When I was a graduate student, a series of experiments we did in neurophysiology involved implanting rats with tiny electrodes in the medial preoptic nucleus of the hypothalamus. The hypothalamus of your brain mediates many complex functions, including feelings of pleasure, excitement, anger, anxiety, fear, hunger, thirst and temperature regulation. It also mediates release of the brain hormone cascade that controls the production of sex hormones.

If you send tiny pulsed electrical charges through the electrodes, the preoptic nucleus interprets them as activation of the libido. This activation puts male rats into a constant state of sexual excitement (and penile erection). Provided with a continuing supply of fresh females, they engage in an orgy of sexual intercourse, ignoring food, sleep and comfort until they keel over from exhaustion.

The rat is a simple creature, but humans and monkeys have similar areas in the hypothalamus, as shown in Figure 1. And electrical stimulation of the preoptic area readily produces sexual arousal and penile erection in monkeys.

It's a bit difficult to get healthy humans to volunteer for needle electrodes implanted in their brains. But a number of human studies using these electrodes to relieve intractable depression, show that men can be sexually aroused by the same hypothalamic stimulation that fires rats and monkeys. In some cases the electrodes are attached to a switch box, permitting the patient to self-stimulate. In my lectures, I show a film of a man, who spent most of his days in a deep depression, sitting motionless in a chair. An implant that allowed self-stimulation of various areas of the hypothalamus, activated his libido and associated feelings of well-being and confidence, every time he pressed a button on a box attached to his belt. This electrical stimulation did the job so well, it transformed him into a raunchy nightclub comedian, good enough to be paid for his act. There is no doubt that the preoptic nucleus, and other areas of the hypothalamus, are mediators of the human libido.

We know now that testosterone is a primary stimulant of the hypothalamus and other brain areas that activates both male and female libido.
**Testosterone and Libido**

In the absence of an electrode, stuck into your brain to fire libido, how does it work? To find out we have had to dip into a little biochemistry. Bear with me, you don't have to be a rocket scientist to follow it. And follow it you should, because libido is the base of hormonal health. Without it, much of life is reduced to a mere mechanical twitch and whimper.

It's no surprise that the hypothalamus, which mediates your libido, also controls the manufacture of all your sex hormones, even though the manufacturing organs are in parts of the body remote from your brain. The arcuate nucleus of the hypothalamus secretes a brain hormone called gonadotropin-releasing hormone (GRH). This hormone trickles down into the anterior (front) lobe of the pituitary gland, the pea-sized blob hanging out of your brain, on a stalk, a couple of inches behind your nose. It's a busy blob.

In both males and females, the anterior or front of the pituitary manufactures all sorts of hormones every day of your life. In this article, we will cover only three that are intimately involved with libido. They are shown in Figure 2.

The first is luteinizing hormone. Under the influence of GRH your pituitary gland releases luteinizing hormone which flows to the testicles in males, where it stimulates special structures called Leydig cells to produce testosterone. Healthy, potent men make about 7 mg of testosterone per day. That's plenty to flow throughout the body and brain to maintain male masculinity and hormonal potency.

In females, luteinizing hormone flows to the ovaries and to the adrenal glands, where it also stimulates testosterone production. Healthy potent women make about 0.3 mg of testosterone per day in the ovaries, the adrenals and various other parts of the body.

It used to be a puzzle why females produce testosterone at all. Then studies showed that the hormone is essential for a woman's hormonal health as it is for a man's. We know now that testosterone is a primary stimulant of the hypothalamus and other brain areas that activate both male and female libido.

Along with luteinizing hormone, the anterior pituitary in both sexes also secretes follicle-stimulating hormone (FSH). In women, FSH is vital to the menstrual cycle and reproduction. In men, it triggers the Sertoli cells of the testicles to make sperm. So it is an essential part of overall potency. But as far as we know, FSH has little effect on libido or emotions.

**Thyroid and Libido**

With all the evidence linking testosterone and libido, the effects of thyroid hormones are sadly neglected, even in medical texts. Big mistake. As I review elsewhere, keeping the thyroid in balance is essential to the balance of many other hormones and systems throughout your body.

Thyroid hormone levels are con-
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trolled by output of another hormone from the hypothalamus, thyrotropin-releasing hormone. It flows to the anterior pituitary to cause release of thyroid-stimulating hormone (TSH) which, in turn, stimulates the thyroid gland at the base of your neck to produce thyroid hormones. As you might have guessed, thyroid hormones have powerful effects.

Yet synthetic thyroid is commonly believed to be relatively innocuous, and seems to be used in America almost as freely as aspirin. We find that numerous athletes, models and celebrities who come to the Colgan Institute for nutrition programs, have normal thyroid function, but have been prescribed thyroid pills or use them without prescription. Reasons range from losing body fat to a general pick-me-up.

More like a general knock-you-down. Studies show without a doubt, that excess serum levels of thyroid (hyperthyroidism) reduce libido and positive emotions to a whimper.

Excess thyroid is also catabolic (destructive) to most body tissues. That's why some folk use it lose body fat. But it is equally destructive to muscle. As we will see in later chapters, maintaining muscle is one of the essential strategies for all aspects of hormonal health. So taking thyroid pills, except in the case of a well-documented thyroid deficiency, delivers a triple-whammy to your muscles, libido and wellbeing.

Low thyroid (hyperthyroidism) is just as bad. When you have insufficient thyroid to help drive your insulin metabolism, multiple body functions go crazy. Low thyroid not only causes lethargy and exhaustion, it also reduces testosterone levels. And you know by now, that reduced testosterone whacks your libido.

"In females, however, there are definite age changes in libido. Young women do not reach peak libido until age 35 - 40."

Prolactin and Libido

The final hormone that profoundly affects libido is prolactin, the milk-producing hormone that enables women to breastfeed. Males also produce prolactin. In both sexes it is released by the anterior pituitary.

Unlike most other pituitary hormones, control of the prolactin is mainly inhibitory. Prolactin output is restricted by release of the neurotransmitter dopamine from the arcuate nucleus of the hypothalamus. That's the same blob of brain that stimulates secretion of luteinizing hormone to drive testosterone production. If the flow of dopamine declines, prolactin secretion hits the roof and testosterone levels hit the floor.

In men, excess prolactin has the same detrimental effects on testosterone, and thereby on libido. But that's not the part of Nature's design for health. In males, high prolactin is an indicator of brain disorder.

Reduced hypothalamic dopamine also inhibits libido directly. Recent science shows that brain areas that drive your libido and emotions, require healthy levels of both testosterone and dopamine for normal function.

The three main causes of excess prolactin production are hyperthyroidism, which we discussed above, prescription drugs and — stress. Stress activates numerous subjective feelings, from loss of well-being and loss of confidence, through anxiety, fear, anger and hate. All negative emotions have profound adverse effects on hormonal health.

Libido and Aging

Various studies of male libido show a maximum strength at about age 17-20 with a slow decline to about age 45-50. About age 50, enough men show a sharp decline in libido, to prompt researchers to create the notion of viripause, akin to the female menopause. Some of these men do show abnormally low testosterone levels, without any other signs of illness, which suggests there may be a grain of truth to male menopause. In these individuals, restoring testosterone levels

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to normal also restores libido and well-being.

Trouble is, all studies to date of aging, sex and emotion have failed to separate our men who are healthy in all the bodily systems important to sexuality. The best yet is by Dr. Raul Schiavi and colleagues at Mount Sinai School of Medicine in New York. Their select sample of men aged 45-74, had no diseases or disorders likely to impair sexuality. They were not more than 20 percent overweight and didn’t take drugs. Results still showed that libido declined with age.

But even this study failed to select the sample for one variable that is critical to hormonal health — maintenance of youthful muscle mass. With usual aging, even apparently healthy men, lose one-quarter of their muscle mass between ages 20 and 80. So it’s likely that Schiavi’s sample were short on muscle. Decline of many bodily functions, including sex hormones and libido, is inevitable.

All major surveys, from Kinsey through the Baltimore Gerontology Center Study, show highly variable levels of libido with age. Some older men exhibit stronger libido than some young men and vice-versa. Some old men report no change in libido throughout life. So it is likely that most losses of male libido found with age, are more a sign of degeneration than passing of the years.

In females, however, there are definite age changes in libido. Young women do not reach peak libido until age 35-40. Even after menopause, the ovaries and adrenal glands of most women continue to produce some testosterone.

Nevertheless, at Cornell Medical Center in New York, Dr. Helen Singer Kaplan has found that at least 15-20 percent of postmenopausal women show low testosterone levels and associated loss of libido and zest for life. In many of these women, low-dose testosterone replacement therapy promptly restores potency. ☨

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