Lent, Lust and the Libido: What Patristic Theology Taught us About Testosterone Biosynthesis

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Abstinence from meat and animal-based foods has been a long-held tradition of the three major world faiths. The myriad of Judeo-Christian traditions, particularly the writings of the Catholic-Orthodox Church Fathers still in extant, attests to the ubiquitous belief in this common form of observance during periods of fasting and penance. Aside from procuring practical benefits, abstaining from flesh-foods virtually eliminates consumption of dietary cholesterol. Evidence-based studies have shown that certain types of cholesterol are positively correlated with testosterone levels, the major androgen responsible for the sex drive. Writings from the Church Fathers and the Judeo-Christian tradition have made an appreciable connection between meat-eating and increased libido, though until recently, no historical-scientific approaches have been initiated to shed light on this fascinating subtlety.

The brain and the libido

To paraphrase a contemporary adage of the modern scientific community, “The brain is the most sexually potent organ.” Studies of sensory networks coupled with new applications of medical imaging clearly indicate that certain regions of the brain become more active during sexual arousal, such as the inferior temporal cortex, orbito-frontal cortex, and anterior cingulate cortex, which have been associated with perceptive-cognitive component, emotional and motivational phenomena, and physical and psychological preparation for sexual activity, respectively (1). The same study found that sexually aroused young adult males had increased levels of serum testosterone, which is in agreement with the current endocrinological evidence that testosterone – the primary androgen in males, and also the hormone responsible for the libido in both sexes – is markedly expressed by the gonads prior to, and during, sexual activity. But hormones, particularly testosterone, are much more potent than simply acting as the source of impetus or facilitation for sex – it can actually affect the neurobiology of the brain. Researchers at the University of Berkeley found that they could completely reverse male-female differences in brain regions associated with sexual arousal in male rats, strictly through altering blood hormonal levels in the animals by castrating the male rats and giving androgens to the females (2). Ostensibly, this sort of research is in its infancy but the field of the psychobiology of sexual activity is quickly becoming inundated with interest into studying this primal, yet complex, human activity.

Religious abstinence from sex and meat

Abstinence from sex has long been advocated as a critical facet of religious living. Judaism, for example, requires its adherents to abstain on Yom Kippur; Islam similarly prohibits engaging in sex during daylight fasting hours. The Christian Catholic-Orthodox formulations (collectively referred to as the Apostolic Tradition) indicate that for periods of fasting, including Lenten observances, Holy Week and Good Friday, sex is to be avoided and acts of charity are to be pursued. But the latter tradition also includes another caveat during fasting periods – abstinence from meat, poultry, fish and dairy products. Advocating the avoidance of such foods are ubiquitously found in the writings of several early Christian writers and theologians, including John Chrysostom, Clement of Alexandria, Augustine of Hippo, Tertullian (3), Basil the Great (7), and Paul the Apostle (8). Many of these writings were taken on the prima facie observation that Jesus himself was never recorded to have eaten meat (fish being the exception). The traditions of these second and third-century theologians persisted throughout
the monastic movement and influenced the western course of Christian fasting observances. For example, by Renaissance times in Europe, meat-eating had become surrounded by an aura of opulence and power, whereas only the Christian monks abstained, hoping to bring a closer affinity to God (9).

Spiritual reasons have been used to support the necessity of this common form of observance, and according to some traditions, include: a means of subjugating the body under the will of the mind (and spirit); a means of returning to the idealized Biblical state of humanity as an herbivore; and to eliminate bodily satisfaction and flatulence which are contradictory to vigilance and sober demeanour during times of spiritual reflection (10).

But there are still more, albeit sublime, reasons why meat and other animal products are prohibited during fasting, one of which can be afforded from the writings and beliefs of the patristic scholar (St.) Augustine, the great Doctor and Latin teacher of the Church, “He [Augustine] attributed the ruinous passions of man to the eating of meat” (5). The saint knew something of these “ruinous passions”; prior to becoming the familiar pillar of the church, he indulged in wanton philandering for much of his youth. Furthermore, a great many of Augustine’s polemic was directed specifically against the pervading pagan Roman practices of the time, which included participation in certain cults that advocated sumptuousness, drinking parties, orgies, and excessive consumption of exotic meats. It is therefore plausible that Augustine may have consciously or unconsciously believed that illicit desires and lust, in its various forms, was associated with meat-eating. Commentaries from the Judeo-Christian perspective concur with this irrevocable subtlety, “Israel grumbled at God through Moses out of their lust for meat. The lust of the flesh is the match that ignites anger and the tongue as fire. Self-gratification is one of the catalysts of lust” (10). Other Jewish and Talmudic sources make similar associations between meat and lust (11).

**Cholesterol – the missing link**

The question, however, begs: is the connection between consumption of animal-based foods with sexual desire inextricably symbolic and spiritual? Not necessarily. It came as an auspicious discovery to learn that certain domestic practices predominating in the Middle East and Europe have commonly used lobster, shellfish, and oysters as a *de facto* therapy for treating impotence in males. Of particular importance is the fact that such domestic aphrodisiacs, especially shellfish, have gained gratuitous notoriety from the medical community as foods containing inordinate amounts of cholesterol. Dietary cholesterol comes almost entirely from the consumption of meat, poultry, fish, and dairy products. Organ meats, such as liver, are especially high in cholesterol content, while foods of plant origin contain virtually no cholesterol. The American Heart Association recommends no more than 300 mg of cholesterol be consumed per day. Fifteen large shrimp alone contain about 166 mg cholesterol, a 3 oz. lobster weighs in at 61 mg, and 6 medium oysters rank at 58 mg of the substance (12).

Given certain ancient and modern cultural practices and corpus of scholarly religious evidence associating sexual desire with the consumption of flesh foods, one can begin to appreciate the views of what many early Church fathers believed and wrote: animal-based foods, which we now know contain cholesterol, can augment sexual desire. Therefore, the Judeo-Christian prohibition against eating meat may be seen as a practical guideline to attenuate or circumvent sexual tendencies during periods of spiritual abstinence and sobriety. Of course, cholesterol is clearly not the sole culprit.

**Testosterone and cholesterol**

Cholesterol is a well-established precursor to testosterone, the primary sex hormone (13). Testosterone is a 19-carbon steroid hormone produced primarily by the Leydig cells of the testes (in men) and the ovaries (in women). It belongs to the androgen class of hormones that also includes dihydrotestosterone (DHT), dehydroepiandrosterone (DHEA), androstenedione, and androstenediol. Six other classes of steroid hormones exist, including estrogens, progestins, mineralocorticoids, glucocorticoids, vitamin D, and bile acids. In men, approximately seven mg of testosterone is produced each day, and blood levels range between 300 and 1000 ng/dL (10-28 nmol/L). Females, on the other hand, produce about 1/15th of this amount, leading to average blood levels of only 25 to 90 ng/dL (1 -2.5 nmol/L). In healthy humans, the "rate-limiting" step in testosterone biosynthesis is the conversion of cholesterol into a hormone called pregnenolone.
This hormone is then first converted to either DHEA or progesterone before being further degraded in a stepwise fashion to testosterone. Schematically, the two possible pathways can be described as shown in Figure 1 (enzymes have been omitted for clarity).

Several studies have reported that levels of high-density lipoprotein cholesterol (HDL-C) are positively associated with endogenous levels of testosterone in men (14). Furthermore, in a southern California cohort of 391 men aged 30-79 years, HDL-C levels were positively correlated with testosterone levels, though very low-density lipoprotein cholesterol (VLDL-C) levels were inversely correlated with testosterone levels. The findings were independent of age, body mass index, physical exercise, smoking, and alcohol intake (15). Scientists at the University of South Carolina conducted a study of more than 3,200 generally healthy men between the ages of 25 and 83. Interestingly, the data indicated that men with lower blood cholesterol or higher amounts of the beneficial HDL-C may be less likely to develop erectile dysfunction or impotence. Men with total cholesterol over 240 milligrams per decilitre (mg/dL) of blood had nearly double the risk of penile dysfunction as men with readings of 180 mg/dl, but those with HDL readings of 60 mg/dL or greater were one-third less likely to develop erectile dysfunction than were men with less than 30 mg/dL HDL (16).

Final considerations
Scientific research can scarcely "prove" anything from the pedantic definition of science; much less can be said of claims made by a pseudo-historical perspective, as is the one employed here. However, it is an alluring prospect that early religious thinkers, particularly from the Judeo-Christian traditions, not only formed spiritual and symbolic notions of why animal-based foods were to be avoided during periods of spiritual observance, but may have inadvertently stumbled at an early, almost unconscious, correlation between the need for sexual abstinence with the prohibition of cholesterol-containing animal foods. But one should not fully embrace the Big Mac as a love potion so readily. Scientific evidence suggests that only HDL cholesterol can facilitate Cupid’s game. Interestingly, the Roman poet Ovid in his work The Art of Love selected nuts - currently being advocated by the health community as foods capable of lowering LDL and raising HDL cholesterol levels - as an effective and powerful aphrodisiac. Viagra beware.

References:
1. J. Redoute et al., Hum Brain Mapp. 11, 162 (2000).
6. Q.S.F. Tertullianus, Apologeticus, 9 (197).
13. P.C. Champe, R. A. Harvey, D.R. Ferrier, Lippincott's Illustrated Reviews:

1) Cholesterol -> pregnenolone -> progesterone -> androstenedione -> Testosterone
2) Cholesterol -> pregnenolone -> DHEA -> androstenediol -> Testosterone

Figure 1. Pathways for the Biosynthesis of Testosterone from Cholesterol. The rate-limiting step in testosterone synthesis is the conversion of cholesterol to a hormone pregnenolone. After testosterone is secreted into the bloodstream, 96-98% is bound to proteins called albumin and globulin for transport in the blood and protection from degradation.
