

## Historical note

# The ancient and medieval Greek writer's perceptions concerning the relationship between sexual characteristics and testicular volume

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Physicians and scholars of antiquity were well aware that the function of the testicles of humans and animals was not restricted to the production of sperm alone but that it was directly related to sexuality and secondary sexual characteristics. This concept was the natural conclusion of their observations on the macroscopical results of the removal of testicular tissue, i.e. castration, either accidentally or intentionally. In this paper we discuss the perception entertained by medical writers of ancient times as regards the relationship existing between the size of testicular mass and an individual's sexual characteristics. For the sake of simplicity, we have classified their views according to the number of testicles a man may have. Generally speaking, it was believed that there was a strong correlation between virility and the existence of no testicle at all, of half a testicle, one testicle, two testicles or even three testicles.

- a) **No testicles:** Hippocrates (5<sup>th</sup>-4<sup>th</sup> c. BC) was the first Greek medical writer to leave a written report on the changes in the voice of eunuchs: "*Eu-*

*nuchs, children and women have high-pitched voices*".<sup>1</sup> He also made the observation that "*Eunuchs never become bald and never present gout*".<sup>2</sup> Aristotle (4<sup>th</sup>-3<sup>rd</sup> c. BC), in a treatise on the nature of the human voice, supports this notion and attributes the voice change to the weakness of the heart due to the ablation of the testicles. His main line of reasoning focuses on the effect testicles were thought to exert on the heart because of their weight through supposedly stretching the intermediate tissues and transferring the tension to the heart in much the same manner as weights of a loom stretch the fibers of the textile. The ablation of the testicles, he theorized, results in permanent relaxation of the heart. He further concluded, "*When the testicles are ablated the male becomes a female*"<sup>3</sup>. Galen, commenting on Aristotle's writings, partly refutes Aristotle's position, affirming that, though the testicle's impact on the body is considerable, it does not concern weight.

*"Aristotle has stated many times that the small organs are the cause of major alterations in the whole body. And we have to add this to his assertion that, if an organ is removed from the body of an animal, then the whole animal changes and what has changed is related to that organ. When it is missing, the animal is weak and when it is present it is a source of power. And in a similar manner, if this organ is an organ of reproduction and is ablated,*

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*then its sexual urge is also removed and this [urge] cannot be replaced, not even by the heart, for if the heart grants life, the testicles provide good life. And since good life is better than life alone, the testicles are at least as important as the heart. Thus, is it fair to consider them [the testicles] merely stones hanging from threads, useful just as weights alone? So why is it that when these are removed, the vigor of the body is also removed? And this undoubtedly should constitute a major problem for Aristotle in his first book on animal generation where, while explaining the need for perpetuation, he assumes that testicles are folded spermatogenic apparatuses, created by nature. In a minor text of his fifth book about tone of voice, high and low pitched, he attempts to prove that the ablation of the testicles makes the heart weaker in its actions...*"<sup>4</sup>

Galen then applies the humors' theory to the function of the testicles in order to explain their properties: *"In the testicles there is an impetuous liquid from which their [the testicles'] body is fed. Each one of them [the organs] processes its familiar nutrient, and likewise testicles process sperm. Therefore it is so strange, that the testicles do not transfer a force throughout the whole body, like the one from the brain, through the nerves, and that from the heart through the arteries. This force is the cause of vigor and virility in, and, for that reason, if a male is castrated by removal of the testicles, the male becomes similar to the female. All the other organs have the same powers on both sexes."*<sup>5</sup> This is a very clear, albeit indirect, reference to the role of a hormone. Galen goes on to refute certain hypotheses about the function of the testicles as entertained by other scholars who insisted that the testicles are responsible exclusively for producing sperm. He states that if the testicles are only for the purposes of procreation, then those athletes competing in the Olympic Games would be able to dedicate themselves more fully to the athletic contests if their testicles were removed and would demonstrate superior performance since their minds would not be distracted by family affairs. However, quite to the contrary, eunuchs do not perform well in these games *".....not only losing their ability to impregnate but also everything else necessary to*

*achieve victory. Hence, this excision is unsafe, severing, together with the testicles, the power from the entire body..."*<sup>6</sup>

As far as the Hippocratic Aphorism is concerned, that *"Eunuchs never become bald and never present gout"*, Galen states that *"In eunuchs neither gout nor baldness emerges. The removal of the testicles turns eunuchs into women. And just as they [women] do not become bald due to their cold constitution, neither do eunuchs"*.<sup>7,8</sup>

- b) Half a testicle:** Galen observed that the removal of the testicles had to be complete in order to perceive the full effect of castration. Otherwise, the effect of castration will be incomplete due to remaining tissue.<sup>9</sup>

Paulus of Aegina (7<sup>th</sup> c. AD) suggests that castration should be executed through ablation with a knife and not by strangulation or constriction, for there is a strong possibility that some tissue will remain alive.<sup>10</sup> Theophilus Protospatharius (9/10<sup>th</sup> c. AD) makes the same observation but adds that *"...some eunuchs may copulate and ejaculate but [the sperm] is useless and infertile."*<sup>11</sup> The damage done to the testicles through compression of the testicular tissue was a subject of great concern for the physicians of antiquity. They even gave special directions to mothers and nannies: *"Holding the baby on our shoulders and walking, this we strongly disapprove of because the pressure keeps the testicles inside or destroys them, sometimes causing cryptorchism and other times castration"*.<sup>12</sup>

- c) One testicle:** Apart from eunuchs who were not completely castrated, there are references concerning the case of monorchids. In *"Hippiatrica"* (veterinary medicine focusing on horses, 9<sup>th</sup> c. AD), the medical writer Apseros states that *"...one must not buy animals with one testicle for they are usually infertile or bear suchlike. Similarly, those that have varicose veins on their testicles are useless. Because the stallion must be perfect and flawless"*.<sup>13</sup> Cyrillus of Alexandria, a famous Byzantine theologian (4-5 c. AD), when commenting on a passage of the Old Testament concerning who is to be excluded from becoming a messenger of the Lord's Word, stated that, amongst

others, the monorchids are definitely excluded. Unfortunately, Cyrillus did not say if these monorchids were born this way or were deprived of one of their testicles either deliberately or accidentally later in life.<sup>14</sup>

- d) Two testicles:** Aetius Amidenus (6<sup>th</sup> c. AD) also makes an important contribution to the physiology of the testicles as regards the quality of sperm:

*"On the properties of the testicles' constitution. A warm constitution is aphrodisiac and masculinating and fertile and swiftly produces growth of hair on the genitals and, to a lesser degree, around them. A cold constitution does the opposite. The combination of warm and dry constitutions produces thick sperm, powerful fertility and arouses the animal to coition. Those that have these constitutions have hair on their genitals and on the entire area around them, starting above, from the umbilicus and ending at the middle of the thighs, and this constitution is very aggressive for intercourse and overwhelms the animal, and if it is aggrieved it will cause impairment [to the animal]. Those that have the scrotum loose are weaker and those that have it tense are robust and this stands for all quadrupeds".<sup>15</sup> Aetius's thesis, albeit wrong in its method of explanation, i.e. via the humor theory, provides information similar to that of modern urology as regards sperm quality.<sup>16</sup>*

- e) Three testicles:** While monorchids were considered only half-men, there is nevertheless one reference to a case of a triorchid. In this case, the excess of testicular tissue led its owner to exaggerated and depraved sexual behavior: *"Agathocles: He became a tyrant and, as stated by Timeus, during his youth he was a pervert, always prepared for debauchery, offering himself to all carnals, scurrilous, having three testicles (triorchesV), hustling in front of those who preferred the behind".<sup>17</sup>*

It is unclear whether Agathocles' case was a true anatomical triorchidism (which is a recognizable, rare, congenital abnormality) or a mythical trope as a result of his outrageous behavior. In a similar reference, we read that the same word is used for naming a kind of a falcon, symbol of power

and masculinity.

*"Triorhes: a kind of falcon. This was also what they called the tyrant of Sicily".<sup>18</sup>* Similarly, Isaac Tzetzēs, a Byzantine scholar (9<sup>th</sup> c. AD?), while commenting on an Alexandrian poet, Lycophrone, uses the terms "predators and wolves and flying eagles with three testicles and extreme vision" to describe valiant heroes like Theseus and Alexander the Great.<sup>19</sup>

## CONCLUSIONS

In conclusion, ancient medical writers had a basically sound idea about the significance of an individual's testicular mass and masculinization. Without knowing the importance of quality as opposed to quantity of testicular cells, they rightly gauged the role of adequate testosterone-producing tissue in contributing to secondary sexual characteristics.

## REFERENCES

1. Hippocrates 1915 *Prorrheticum*. In: Diels H, Teubner (eds) Galeni in Hippocratis prorrheticum commentaria iii, *Corpus medicorum Graecorum*, Leipzig 16: p, 608.
2. Hippocrates 1962 *Aphorismi*. In: Littré E (ed) *Oeuvres complètes d'Hippocrate*, Publication Hakkert, Amsterdam; chapter 6, section 28.
3. Aristoteles 1965 *De generatione animalium*. In: Drossaert L (ed) *Publication Clarendon Press*, Oxford; p, 787b.
4. Galen 1964 *De semine libri ii*. In: Kóhn CG (ed) *Claudii Galeni opera omnia*, Hildesheim, Olms 4: p, 574.
5. Galen 1964 *De semine libri ii*. In: Kóhn CG (ed) *Claudii Galeni opera omnia*. Hildesheim, Olms 4: p, 583.
6. Galen 1964 *De semine libri ii*. In: Kóhn CG (ed) *Claudii Galeni opera omnia*. Hildesheim, Olms 4: p, 563.
7. Galen 1965 *Hippocratis aphorismos commentarii vii*. In: Kóhn CG (ed) *Claudii Galeni opera omnia*, Hildesheim, Olms 57: p, 92.
8. Troianus S 1997 *Crime and Punishment in Byzantium*. Goulandri Foundation Publications, Athens; pp, 50-51 (in Greek).
9. Galen 1964 *De semine libri ii*. In: Kóhn CG(ed) *Claudii Galeni opera omnia*. Hildesheim, Olms 4: p, 21.
10. Maraslis A, 1984 *Surgery in Byzantium*, (Post-Doctoral Thesis), Athens University, Athens; pp, 344-345.
11. Theophilus Protospatharius 1842 *De corporis humani fabrica libri quinque*. In: Greenhill GA (ed) *Publication Oxford University Press*, Oxford; book 5, section 28.
12. Soranus 1927 *Gynaeciorum libri iv*. In: Ilberg J (ed)

- Publication Teubner, Leipzig; book 2, chapter 40, section 5.
13. *Hippiatrica Berolinensia* 1971. In: Oder E, Hoppe K (eds) Publication Teubner, Stuttgart; chapter 738.
  14. Cyrillus Theologus. *De adoratione et cultu in spiritu et veritate*, MPG ; 68: p, 793.
  15. Aetius Amidenus 1935. *Iatricorum liber iv*. In: Olivieri A (ed) Publication Teubner, Leipzig; 8.1: chapter 4.
  16. Smith's General Urology 1993. In: Tanagho E, McAninch J (eds) McGraw Hill Publication, New York; p, 677.
  17. *Suda Lexicon* 1971. In: Adler A (ed), Publication Teubner, Stuttgart; word: Agathocles.
  18. *Suda Lexicon* 1971. In: Adler A (ed) Publication Teubner, Stuttgart; word: Triorhes.
  19. Tzetzes Isaak 1958 *Scholia in Lycophronem*. In: Scheer E (ed) *Lycophronis Alexandra*, Berlin; Weidmann 2: scholio 147.