet to live without pain is a curse.

Frank Vertosick [9, pp. 185,186] tells about a Puerto Rican man named Ricardo who contracted syphilis as a young adult. When he reached middle age, the bacterium attacked his peripheral nervous system, resulting in loss of sensation in his feet and legs. He felt no pain when he pierced his foot with a nail. Instead he thought he had a stone in his shoe. As the disease progressed he lost all sensation in his legs and could not walk unless he riveted his attention on their position. His ankles swelled and deformed because he could not judge his legs' position relative to the surface on which he was walking. Without the perception of pain, he became a severely handicapped man.

Paul Brand [12] p.4-5 gives the following illustration: a child named Tanya was born with congenital painlessness. When only a toddler, she chewed off the tips of her fingers and happily used her own blood to fingerpaint on the floor. This horrified her parents for they could not stop the behavior. Tanya learned to use shock to get what she wanted. She had no instinct toward self-preservation. She often tore off protective plaster casts. By age eleven, her legs had been amputated, her tongue was severely lacerated, and chronic infections invaded her arms and legs. Her father could not cope with the trauma of raising such a child. Declaring they had created a monster, he abandoned the family. Brand observed that people afflicted with congenital painlessness seldom live very long, so it was not surprising Tanya died in an institution soon after.

Paul Brand [2], an orthopedic surgeon in India and later in the United States, became an expert in understanding and treating patients with leprosy. He defined leprosy as an affliction of painlessness. He maintained that leprosy disfigurements are avoidable secondary trauma brought on by lack of pain perception. Leprosy destroys nerve endings through ischemia. It affects certain facial nerves, the lower median nerve, the ulnar nerve, and the lower branches of the plantar and sciatic nerves. Patients with leprosy are unaware of the damage caused by adverse activities or even common, every-day activities. Conversely, with an intact nervous system, a person subconsciously alters gait and balance so no single area of the foot receives too much pressure. Patients with leprosy fail to do this. If pressure is not relieved periodically, pressure sores form with any activity. People afflicted with leprosy are not aware of stepping on uneven pavement. They are indifferent to walking on an injured foot. One such man ran to be first in line at a health clinic. Upon examination, Dr. Brand noted that the man's tibia protruded from the skin.

After spending some time in Dr. Brand's leprosy sanatorium in India, a young man wanted to return home. During his first night there, he suffered injury to his hands because rats chewed on his fingers as he slept. His inability to avoid injury devastated him. He tried to stay awake, but exhaustion overcame him and he awoke with new injuries. Dr. Brand said this man claimed to suffer in his heart because he could not suffer in his body.

PAIN EXHIBITS SOME UNIQUE FEATURES

Pain is a unique sensory perception. Most sensory neurons habituate with steady stimulation – pain neurons do not. Humans can share a visual image with others; pain cannot be shared. On the other hand, there is a question whether one's sympathetic pain is real or imagined. One feels pain only in the mind. The brain treats all incoming signals impartially. Yet, humans are capable of consciously ignoring even the most excruciating pain. Pain, when it reaches one's conscious thought, takes precedence over everything else, demanding to be heard, but humans tolerate intense pain if the activity or consequence is sufficiently rewarding. Pain screams for attention; yet when it is quieted, it quickly escapes one's memory.

Paul Brand [2 p. 40] tells this story: on the battlefield, enemy artillery fire shattered a World War Two soldier's legs. Jake, the soldier, crawled into a nearby foxhole for safety. Moments later he saw one of his buddies fall. He pulled himself out of his foxhole, crawled to his buddy, and dragged him to safety. Later, in the hospital, he cried like a baby when nurses came to give him penicillin shots. He said it was different on the battlefield, as a lot more was going on out there – the noise, the flashes, his buddies around him. Later in the hospital, he had only one thing to think about all night long: that needle. It was huge and the closer it came, the bigger it got.

Jane was a young ballet star in Columbus, Ohio. Even though dying of uterine and breast cancer, she preserved meaning in her life by devoting her time and energy to ballet students. Despite surgery, chemotherapy and pain, she continued to go to ballet class. She said that just walking into the studio, seeing the people she knew, took her away from her health problems.

In Micronesia and some parts of the Amazon, pregnant women stop work for a short while, go to the edge of the field to deliver their babies, then return to work. At the same time, their husbands, at home, writhe with the pains of childbirth. Why? In this culture, the father feels the pains of labor. If he does not exhibit enough pain, his paternity is in question.

Pain disrupts humans' lives, but they can't even accurately describe it. People use such terms as "burning," "stabbing" or "dull" to describe pain. Burn victims, however, don't describe their pain as "burning" nor do victims of puncture wounds use the term "stabbing."

Physical pain drives humans to despair or it merely provides some of life's experiences. People hate it and can't escape it. But they can escape pain's devastating effects.

THE SPIRITUAL ASPECT OF PAIN

Dr. Brand entitled his book, "Pain, the Gift Nobody Wants." Humans have a difficult task trying to make sense of a gift God gave them and created within them. Pain is so disturbing they cannot believe a loving God would allow it. . . let alone call it good.

Physical pain can be traced within the nervous system. It can be subdued with drugs or by engaging in activities that divert the attention to more pleasant experiences. All physical pain creates a second type of pain, not easily mapped or subdued. This is emotional or spiritual pain.

Dr. Steven Brena, [3, p 5] suggests that pain may be a point of convergence between science and religion. Religion binds humans to an ethical code and to each other as they help one another understand the human role in God's creation. Humans are a trinity consisting of body, mind and soul. Pain forces them to regard these unique properties and hold themselves accountable for their actions. This conception of humanity regards service to each other as the purpose and goal of humanity. If humans disregard this role, they cause themselves and each other, immense suffering and pain.

Frank Vertosick [9] regards pain as a challenge or a mountain to climb in order to strengthen one's character. He notes that humans lack a protective covering, have relatively poor eyesight and hearing, are not fleet of foot, and have poor self-protective attributes. Humans rely on intelligence in order to survive. He points out that the perception of pain requires intelligence. Suffering, which is the emotional aspect of pain requires even more than mere intelligence; it requires awareness.

Humans alone in the Creation have the capacity to reason. Humans alone are created in the image of God, with a mind, body, and soul. Pain makes people aware of their frailty. It is humbling. It forces people to consider their priorities. It should draw people together.

Dr. Brena offers a quote from Kathopanishad, [2, p. 10] comparing the human trinity to a chariot (the body), carrying the self (the soul), and guided by the charioteer (the mind). Habits and emotions are like the reins; the senses are depicted as the horse. The mind must properly control the reins so the body carries the soul in an orderly fashion. (fig. 2)

It might be added that the senses, (the horse) must also be properly trained. Because of God-given intelligence and awareness, humans are able to manipulate their environment in order to make life more comfortable. Without constant training, the role of the senses is diverted from monitoring human need to satisfying human desire. Hunger is replace by appetite. This perspective explains today's fragmentation of society and its spiritual confusion. People in Western culture suffer less pain but cope less effectively with what they do experience.

A study of the Bible's references to pain leaves one even more confused and disturbed because humans are locked in to their culture's views on worth. Christians must understand how pain reveals God's plan as laid out in the Bible for the redemption of humans. Using a concordance, the Bible becomes its own commentary. Human-written commentaries are often biased by the writer's experiences. The Bible has very little to say about physical pain. It is acknowledged but not explained. On the other hand, the Bible describes suffering and tells Christians a great deal about relationships and God's desire to have a relationship with His human creation. Relationships are painful experiences and are damaged by greed, waywardness, selfishness, foolish ideas, or lack of self-control on the part of the human creation. God suffers immense sorrow because humans are so disobedient and wayward.

The Hebrew word *rah* is used to depict evil, distress, grief or harm. This word is found in the account of Job. Afflicted with painful boils, his wife and friends also caused him grief. When God addressed Job, he ignored Job's pain and refocused on His creation.

The Hebrew word for labor pains of birth is *hebel* or *chiyl*. This word is used in Isaiah 26:17. This depicts the physical pain of the birth process.

The root Hebrew word used in the first chapters of Genesis is *atsab*, meaning pain in the form of grief or sorrow or hard work. Certainly Eve must have suffered great physical pain bearing two children though the Bible does not describe her pain, stating her joy because she had borne a man. Yet she must have suffered far worse, almost unimaginable grief, *atsab*, when her first born son, Cain, murdered Abel and was banished. When the Creation was very new, human selfishness shattered the perfection. Adam and Eve were banished from the beautiful Garden of Eden, Abel was murdered, and Cain was banished from the very presence of God. Adam and Eve endured *atsab* for the remainder of their lives. Genesis 6:6 uses the same root word to express God's anguish with the wickedness of His human creation. In Genesis 6:6 God declares, "My heart is grieved (*atsab*) that I have made man."

According to commentaries, Genesis is a book of relationships. Every human-to-human relationship depicted in Genesis suffers from error, greed and foolishness. God suffered grief because His people were so "stiff-necked." Even so, God made an everlasting covenant with the Hebrew people and He made an everlasting covenant with the New Testament Church. The word *atsab* seems to imply a pain that comes from supernatural love.

In current times, pain and grief will occur because humans cannot stop their foolishness, the "Adam Bomb" of rebellion. Because Christians are a people set aside for God, those who rebel against God will hate them and what they stand for. Only a right relationship with God will sustain them. Christians' great mission is to support each other as a Body of Christ. Instead of "Adam Bombs" they must focus on igniting Spiritual Bombs.

Colson [4] relates: In 1989, Laszlo Tokes ignited a spiritual bomb in Timosoara, Romania. He mourned for his country and the people of his town because of the atheistic secularism of communism. Instead of weeping, he organized Bible studies and revitalized worship. The secret police beat him and finally evicted him from his home and church. When the state leaders came to arrest him, his entire congregation of 5,000, armed with candles, held vigil through the night. The police finally broke through this crowd. The police severely beat Tokes and hauled him away. A riot followed. The state police

wounded or killed many, but the worshipers continued to sing praises to God. By Christmas that year, Romania was free and the people were able, once again, to worship God openly. One young man lost a leg during the riots and while in the hospital, proclaimed that he didn't mind so much the loss of his leg, as it was he who lit the first candle.

The above incident demonstrates that the congregation knew the role of the soul in the trinity of man. This kind of relationship with God is painful. The "Adam Bomb" of pain is not the decay, chaos, and death brought into the world by Adam, but rather, the pain all humans contribute to the world, via their selfishness and disobedience.

Developing a relationship with God is painful. It requires humans to admit their waywardness. Understanding this is the beginning of understanding Grace and Mercy. It is imperative that humans trade the "Adam Bomb" for an "Abraham Bomb," a "Laszlo Tokes Bomb," or a "Jesus Bomb." God-given pain, both physical and spiritual, can be a friend. Let its teachings lead all Christians to a closer relationship with their Creator.

CONCLUSION

Pain is a created sensory perception, a God-given gift. Humans suffer spiritual pain because of disobedience, foolishness, waywardness, and selfishness. These attributes destroy human-to-human relationships and human-to-God relationships. This self-centered attitude is each person's heritage of the Adam Bomb of pain. Each Christian can pursue a personal relationship with God, and relationships are painful. As a created being, made in the image of God, each human is finite and fallible. God calls His followers a "peculiar people," set aside for His glory. He loves His children so much that His Son became totally human and died for them. Pain is the element that guides all humans from the creation to His arms.

REFERENCES

[1] Aidly, David, The Physiology of Excitable Cells, Cambridge U. Press, Cambridge, 1989

[2] Brand, Paul, and Yancey, Philip, Pain: The Gift Nobody Wants, Harper Collins, N.Y., 1993

[3] Brena, Steven, Pain and Religion, Charles Thomas, pub., Springfield, Il., 1972

[4] Colson, Charles, The Body, Desktop Miracles, Inc., Stowe, Vt., 1992

[5] Roberts, P.A., Neuroanatomy, second ed., U. of OK. Notes, Springer Verlag, N.Y., 1991

[6] Sackett, David, and others, Evidence-Based Medicine, Churchill Livingston Press, Edinburgh, 2000

[7] Strong, James, Strong's Exhaustive Concordance of the Bible, Crusade Bible Pub., Nashville, no date given

[8] The Holy Bible, King James Version, PSI and Associates Inc., Miami, 1986

[9] Vertosich, Frank T., Why We Hurt, Harcourt Inc., N.Y, 2000

[10] Wall, Patrick, and Melzack, Ronald, Textbook of Pain, Churchill, Livingston, Oxford, 1999