Blocking Tissue Destruction

From the original article in 2006. Author: Ray Peat.

There always seems to be a rough balance between tissue regeneration and tissue degeneration, with growth and repair occurring when the equilibrium shifts in one direction,and with atrophy or degeneration occurring when the balance shifts in the other direction. If we can understand the mechanisms of atrophy, and how to retard or to block tissue destruction, then we can restore the balance to a degree which might allow regeneration to occur, even if we don't clearly understand the mechanisms of growth.

Skin and bones are such different types of tissue that it will be useful to start with them, because if we can see similar processes of degeneration or regeneration in them, then the chances are good that the same processes will occur in other tissues too. Bone is a relatively stable tissue, while skin is a tissue whose cells divide rapidly.

It is common medical knowledge that cortisone and realted glucocorticioid-type hormones cause skin to atrophy, becoming thinner. Using topical applications of a synthetic derivative of cortisione,CM Papa and A M. Kligman showed that the atrophy extended to the pigment cells,reducing theirr size and eliminating most of their dendritic branches. Some animal studies have found that estrogen caused the skin to become thinner. The other steroids they tested,progesterone, testosterone,and pregnenolone, acted in the opposite direction, making aged and atrophied skin thicker and more regular. They also made the pigment cells larger, and increased their branchinhg.l Since these hormones were already known to have protective actions against cortisone and estrogen, these results were not too surprising, though they did directly contradict the claims of people who made estrogen-containing cosmetics.

Since progesterone and pregnenolone do not cause healthy, young skin to thicken, their effect in damaged skin is probably partly to replace the deficiency of that type of steroid which occurs with aging, and to offset the damaging effects of the catabolic hormones, whose influence does not decrease with age.

Many years ago it was found that in old age a woman's estrogens were increasedd relative to the 17-keto steroids adrenal androgens. Later, it was found that the conversion of androgen to estrogen increases with age in both men and women, and that this occurs largely in fat cells. Several years ago, P. K. Siiteri found that low thyroid modified the enzymes of fat cells in a way that would tend to increase the conversion of androgen to estrogen. More recently, it was found that adding progesterone to the enzymes had the opposite effect of aging and hypothyroidism, protecting the androgen from conversion to estrogen. These researchers (C. J. Newton and colleagues, of London) concluded that the decreased output of progesterone after the menopause might account for the increased production of estrogen.3 Since progesterone declines in aging men, too, this could account for the same process in men.

Vitamin A's effect on the skin opposes that of estrogen.4 There are several mechanisms that could account for this. Vitamin A is used in the formation of steroids, and since the skin is a major site of steroid metabolism, vitamin A might help to maintain the level of the anti-catabolic steroids. A deficiency of vitamin A causes excessive release of the lysosomal enzymes, acid hydrolases, resulting in tissue catabolism.5 Also, vitamin A is necessary for the proper differentiation of cells in skin and other membranes. A deficiency tends to cause an increased rate of cell division, with the production of abnormal cells, and a substitution of keratinized cells for other types. Estrogen also promotes keratinization and speeds cell division. A deficiency of vitamin A can cause leukoplakia in the mouth and on the cervix of the uterus; although this is considered "pre-cancerous," I have found it to be very easily reversible, as I have discussed elsewhere.6 I suspect that the intracellular fiber, keratin, is produced when a cell can't afford to do anything more complex. Adequate vitamin A speeds protein synthesis,7 and allows it to be used more efficiently.

Prolactin (which is promoted by estrogen, and inhibited by progesterone) increases with stress and with age. It probably affects every tissue, but it seems to have its greatest efects on the secretory membranes. It is known to have strong effects on the kidney, gut and skin (sweat and oil glands, hair follicles, and feathers inbirds), and on the gills of fish. Its involvement with milk production suggests that it might mobilize calcium from bones, and inf fact it does contribute to osteoporosis. This was foreseen by G. Bourne, in his book on the metabolism of hard tissues, when he suggested that estrogen, acting through the pituitary, might be expected to promote osteoporosis.

Since reading Bourne's book, I have doubted that it was rational to use estrogen to prevent osteoporosis, especially when it is known to be carcinogenic and when the ratio of estrogen to and androgens and progesterone increases after menopause. Now that several publications have appeared clearly showing that estrogen increases prolactin, that prolactin increases with cancellous bone; adrenal androgens. Thyroid. Rate of formation, overall metabolic rate.

Arthritis and natural hormones

A very healthy 71 year-old man was under his house repairing the foundation, when a support slipped and let the house fall far enough to break some facial bones. During his recovery, he developed arthritis in his hands. It is fairly common for arthritis to appear shortly after an accident, a shock, or surgery, and Han Selye's famous work with rats shows that when stress exhausts the adrenal glands (so they are unable to produce normal amounts of cortisone and related steroid hormones), arthritis and other "degenerative" diseases are likely to develop.

But when this man went to his doctor to "get something for his arthritis," he was annoyed that the doctor insisted on giving him a complete physical exam, and wouldn't give him a shot of cortisone. The examination showed low thyroid function, and the doctor prescribed a supplement of thyroid extract, explaining that arthritis is one of the many symptoms of hypothyroidism. The patient agreed to take the thyroid, but for several days he grumbled about the doctor 'fixing something

that wasn't wrong' with him, and ignoring his arthritis. But in less than two weeks, the arthritis had entirely disappeared. He lived to be 89, without a recurrence of arthritis. (He died iatrogenically, while in good health.)

Selye's work with the diseases of stress, and the anti-stress hormones of the adrenal cortex, helped many scientists to think more clearly about the interaction of the organism with its environment, but it has led others to focus too narrowly on hormones of the adrenal cortex (such as cortisol and cortisone), and to forget the older knowledge about natural resistance. There are probably only a few physicians now practicing who would remember to check for hypothyroidism in an arthritis patient, or in other stress-related conditions. Hypothyroidism is a common cause of adrenal insufficiency, but it also has some direct effects on joint tissues. In chronic hypothyroidism (myxedema and cretinism), knees and elbows are often bent abnormally.

By the 1930's, it was well established that the resistance of the organism depended on the energy produced by respiration under the influence of the thyroid gland, as well as on the adrenal hormones, and that the hormones of pregnancy (especially progesterone) could substitute for the adrenal hormones. In a sense, the thyroid hormone is the basic anti-stress hormone, since it is required for the production of the adrenal and pregnancy hormones.

A contemporary researcher, F. Z. Meerson, is putting together a picture of the biological processes involved in adapting to stress, including energy production, nutrition, hormones, and changes in cell structure.

While one of Selye's earliest observations related gastrointestinal bleeding to stress, Meerson's work has revealed in a detailed way how the usually beneficial hormone of adaptation, cortisone, can cause so many other harmful effects when its action is too prolonged or too intense.

Some of the harmful effects of the cortisone class of drugs (other than gastro-intestinal bleeding) are: Hypertension, osteoporosis, delayed healing, atrophy of the skin, convulsions, cataracts, glaucoma, protruding eyes, psychic derangements, menstrual irregularities, and loss of immunity allowing infections (or cancer) to spread.

While normal thyroid function is required for the secretion of the adrenal hormones, the basic signal which causes cortisone to be formed is a drop in the blood glucose level. The increased energy requirement of any stress tends to cause the blood sugar to fall slightly, but hypothyroidism itself tends to depress blood sugar.

The person with low thyroid function is more likely than a normal person to require cortisone to cope with a certain amount of stress. However, if large amounts of cortisone are produced for a long time, the toxic effects of the hormone begin to appear. According to Meerson, heart attacks are provoked and aggravated by the cortisone produced during stress. (Meerson and his colleagues have demonstrated that the progress of a heart attack can be halted by a treatment including natural substances such as vitamin E and magnesium.)

While hypothyroidism makes the body require more cortisone to sustain blood sugar and energy production, it also limits the ability to produce cortisone, so in some cases stress produces symptoms resulting from a deficiency of cortisone, including various forms of arthritis and more generalized types of chronic inflammation.

Often, a small physiological dose of natural hydrocortisone can help the patient meet the stress, without causing harmful side-effects. While treating the symptoms with cortisone for a short time, it is important to try to learn the basic cause of the problem, by checking for hypothyroidism, vitamin A deficiency, protein deficiency, a lack of sunlight, etc. (I suspect that light on the skin directly increases the skin's production of steroids, without depending on other organs. Different steroids probably involve different frequencies of light, but orange and red light seem to be important frequencies.) Using cortisone in this way, physiologically rather than pharmacologically, it is not likely to cause the serious problems mentioned above.

Stress-induced cortisone deficiency is thought to be a factor in a great variety of unpleasant conditions, from allergies to ulcerative colitis, and in many forms of arthritis. The stress which can cause a cortisone deficiency is even more likely to disturb formation of progesterone and thyroid hormone, so the fact that cortisone can relieve symptoms does not mean that it has corrected the problem.

According to the Physicians' Desk Referenc, hormones similar to cortisone are useful for treating rheumatoid arthritis, post-traumatic osteoarthritis, synovitis of osteoarthritis, acute gouty arthritis, acute nonspecific tenosynovitis, psoriatic arthritis, ankylosing spondylitis, acute and subacute bursitis, and epicondylitis.

Although cortisone supplementation can help in a great variety of stress-related diseases, no curewill take place unless the basic cause is discovered. Besides the thyroid, the other class of adaptive hormones which are often out of balance in the diseases of stress, is the group of hormones produced mainly by the gonads: the "reproductive hormones." During pregnancy these hormones serve to protect the developing baby from the stresses suffered by the mother, but the same hormones function as part to the protective anti-stress system in the non-pregnant individual, though at a lower level.

Some forms of arthritis are known to improve or even to disappear during pregnancy. As mentioned above, the hormones of pregnancy can make up for a lack of adrenal cortex hormones. During a healthy pregnancy, many hormones are present in increased amounts, including the thyroid hormones. Progesterone, which is the most abundant hormone of pregnancy, has both anti-inflammatory and anesthetic actions, which would be of obvious benefit in arthritis.

There are other naturally anesthetic hormones which are increased during pregnancy, including DHEA, which is being studied for its anti-aging, anti-cancer, and anti-obesity effects. (One of the reasons that is frequently given for the fact that this hormone hasn't been studied more widely is that, as a natural substance, it has not been monopolized by a drug patent, and so no drug company has been willing to invest money in studying its medical uses.) These hormones also have the ability to control cell division, which would be important in forms of arthritis that involve invasive tissue growth.

While these substances, so abundant in pregnancy, have the ability to substitute for cortisone, they can also be used by the adrenal glands to produce cortisol and related hormones. But probably the most surprising property of these natural steroids is that they protect against the toxic side-effects of excessive adrenal hormones. And they seem to have no side-effects of their own; after about fifty years of medical use, no toxic side effects have been found for progesterone or pregnenolone.

Pregnenolone is the material the body uses to form either progesterone or DHEA. Others, including DHEA, haven't been studied for so long, but the high levels which are normally present in healthy people would suggest that replacement doses, to restore those normal levels, would not be likely to produce toxic side effects. And, considering the terrible side effects of the drugs that are now widely used, these drugs would be justifiable simply to prevent some of the toxic effects of conventional treatment.

It takes a new way of thinking to understand that these protective substances protect against an excess of the adrenal steroids, as well as making up for a deficiency. Several of these natural hormones also have a protective action against various poisons; Selye called this their "catatoxic" effect.

Besides many people whose arthritis improved with only thyroid supplementation, I have seen 30 people use one or more of these other natural hormones for various types of arthritis, usually with a topical application. Often the pain is relieved within a few minutes. I know of several other people who used progesterone topically for inflamed tendons, damaged cartilage, or other inflammations. Only one of these, a woman with rheumatoid arthritis in many joints, had no significant improvement. An hour after she had applied it to her hands and feet, she enthusiastically reported that her ankle had stopped hurting, but after this she said she had no noticeable improvement.

We often hear that "there is no cure for arthritis, because the causes are not known." If the cause is an imbalance in the normal hormones of adaptation and resistance, then eliminating the cause by restoring balance will produce a true cure. But if it is more profitable to sell powerful drugs than to sell the nutrients needed to form natural hormones (or to supplement those natural hormones) we can't expect the drug companies to spend any money investigating that sort of cure. And at present the arthritis market amounts to billions of dollars in drug sales each year.
