Armstrong Center for Medicine and Health

Living Healthy Is a Choice

You are a Ferrari,

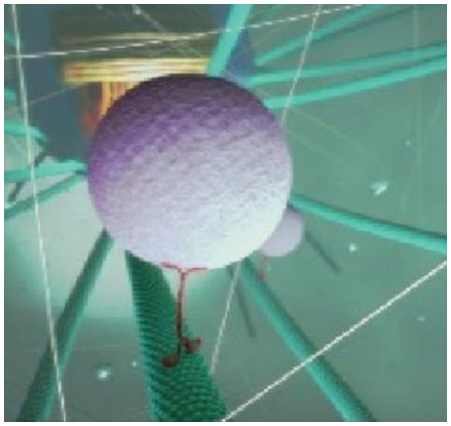
although you sometimes feel like *this:*

Your Amazing Human Body

Your body and brain are a universe of beauty, harmony and incredible complexity. Many scientists of our day echo the same message as they gain a deeper understanding of the body and brain. Nationally known clinical neuropsychologist, Dr. Paul Nussbaum, says "the human brain is indeed the single most magnificent miracle ever designed, and it sits directly between our ears." The human brain–a two to four pound organ consisting of some 100 billion neurons (nerve cells) and comprised of sixty-percent fat. (We are all fatheads!) Recent scientific evidence suggests the brain produces thousands of new brain cells each day, and the rate of production can be increased by healthy eating and regular exercise.

The Universe of the Human Cell

Consider the amazing tiny universe found in one of the thirty-trillion human cells in the body, buzzing with activity. Each cell in the human body is its own little universe. It includes an array of mechanisms for building and tearing down "roads" traversed by strange-looking, self-propelled vehicle motor proteins—designed to transport waste out of the cell. It contains special mechanisms for bringing oxygen, glucose and other nutrients into the cell. The mind-boggling number of chemical reactions indispensable for the life of the cell are made possible by the 2,000 enzymes produced within a given cell, some capable of stimulating as many as one hundred thousand chemical reactions per second. (Check the YouTube video: *ABCs Inner Life of the Cell*)



The Spine

Consider the structural stability of the spine, and why it doesn't buckle when subjected to heavy loads. Because of the connecting structures of the muscles which function similar to guy wires, the spinal column maintains its structural integrity when subjected to strong compressive forces. In his book entitled, Low Back Disorders (pp. 113f), renowned back expert Dr. Stuart McGill, Professor of Spine Biomechanics at the University of Waterloo, presents an interesting illustration:

> Suppose a fishing rod is placed upright and vertical with the butt on the ground. If the rod were to have a small load placed in its tip, perhaps a pound or two, it would soon bend and buckle. Now suppose that the same rod has guy wires attached at different levels along its length and that those wires are also attached to the ground in a circular pattern. Each wire is pulled to the same tension (this is critical). Now if the tip of the rod is loaded as before, the rod can sustain the compressive forces successfully. If you reduce the tension of just one of the wires, the rod will buckle.

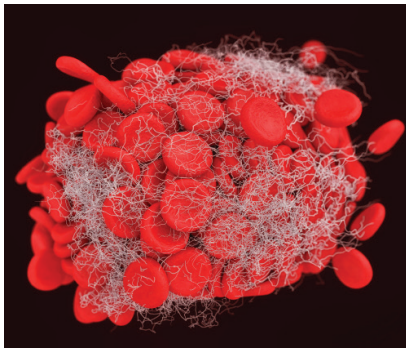
Dr. McGill reports scientists have tested the load-bearing capability of the human spine of cadavers--testing the spine with the muscles removed (no guy wires), it can withstand a load of only twenty pounds. A properly supported spine of a young, healthy male--that is, with healthy bones and discs, muscles, tendons, and ligaments the spinal column can withstand a downward force of greater than two-thousand pounds without crushing or buckling!

The Red Blood Cell

Red blood cells are the smallest cells in the body, with a diameter about one tenth of the width of the average human hair. There are about twenty-five trillion red blood cells in the body. The life of these cells is about three to four months, so they must be replaced at the rate of three million per second. Each red blood cell contains about 250 million molecules of hemoglobin, capable of transporting one billion life-giving oxygen molecules. They change their disc shape to squeeze through tiny capillaries by rearranging their cytoskeleton (internal scaffolding).

The Clotting Process

How we are protected from bleeding to death from a simple wound is another amazing complex process. Platelets, fragments of large cells produced in both bone marrow and the lungs, are attracted to damaged tissue--a slice, cut or puncture wound. The platelets adhere to damaged blood vessels, forming a platelet plug. The plug releases chemicals resulting the narrowing (vasoconstriction) of the blood vessels. The platelets also release other chemicals to combine with plasma to produce thromboplastin. Thromboplastin acts as an enzyme to activate prothrombin, converting it to the active form, thrombin. In turn, thrombin works to convert the soluble protein fibrinogen into the insoluble protein fibrin. Fibrin molecules join in a mesh around the wound, trapping blood cells to form a blood clot. There is more: Platelets cause retraction of the clot, pulling the fibrin strands, bringing the edges of the wound closer together. Because the plasma proteins prothrombin and fibrinogen are neutralized by enzymes immediately after they form, the clotting is limited to the area of the wound. Otherwise, clotting would spread throughout the body, forming a deadly giant clot.



So, we all are Ferraris, deserving the best of care, equipping us to be at our best in the things we are called to do, the things we love to do, and for knowing, enjoying, and serving the special people in our lives.

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