The He Hormone

By Andrew Sullivan
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It has a slightly golden hue, suspended in an oily substance and injected in a needle about half as thick as a telephone wire. I have never been able to jab it suddenly in my hip muscle, as the doctor told me to. Instead, after swabbing a small patch of my rump down with rubbing alcohol, I push the needle in slowly until all three inches of it are submerged. Then I squeeze the liquid in carefully, as the muscle often spasms to absorb it. My skin sticks a little to the syringe as I pull it out, and then an odd mix of oil and blackish blood usually trickles down my hip.

I am so used to it now that the novelty has worn off. But every now and again the weirdness returns. The chemical I am putting in myself is synthetic testosterone: a substance that has become such a metaphor for manhood that it is almost possible to forget that it has a physical reality. Twenty years ago, as it surged through my pubescent body, it deepened my voice, grew hair on my face and chest, strengthened my limbs, made me a man. So what, I wonder, is it doing to me now?

There are few things more challenging to the question of what the difference between men and women really is than to see the difference injected into your hip. Men and women differ biologically mainly because men produce 10 to 20 times as much testosterone as most women do, and this chemical, no one seriously disputes, profoundly affects physique, behavior, mood and self-understanding. To be sure, because human beings are also deeply socialized, the impact of this difference is refracted through the prism of our own history and culture. But biology, it is all too easy to forget, is at the root of this process. As more people use testosterone medically, as more use testosterone-based steroids in sports and recreation and as more research explores the behavioral effects of this chemical, the clearer the power of that biology is. It affects every aspect of our society, from high divorce rates and adolescent male violence to the exploding cults of bodybuilding and professional wrestling. It helps explain, perhaps better than any other single factor, why inequalities between men and women remain so frustratingly resilient in public and private life. This summer, when an easy-to-apply testosterone gel hits the market, and when more people experience the power of this chemical in their own bodies, its social importance, once merely implicit, may get even harder to ignore.

My own encounter with testosterone came about for a simple medical reason. I am H.I.V.-positive, and two years ago, after a period of extreme fatigue and weight loss, I had my testosterone levels checked. It turned out that my body was producing far less testosterone than it should have been at my age. No one quite knows why, but this is common among men with long-term H.I.V. The usual treatment is regular injection of artificial testosterone, which is when I experienced my first manhood supplement.

At that point I weighed around 165 pounds. I now weigh 185 pounds. My collar size went from a 15 to a 17 1/2 in a few months; my chest went from 40 to 44. My appetite in every sense of that word expanded beyond measure. Going from napping two hours a day, I now rarely sleep in the daytime and have enough energy for daily workouts and a hefty work schedule. I can squat more than 400 pounds. Depression, once a regular feature of my life, is now a distant memory. I feel
better able to recover from life's curveballs, more persistent, more alive. These are the long-term
effects. They are almost as striking as the short-term ones.

Because the testosterone is injected every two weeks, and it quickly leaves the bloodstream, I can
actually feel its power on almost a daily basis. Within hours, and at most a day, I feel a deep
surge of energy. It is less edgy than a double espresso, but just as powerful. My attention span
shortens. In the two or three days after my shot, I find it harder to concentrate on writing and feel
the need to exercise more. My wit is quicker, my mind faster, but my judgment is more
impulsive. It is not unlike the kind of rush I get before talking in front of a large audience, or
going on a first date, or getting on an airplane, but it suffuses me in a less abrupt and more
consistent way. In a word, I feel braced. For what? It scarcely seems to matter.

And then after a few days, as the testosterone peaks and starts to decline, the feeling alters a little.
I find myself less reserved than usual, and more garrulous. The same energy is there, but it seems
less directed toward action than toward interaction, less toward pride than toward lust. The odd
thing is that, however much experience I have with it, this lust peak still takes me unawares. It is
not like feeling hungry, a feeling you recognize and satiate. It creeps up on you. It is only a few
days later that I look back and realize that I spent hours of the recent past socializing in a bar or
checking out every potential date who came vaguely over my horizon. You realize more acutely
than before that lust is a chemical. It comes; it goes. It waxes; it wanes. You are not helpless in
front of it, but you are certainly not fully in control.

Then there's anger. I have always tended to bury or redirect my rage. I once thought this an
inescapable part of my personality. It turns out I was wrong. Late last year, mere hours after a T
shot, my dog ran off the leash to forage for a chicken bone left in my local park. The more I
chased her, the more she ran. By the time I retrieved her, the bone had been consumed, and I gave
her a sharp tap on her rear end. "Don't smack your dog!" yelled a burly guy a few yards away.
What I found myself yelling back at him is not printable in this magazine, but I have never used
that language in public before, let alone bellow it at the top of my voice. He shouted back, and
within seconds I was actually close to hitting him. He backed down and slunk off. I strutted
home, chest puffed up, contrite beagle dragged sheepishly behind me. It wasn't until half an hour
later that I realized I had been a complete jerk and had nearly gotten into the first public brawl of
my life. I vowed to inject my testosterone at night in the future.

That was an extreme example, but other, milder ones come to mind: losing my temper in a petty
argument; innumerable traffic confrontations; even the occasional slightly too prickly column or
e-mail flame-out. No doubt my previous awareness of the mythology of testosterone had subtly
primed me for these feelings of irritation and impatience. But when I place them in the larger
context of my new testosterone-associated energy, and of what we know about what testosterone
tends to do to people, then it seems plausible enough to ascribe some of this increased edginess
and self-confidence to that biweekly encounter with a syringe full of manhood.

Testosterone, oddly enough, is a chemical closely related to cholesterol. It was first isolated by a
Dutch scientist in 1935 from mice testicles and successfully synthesized by the German biologist
Adolf Butenandt. Although testosterone is often thought of as the definition of maleness, both
men and women produce it. Men produce it in their testicles; women produce it in their ovaries
and adrenal glands. The male body converts some testosterone to estradiol, a female hormone,
and the female body has receptors for testosterone, just as the male body does. That's why women
who want to change their sex are injected with testosterone and develop male characteristics, like
deeper voices, facial hair and even baldness. The central biological difference between adult men
and women, then, is not that men have testosterone and women don't. It's that men produce much, much more of it than women do. An average woman has 40 to 60 nanograms of testosterone in a deciliter of blood plasma. An average man has 300 to 1,000 nanograms per deciliter.

Testosterone's effects start early -- really early. At conception, every embryo is female and unless hormonally altered will remain so. You need testosterone to turn a fetus with a Y chromosome into a real boy, to masculinize his brain and body. Men experience a flood of testosterone twice in their lives: in the womb about six weeks after conception and at puberty. The first fetal burst primes the brain and the body, endowing male fetuses with the instinctual knowledge of how to respond to later testosterone surges. The second, more familiar adolescent rush -- squeaky voices, facial hair and all -- completes the process. Without testosterone, humans would always revert to the default sex, which is female. The Book of Genesis is therefore exactly wrong. It isn't women who are made out of men. It is men who are made out of women. Testosterone, to stretch the metaphor, is Eve's rib.

The effect of testosterone is systemic. It engenders both the brain and the body. Apart from the obvious genital distinction, other differences between men's and women's bodies reflect this: body hair, the ratio of muscle to fat, upper-body strength and so on. But testosterone leads to behavioral differences as well. Since it is unethical to experiment with human embryos by altering hormonal balances, much of the evidence for this idea is based on research conducted on animals. A Stanford research group, for example, as reported in Deborah Blum's book "Sex on the Brain," injected newborn female rats with testosterone. Not only did the female rats develop penises from their clitorises, but they also appeared fully aware of how to use them, trying to have sex with other females with merry abandon. Male rats who had their testosterone blocked after birth, on the other hand, saw their penises wither or disappear entirely and presented themselves to the female rats in a passive, receptive way. Other scientists, theorizing that it was testosterone that enabled male zebra finches to sing, injected mute female finches with testosterone. Sure enough, the females sang. Species in which the female is typically more aggressive, like hyenas in female-run clans, show higher levels of testosterone among the females than among the males. Female sea snipes, which impregnate the males, and leave them to stay home and rear the young, have higher testosterone levels than their mates. Typical "male" behavior, in other words, corresponds to testosterone levels, whether exhibited by chromosomal males or females.

Does this apply to humans? The evidence certainly suggests that it does, though much of the "proof" is inferred from accidents. Pregnant women who were injected with progesterone (chemically similar to testosterone) in the 1950's to avoid miscarriage had daughters who later reported markedly tomboyish childhoods. Ditto girls born with a disorder that causes their adrenal glands to produce a hormone like testosterone rather than the more common cortisol. The moving story, chronicled in John Colapinto's book "As Nature Made Him," of David Reimer, who as an infant was surgically altered after a botched circumcision to become a girl, suggests how long-lasting the effect of fetal testosterone can be. Despite a ruthless attempt to socialize David as a girl, and to give him the correct hormonal treatment to develop as one, his behavioral and psychological makeup was still ineradicably male. Eventually, with the help of more testosterone, he became a full man again. Female-to-male transsexuals report a similar transformation when injected with testosterone. One, Susan/Drew Seidman, described her experience in The Village Voice last November. "My sex-drive went through the roof," Seidman recalled. "I felt like I had to have sex once a day or I would die. . . . I was into porn as a girl, but now I'm really into porn." For Seidman, becoming a man was not merely physical. Thanks to testosterone, it was also
psychological. "I'm not sure I can tell you what makes a man a man," Seidman averred. "But I know it's not a penis."

The behavioral traits associated with testosterone are largely the cliche-ridden ones you might expect. The Big T correlates with energy, self-confidence, competitiveness, tenacity, strength and sexual drive. When you talk to men in testosterone therapy, several themes recur. "People talk about extremes," one man in his late 30's told me. "But that's not what testosterone does for me. It makes me think more clearly. It makes me think more positively. It's my Saint Johnswort." A man in his 20's said: "Usually, I cycle up the hill to my apartment in 12th gear. In the days after my shot, I ride it easily in 16th." A 40-year-old executive who took testosterone for bodybuilding purposes told me: "I walk into a business meeting now and I just exude self-confidence. I know there are lots of other reasons for this, but my company has just exploded since my treatment. I'm on a roll. I feel capable of almost anything."

When you hear comments like these, it's no big surprise that strutting peacocks with their extravagant tails and bright colors are supercharged with testosterone and that mousy little male sparrows aren't. "It turned my life around," another man said. "I felt stronger -- and not just in a physical sense. It was a deep sense of being strong, almost spiritually strong." Testosterone's antidepressive power is only marginally understood. It doesn't act in the precise way other antidepressants do, and it probably helps alleviate gloominess primarily by propelling people into greater activity and restlessness, giving them less time to think and reflect. (This may be one reason women tend to suffer more from depression than men.) Like other drugs, T can also lose potency if overused. Men who inject excessive amounts may see their own production collapse and experience shrinkage of their testicles and liver damage.

Individual effects obviously vary, and a person's internal makeup is affected by countless other factors -- physical, psychological and external. But in this complex human engine, testosterone is gasoline. It revs you up. A 1997 study took testosterone samples from 125 men and 128 women and selected the 12 with the lowest levels of testosterone and the 15 with the highest. They gave them beepers, asked them to keep diaries and paged them 20 times over a four-day period to check on their actions, feelings, thoughts and whereabouts. The differences were striking. High-testosterone people "experienced more arousal and tension than those low in testosterone," according to the study. "They spent more time thinking, especially about concrete problems in the immediate present. They wanted to get things done and felt frustrated when they could not. They mentioned friends more than family or lovers."

Unlike Popeye's spinach, however, testosterone is also, in humans at least, a relatively subtle agent. It is not some kind of on-off switch by which men are constantly turned on and women off. For one thing, we all start out with different base-line levels. Some women may have remarkably high genetic T levels, some men remarkably low, although the male-female differential is so great that no single woman's T level can exceed any single man's, unless she, or he, has some kind of significant hormonal imbalance. For another, and this is where the social and political ramifications get complicated, testosterone is highly susceptible to environment. T levels can rise and fall depending on external circumstances -- short term and long term. Testosterone is usually elevated in response to confrontational situations -- a street fight, a marital spat, a presidential debate -- or in highly charged sexual environments, like a strip bar or a pornographic Web site. It can also be raised permanently in continuously combative environments, like war, although it can also be suddenly lowered by stress.
Because testosterone levels can be measured in saliva as well as in blood, researchers like Alan Booth, Allan Mazur, Richard Udry and particularly James M. Dabbs, whose book "Heroes, Rogues and Lovers" will be out this fall, have compiled quite a database on these variations. A certain amount of caution is advisable in interpreting the results of these studies. There is some doubt about the validity of onetime samples to gauge underlying testosterone levels. And most of the studies of the psychological effects of testosterone take place in culturally saturated environments, so that the difference between cause and effect is often extremely hard to disentangle. Nevertheless, the sheer number and scale of the studies, especially in the last decade or so, and the strong behavioral correlations with high testosterone, suggest some conclusions about the social importance of testosterone that are increasingly hard to gainsay.

Testosterone is clearly correlated in both men and women with psychological dominance, confident physicality and high self-esteem. In most combative, competitive environments, especially physical ones, the person with the most T wins. Put any two men in a room together and the one with more testosterone will tend to dominate the interaction. Working women have higher levels of testosterone than women who stay at home, and the daughters of working women have higher levels of testosterone than the daughters of housewives. A 1996 study found that in lesbian couples in which one partner assumes the male, or "butch," role and another assumes the female, or "femme," role, the "butch" woman has higher levels of testosterone than the "femme" woman. In naval medical tests, midshipmen have been shown to have higher average levels of testosterone than plebes. Actors tend to have more testosterone than ministers, according to a 1990 study. Among 700 male prison inmates in a 1995 study, those with the highest T levels tended to be those most likely to be in trouble with the prison authorities and to engage in unprovoked violence. This is true among women as well as among men, according to a 1997 study of 87 female inmates in a maximum security prison. Although high testosterone levels often correlate with dominance in interpersonal relationships, it does not guarantee more social power. Testosterone levels are higher among blue-collar workers, for example, than among white-collar workers, according to a study of more than 4,000 former military personnel conducted in 1992. A 1998 study found that trial lawyers -- with their habituation to combat, conflict and swagger -- have higher levels of T than other lawyers.

The salient question, of course, is, How much of this difference in aggression and dominance is related to environment? Are trial lawyers naturally more testosteroned, and does that lead them into their profession? Or does the experience of the courtroom raise their levels? Do working women have naturally higher T levels, or does the prestige of work and power elevate their testosterone? Because of the limits of researching such a question, it is hard to tell beyond a reasonable doubt. But the social context clearly matters. It is even possible to tell who has won a tennis match not by watching the game, but by monitoring testosterone-filled saliva samples throughout. Testosterone levels rise for both players before the match. The winner of any single game sees his T production rise; the loser sees it fall. The ultimate winner experiences a postgame testosterone surge, while the loser sees a collapse. This is true even for people watching sports matches. A 1998 study found that fans backing the winning side in a college basketball game and a World Cup soccer match saw their testosterone levels rise; fans rooting for the losing teams in both games saw their own T levels fall. There is, it seems, such a thing as vicarious testosterone.

One theory to explain this sensitivity to environment is that testosterone was originally favored in human evolution to enable successful hunting and combat. It kicks in, like adrenaline, in anticipation of combat, mental or physical, and helps you prevail. But a testosterone crash can be a killer too. Toward the end of my two-week cycle, I can almost feel my spirits dragging. In the event of a just-lost battle, as Matt Ridley points out in his book "The Red Queen," there's a good
reason for this to occur. If you lose a contest with prey or a rival, it makes sense not to pick another fight immediately. So your body wisely prompts you to withdraw, filling your brain with depression and self-doubt. But if you have made a successful kill or defeated a treacherous enemy, your hormones goad you into further conquest. And people wonder why professional football players get into postgame sexual escapades and violence. Or why successful businessmen and politicians often push their sexual luck.

Similarly, testosterone levels may respond to more long-term stimuli. Studies have shown that inner-city youths, often exposed to danger in high-crime neighborhoods, may generate higher testosterone levels than unthreatened, secluded suburbanites. And so high T levels may not merely be responses to a violent environment; they may subsequently add to it in what becomes an increasingly violent, sexualized cycle. (It may be no accident that testosterone-soaked ghettos foster both high levels of crime and high levels of illegitimacy.) In the same way, declines in violence and crime may allow T levels to drop among young inner-city males, generating a virtuous trend of further reductions in crime and birth rates. This may help to explain why crime can decline precipitously, rather than drift down slowly, over time. Studies have also shown that men in long-term marriages see their testosterone levels progressively fall and their sex drives subsequently decline. It is as if their wives successfully tame them, reducing their sexual energy to a level where it is more unlikely to seek extramarital outlets. A 1993 study showed that single men tended to have higher levels of testosterone than married men and that men with high levels of testosterone turned out to be more likely to have had a failed marriage. Of course, if you start out with higher T levels, you may be more likely to fail at marriage, stay in the sexual marketplace, see your testosterone increase in response to this and so on.

None of this means, as the scientists always caution, that testosterone is directly linked to romantic failure or violence. No study has found a simple correlation, for example, between testosterone levels and crime. But there may be a complex correlation. The male-prisoner study, for example, found no general above-normal testosterone levels among inmates. But murderers and armed robbers had higher testosterone levels than mere car thieves and burglars. Why is this not surprising? One of the most remarkable, but least commented on, social statistics available is the sex differential in crime. For decades, arrest rates have shown that an overwhelmingly disproportionate number of arrestees are male. Although the sex differential has narrowed since the chivalrous 1930's, when the male-female arrest ratio was 12 to 1, it remains almost 4 to 1, a close echo of the testosterone differential between men and women. In violent crime, men make up an even bigger proportion. In 1998, 89 percent of murders in the United States, for example, were committed by men. Of course, there's a nature-nurture issue here as well, and the fact that the sex differential in crime has decreased over this century suggests that environment has played a part. Yet despite the enormous social changes of the last century, the differential is still 4 to 1, which suggests that underlying attributes may also have a great deal to do with it.

This, then, is what it comes down to: testosterone is a facilitator of risk -- physical, criminal, personal. Without the influence of testosterone, the cost of these risks might seem to far outweigh the benefits. But with testosterone charging through the brain, caution is thrown to the wind. The influence of testosterone may not always lead to raw physical confrontation. In men with many options it may influence the decision to invest money in a dubious enterprise, jump into an ill-advised sexual affair or tell an egregiously big whopper. At the time, all these decisions may make some sort of testosteroned sense. The White House, anyone?

The effects of testosterone are not secret; neither is the fact that men have far more if it than women. But why? As we have seen, testosterone is not synonymous with gender; in some
species, it is the female who has most of it. The relatively new science of evolutionary psychology offers perhaps the best explanation for why that's not the case in humans. For neo-Darwinians, the aggressive and sexual aspects of testosterone are related to the division of labor among hunter-gatherers in our ancient but formative evolutionary past. This division -- men in general hunted, women in general gathered -- favored differing levels of testosterone. Women need some testosterone -- for self-defense, occasional risk-taking, strength -- but not as much as men. Men use it to increase their potential to defeat rivals, respond to physical threats in strange environments, maximize their physical attractiveness, prompt them to spread their genes as widely as possible and defend their home if necessary.

But the picture, as most good evolutionary psychologists point out, is more complex than this. Men who are excessively testosterone are not that attractive to most women. Although they have the genes that turn women on -- strong jaws and pronounced cheekbones, for example, are correlated with high testosterone -- they can also be precisely the unstable, highly sexed creatures that childbearing, stability-seeking women want to avoid. There are two ways, evolutionary psychologists hazard, that women have successfully squared this particular circle. One is to marry the sweet class nerd and have an affair with the college quarterback: that way you get the good genes, the good sex and the stable home. The other is to find a man with variable T levels, who can be both stable and nurturing when you want him to be and yet become a muscle-bound, bristly gladiator when the need arises. The latter strategy, as Emma Bovary realized, is sadly more easily said than done.

So over millennia, men with high but variable levels of testosterone were the ones most favored by women and therefore most likely to produce offspring, and eventually us. Most men today are highly testosterone, but not rigidly so. We don't have to live at all times with the T levels required to face down a woolly mammoth or bed half the village's young women. We can adjust so that our testosterone levels make us more suitable for co-parenting or for simply sticking around our mates when the sexual spark has dimmed. Indeed, one researcher, John Wingfield, has found a suggestive correlation in bird species between adjustable testosterone levels and males that have an active role to play in rearing their young. Male birds with consistently high testosterone levels tend to be worse fathers; males with variable levels are better dads. So there's hope for the new man yet.

From the point of view of men, after all, constantly high testosterone is a real problem, as any 15-year-old boy trying to concentrate on his homework will tell you. I missed one deadline on this article because it came three days after a testosterone shot and I couldn't bring myself to sit still long enough. And from a purely genetic point of view, men don't merely have an interest in impregnating as many women as possible; they also have an interest in seeing that their offspring are brought up successfully and their genes perpetuated. So for the male, the conflict between sex and love is resolved, as it is for the female, by a compromise between the short-term thrill of promiscuity and the long-term rewards of nurturing children. Just as the female does, he optimizes his genetic outcome by a stable marriage and occasional extramarital affairs. He is just more likely to have these affairs than a woman. Testosterone is both cause and effect of this difference.

And the difference is a real one. This is so obvious a point that we sometimes miss it. But without that difference, it would be hard to justify separate sports leagues for men and women, just as it would be hard not to suspect judicial bias behind the fact that of the 98 people executed last year in the United States, 100 percent came from a group that composes a little less than 50 percent of
the population; that is, men. When the discrepancy is racial, we wring our hands. That it is sexual raises no red flags. Similarly, it is not surprising that 55 percent of everyone arrested in 1998 was under the age of 25 -- the years when male testosterone levels are at their natural peak.

It is also controversial yet undeniable that elevating testosterone levels can be extremely beneficial for physical and mental performance. It depends, of course, on what you're performing in. If your job is to whack home runs, capture criminals or play the market, then testosterone is a huge advantage. If you're a professional conciliator, office manager or teacher, it is probably a handicap. Major League Baseball was embarrassed that Mark McGwire's 1998 season home-run record might have been influenced by his use of androstenedione, a legal supplement that helps increase the body's own production of testosterone. But its own study into andro's effects concluded that regular use of it clearly raises T levels and so improves muscle mass and physical strength, without serious side effects. Testosterone also accelerates the rate of recovery from physical injury. Does this help make sense of McGwire's achievement? More testosterone obviously didn't give him the skill to hit 70 home runs, but it almost certainly contributed to the physical and mental endurance that helped him do so.

Since most men have at least 10 times as much T as most women, it therefore makes sense not to have coed baseball leagues. Equally, it makes sense that women will be underrepresented in a high-testosterone environment like military combat or construction. When the skills required are more cerebral or more endurance-related, the male-female gap may shrink, or even reverse itself. But otherwise, gender inequality in these fields is primarily not a function of sexism, merely of common sense. This is a highly controversial position, but it really shouldn't be. Even more unsettling is the racial gap in testosterone. Several solid studies, published in publications like Journal of the National Cancer Institute, show that black men have on average 3 to 19 percent more testosterone than white men. This is something to consider when we're told that black men dominate certain sports because of white racism or economic class rather than black skill. This reality may, of course, feed stereotypes about blacks being physical but not intellectual. But there's no evidence of any trade-off between the two. To say that someone is physically gifted is to say nothing about his mental abilities, as even N.F.L. die-hards have come to realize. Indeed, as Jon Entine points out in his new book, "Taboo," even the position of quarterback, which requires a deft mix of mental and physical strength and was once predominantly white, has slowly become less white as talent has been rewarded. The percentage of blacks among N.F.L. quarterbacks is now twice the percentage of blacks in the population as a whole.

But fears of natural difference still haunt the debate about gender equality. Many feminists have made tenacious arguments about the lack of any substantive physical or mental differences between men and women as if the political equality of the sexes depended on it. But to rest the equality of women on the physical and psychological equivalence of the sexes is to rest it on sand. In the end, testosterone bites. This year, for example, Toys "R" Us announced it was planning to redesign its toy stores to group products most likely to be bought by the same types of consumers: in marketing jargon, "logical adjacencies." The results? Almost total gender separation. "Girl's World" would feature Easy-Bake Ovens and Barbies; "Boy's World," trucks and action figures. Though Toys "R" Us denied that there was any agenda behind this -- its market research showed that gender differences start as young as 2 years old -- such a public out-cry ensued that the store canceled its plans. Meanwhile, Fox Family Channels is about to introduce two new, separate cable channels for boys and
girls, boyzChannel and girlzChannel, to attract advertisers and consumers more efficiently. Fox executives told The Wall Street Journal that their move is simply a reflection of what Nielsen-related research tells them about the viewing habits of boys and girls: that, "in general terms, girls are more interested in entertainment that is relationship-oriented," while boys are "more action-oriented." T anyone? After more than two decades of relentless legal, cultural and ideological attempts to negate sexual difference between boys and girls, the market has turned around and shown that very little, after all, has changed.

Advocates of a purely environmental origin for this difference between the sexes counter that gender socialization begins very early and is picked up by subtle inferences from parental interaction and peer pressure, before being reinforced by the collective culture at large. Most parents observing toddlers choosing their own toys and play patterns can best judge for themselves how true this is. But as Matt Ridley has pointed out, there is also physiological evidence of very early mental differences between the sexes, most of it to the advantage of girls. Ninety-five percent of all hyperactive kids are boys; four times as many boys are dyslexic and learning-disabled as girls. There is a greater distinction between the right and left brain among boys than girls, and worse linguistic skills. In general, boys are better at spatial and abstract tasks, girls at communication. These are generalizations, of course. There are many, many boys who are great linguists and model students, and vice versa. Some boys even prefer, when left to their own devices, to play with dolls as well as trucks. But we are talking of generalities here, and the influence of womb-given testosterone on those generalities is undeniable.

Some of that influence is a handicap. We are so used to associating testosterone with strength, masculinity and patriarchal violence that it is easy to ignore that it also makes men weaker in some respects than women. It doesn't correlate with economic power: in fact, as we have seen, blue-collar workers have more of it than white-collar workers. It gets men into trouble. For reasons no one seems to understand, testosterone may also be an immune suppressant. High levels of it can correspond, as recent studies have shown, not only with baldness but also with heart disease and a greater susceptibility to infectious diseases. Higher levels of prostate cancer among blacks, some researchers believe, may well be related to blacks' higher testosterone levels. The aggression it can foster and the risks it encourages lead men into situations that often wound or kill them. And higher levels of testosterone-driven promiscuity make men more prone to sexually transmitted diseases. This is one reason that men live shorter lives on average than women. There is something, in other words, tragic about testosterone. It can lead to a certain kind of male glory; it may lead to valor or boldness or impulsive romanticism. But it also presages a uniquely male kind of doom. The cockerel with the brightest comb is often the most attractive and the most testosteroned, but it is also the most vulnerable to parasites. It is as if it has sacrificed quantity of life for intensity of experience, and this trade-off is a deeply male one.

So it is perhaps unsurprising that those professions in which this trade-off is most pronounced -- the military, contact sports, hazardous exploration, venture capitalism, politics, gambling -- tend to be disproportionately male. Politics is undoubtedly the most controversial because it is such a critical arena for the dispersal of power. But consider for a moment how politics is conducted in our society. It is saturated with combat, ego, conflict and risk. An entire career can be lost in a single gaffe or an unexpected shift in the national mood. This ego-driven roulette is almost as highly biased toward the testosteroned as wrestling. So it makes some sense that after almost a century of electorates made up by as many women as men, the number of female politicians remains pathetically small in most Western democracies. This may not be endemic to politics; it
may have more to do with the way our culture constructs politics. And it is not to say that women
are not good at government. Those qualities associated with low testosterone -- patience, risk
aversion, empathy -- can all lead to excellent governance. They are just lousy qualities in the
crapshoot of electoral politics.

If you care about sexual equality, this is obviously a challenge, but it need not be as depressing as
it sounds. The sports world offers one way out. Men and women do not compete directly against
one another; they have separate tournaments and leagues. Their different styles of physical
excellence can be appreciated in different ways. At some basic level, of course, men will always
be better than women in many of these contests. Men run faster and throw harder. Women could
compensate for this by injecting testosterone, but if they took enough to be truly competitive, they
would become men, which would somewhat defeat the purpose.

The harder cases are in those areas in which physical strength is important but not always crucial,
like military combat or manual labor. And here the compromise is more likely to be access but
inequality in numbers. Finance? Business? Here, where the testosterone-driven differences may
well be more subtly psychological, and where men may dominate by discrimination rather than
merit, is the trickiest arena. Testosterone-induced impatience may lead to poor decision-making,
but low-testosterone risk aversion may lead to an inability to seize business opportunities.
Perhaps it is safest to say that unequal numbers of men and women in these spheres is not prima
facie evidence of sexism. We should do everything we can to ensure equal access, but it is foolish
to insist that numerical inequality is always a function of bias rather than biology. This doesn't
mean we shouldn't worry about individual cases of injustice; just that we shouldn't be shocked if
gender inequality endures. And we should recognize that affirmative action for women (and men)
in all arenas is an inherently utopian project.

Then there is the medical option. A modest solution might be to give more women access to
testosterone to improve their sex drives, aggression and risk affinity and to help redress their
disadvantages in those areas as compared with men. This is already done for severely depressed
women, or women with hormonal imbalances, or those lacking an adequate sex drive, especially
after menopause. Why not for women who simply want to rev up their will to power? Its use
needs to be carefully monitored because it can also lead to side effects, like greater susceptibility
to cancer, but that's what doctors are there for. And since older men also suffer a slow drop-off in
T levels, there's no reason they should be cold-shouldered either. If the natural disadvantages of
gender should be countered, why not the natural disadvantages of age? In some ways, this is
already happening. Among the most common drugs now available through Internet doctors and
pharmacies, along with Viagra and Prozac, is testosterone. This summer, with the arrival of
AndroGel, the testosterone gel created as a medical treatment for those four to five million men
who suffer from low levels of testosterone, recreational demand may soar.

Or try this thought experiment: what if parents committed to gender equity opted to counteract
the effect of testosterone on boys in the womb by complementing it with injections of artificial
female hormones? That way, structural gender difference could be eradicated from the beginning.
Such a policy would lead to "men and women with normal bodies but identical feminine brains,"
Matt Ridley posits. "War, rape, boxing, car racing, pornography and hamburgers and beer would
soon be distant memories. A feminist paradise would have arrived." Today's conservative cultural
critics might also be enraptured. Promiscuity would doubtless decline, fatherhood improve, crime
drop, virtue spread. Even gay men might start behaving like lesbians, fleeing the gym and
marrying for life. This is a fantasy, of course, but our increasing control and understanding of the
scientific origins of our behavior, even of our culture, is fast making those fantasies things we
will have to actively choose to forgo.

But fantasies also tell us something. After a feminist century, we may be in need of a new
understanding of masculinity. The concepts of manliness, of gentlemanly behavior, of chivalry
have been debunked. The New Age bonding of the men's movement has been outlived. What our
increasing knowledge of testosterone suggests is a core understanding of what it is to be a man,
for better and worse. It is about the ability to risk for good and bad; to act, to strut, to dare, to
seize. It is about a kind of energy we often rue but would surely miss. It is about the foolishness
that can lead to courage or destruction, the beauty that can be strength or vanity. To imagine a
world without it is to see more clearly how our world is inseparable from it and how our current
political pieties are too easily threatened by its reality.

And as our economy becomes less physical and more cerebral, as women slowly supplant men in
many industries, as income inequalities grow and more highly testosteroned blue-collar men find
themselves shunted to one side, we will have to find new ways of channeling what nature has
bequeathed us. I don't think it's an accident that in the last decade there has been a growing focus
on a muscular male physique in our popular culture, a boom in crass men's magazines, an
explosion in violent computer games or a professional wrestler who has become governor. These
are indications of a cultural displacement, of a world in which the power of testosterone is
ignored or attacked, with the result that it re-emerges in cruder and less social forms. Our main
task in the gender wars of the new century may not be how to bring women fully into our society,
but how to keep men from seceding from it, how to reroute testosterone for constructive ends,
rather than ignore it for political point-making.

For my part, I'll keep injecting the Big T. Apart from how great it makes me feel, I consider it no
insult to anyone else's gender to celebrate the uniqueness of one's own. Diversity need not mean
the equalization of difference. In fact, true diversity requires the acceptance of difference. A
world without the unruly, vulnerable, pioneering force of testosterone would be a fairer and
calmer, but far grayer and duller, place. It is certainly somewhere I would never want to live.
Perhaps the fact that I write this two days after the injection of another 200 milligrams of
testosterone into my bloodstream makes me more likely to settle for this colorful trade-off than
others. But it seems to me no disrespect to womanhood to say that I am perfectly happy to be a
man, to feel things no woman will ever feel to the degree that I feel them, to experience the world
in a way no woman ever has. And to do so without apology or shame.
By the time I retrieved her, the bone had been consumed, and I gave her a sharp tap on her rear end. "Don't smack your dog!" yelled a burly guy a few yards away. What I found myself yelling back at him is not printable in this magazine, but I have never used that language in public before, let alone bellow it at the top of my voice. Hormones are the chemical messengers of the body. They regulate the body physiology based on the signals from the brain. They transfer the signal directly on to the respective organ or system for the changes to happen. So they are like the messengers carrying a message from the brain to the other organs. Most of the hormones are named after the gland from which they are secreted. These are then carried by blood into target tissues where they show their effect. They regulate most of the body physiology and functions.