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Articoli/*Articles*

SPERM DISORDERS ACCORDING TO THE BYZANTINE MEDICAL WRITERS (4th-14th centuries)

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SUMMARY

Research in the works of the Byzantine medical authors brought to light significant information concerning disorders of the sperm as causes of infertility. The eminent Byzantine physicians give detailed accounts about the anatomy of the genitals, the creation of the sperm and its disorders as regards its quantity, quality, appearance, consistency, colour, ejaculation etc. According to those authors, the disorders of the sperm are due to, dietetic reasons (a list of foods and drugs influencing the production of sperm is referred to by many Byzantine physicians); constitution and age of the patient; obesity; diseases, such as "gonorrhea" *(involuntary loss of sperm),* oneirogmus, *stenosis of the spermiducts, hypospadias and atrophy of the genitals; iatrogenic reasons (traumatic cutting off of the spermiducts during a lithotomy); castration.*
These concepts were based on the works of the ancient Greek physicians of the Hippocratic, Hellenistic and Roman eras. However, such ideas, enriched by the personal experience of the Byzantine doctors, were transmitted to and influenced Islamic and European medicine and thus the rest of the world.

Many Byzantine writers from early until later periods dealt with the disorders of the sperm as causes of infertility and gave significant information about its creation, characteristics (quantity, quality, appearance, colour, consistency), ejaculation etc.

Creation of the sperm and anatomy of the genitals

The eminent Byzantine physician Oribasius (4th century A.D.) was the first to occupy himself with the creation, qualities and

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disorders of the sperm based on the views of Athenaeus (1st century A.D.) and Galen (2nd century A.D.). In the opinion of the former, the sperm begins to be produced at the age of 14 but becomes fertile at the age of 18 and is no longer produced in those who have reached advanced age[1].

In an extensive chapter, Oribasius[2] quotes opinions of Galen from his various works. The former begins with the definition of the sperm; that is, spirit (*pneuma*) and foamy liquid which, when introduced into the suitable area (he means the womb), becomes the beginning of the creation of the animal. When, however, it falls elsewhere, the spirit expires quickly and there remains a concentrated gluey liquid[3].

Then he deals extensively with the production of the sperm which is created in the vessels before they reach the testicles; he writes that an artery and a vein appear to approach each testicle, not directly but forming numerous spirals or varicoses. In these spirals the blood is transformed into sperm and whitens slowly as can be readily observed. Finally, at the point when the vessel touches the testicle, the substance of the sperm is clearly discernible inside the vessel. In his view the testicles have a hollow and cavernous consistency; the sperm is not produced there but received in the testicles, since it has previously been secreted in the vessels; however, it becomes perfected in the testicles so as to be suitable for creation of the animal.

The artery and vein commence from the vessels of the back in the iliac region and reach the epididymis - an *organ* which exists in the head of the testicle as its name indicates (*epi* is in Greek *on* and *didymos* is *testicle*). From the epididymis, which consists of numerous cavernous areas, the fertile liquid (sperm) is transferred to the testicle. The deferens takes the sperm from this point (testicles or epididymis - it is unclear) and brings it to the roots of the penis.

In the case of removal of the testicles, even if the epididymis remains, the ability to produce fertile sperm is lost together with the manhood of the animal. Those who have lost their testicles, lose their innate warmth and become frigid; their strength is reduced, as in the aged, and the beat of their arter-

ies becomes weak. They also lose their body hair, not only their facial hair, and do not desire sexual relations; they have lost their vigour.

In the case where, due to excessive continuous sexual relations, all the sperm is used up, the testicles absorb more sperm from the above veins, which is of small quantity and mixed with blood as it is violently absorbed from the testicles. Then those veins continually absorb new sperm from the upper vessels so as to empty all the veins of the animal. They remove not only the liquids of the animal containing the fertile substances but also the vital spirit (*pneuma vitalis*) which is emptied from the arteries together with the liquid sperm. Thus we are not surprised that the lascivious are weaker because they have lost the best substances of the body. Some of these sexually excessive people die because the vital spirit dissolves with the sexual pleasure itself[4].

It is worth noting that Galen believed that females had small and not easily perceived testicles, spermatic vessels and epididymis which were located nearly at the bottom of the womb[5]. These organs also produced sperm, a view that can also be found in the *Corpus Hippocraticum*[6].

Paul of Aegina[7] (7th century A.D.) gives clear descriptions of the testicles, their vessels, spermiducts and membranes which surround them. He also writes that the main substance of the testicles, which comprises the fertile power of the sperm, is glandular (ἀδενώδης *adenodes*) and *crumbly* (ψαθαρά).

Dietetic reasons influencing the sperm.

Oribasius[8] first stresses the significant influence of the foods and drugs on the quantity and quality of the sperm, quoting the relevant knowledge of Galen[9].

The writer distinguishes foods in two categories: those which create sperm and which destroy it, and secondly those which cause ejaculation of the sperm and which cause it to be stored in the genitals.

All the foods which create flatulence and drugs which are warm and contain air (*pneuma*) create sperm. On the contrary, all the dry and frigid substances inhibit sperm.

Those which provoke the ejaculation of sperm are all warm and flatulent - that is foods without dry qualities. The foods that assist the storage of the sperm possess opposite qualities.

The foods producing or bringing sperm to the surface are all those containing gases (πνευματώδη, *pneumatode*) such as bulbs[10], chick - peas[11], broad beans, figs, octopus and pinenuts which are all called πολύσπερμα *(polysperma*, producing plentiful sperm). Certain drugs have the same qualities, such as the one extracted from the lizard called *skingos*[12] and the herb *satyrion*[13] and finally certain foods and drugs such as the seed of the wicker reed[14] and the herb *euzomon*[15] (rocket). Cold foods and drugs cause thickening of the consistency of the sperm, congealing and stagnation, without destroying it. Among these are lettuce[16], blite[17], wild spinach[18], marrows (bottle gourds)[19], berries, melons and cucumbers. Dry foods and drug do not permit the production of sperm even if warm, such as the herb rue[20]; even more so if not warm, such as the water-lily (*nymphaea*)[21].

It should be noted that in the production of milk and the menstrual blood, the same qualities are possessed by all those foods and drugs.

Oribasius[22] quotes a special chapter from Rufus of Ephesus (1st century A.D.) concerning sperm disorders. Food, writes Rufus, influences the sperm, which is why physicians order a man who wants children to eat and drink well; while a woman does not need such food, as she is but the recipient of the sperm.

The writer provides particular examples of disorders of the sperm due to diet. Someone from Corinth visited the physician, complaining that during intercourse he ejaculated much pneuma and not genetic material. Rufus writes that he diagnosed *dryness* and imposed a suitable diet with the result that he soon became well and the sperm was restored. Another patient named Milesius (possibly from Miletus), 22 years old, complained that during intercourse he could not ejaculate but, when sleeping, a large quantity of sperm automatically ejaculated (perhaps he refers to *oneirogmus*). Rufus writes that he diagnosed that during intercourse, due to the considerable humid coolness, the

patient could not produce warm sperm which on the contrary was warmed during sleep, as sleep warms the internal organs while cooling the external. He was treated by horseriding, application of a concoction from the testicles of beaver (organotherapy) and a warm, dry diet.

Aetius[23] (6th century A.D.) follows Oribasius regarding food and drugs which produce or prevent sperm. He believes that an unsuitable diet and a bad way of life destroy the sperm[24]; he refers to his own experience in which many men with the change to a healthier diet and suitable treatment acquired fertile sperm; although he had observed that some men did not have children with their wives but could do so if they took other women.

To cure infertility Aetius[25] recommends suitable food and drink which are aphrodisiac and produce sperm, such as those containing moderate pneuma and warmth. He suggests wine more than water and herbs the orminon[26], rocket (*euzomon*) and mallow[27]. He prohibits mint[28], calaminthe (*Calamintha*) and rue because the first two produce a lot of sperm, but weak and diluted, while the third destroys it completely.

Constitution and age

Oribasius[29], quoting Rufus, writes that people most suited to aphrodisiacs have the warmest and most humid constitutions: that is, from the point of view of age, the young; from the point of view of time, the spring, as it is the warmest and most humid season. The diet with the same qualities is the most suitable for lust. On the contrary, the worst diet is that which dries and cools; the worst age is old age which correspond to the autumn.

Aetius[30] relates the same constitutions to the increase or decrease of the sperm. Paul of Aegina[31] follows the opinion of the earlier physicians concerning the quantity and quality of the sperm, according to the various constitutions.

The eleventh century physician and philosopher, Michael Psellus[32], also deals with the constitutions in a chapter *About Testicles*. He summarises the opinions of the earlier writers and

believes that a warm constitution gives a tendency for regular intercourse and dense body hair. The opposite is true of a cool constitution. He further believes that a characteristic of the liquid constitution is the production of abundant sperm, the opposite holds good for a dry constitution. Later he provides a long list of foods, the influence of which depends on the constitution. He summarises and clarifies the knowledge of the earlier writers, especially regarding the qualities of bulbs to produce sperm and *pneuma*; on the contrary, garlic, onions and greens produce watery and acid sperm.

Obesity

Overweight produces infertility in both men and women, in the opinion of Aetius[33]. In fat men the sperm does not mature in the genital organs and the large stomach obstructs the approach and the rapid ejaculation of the sperm into the womb. Fat women produce a small amount of blood in menstruation because most of their food becomes fat. In such cases a suitable diet is required for reducing weight.

Diseases

Byzantine physicians identify some diseases, congenital or acquired, which provoke disorders of the sperm.

Oribasius[34] defines *gonorrhea* as involuntary loss of sperm which goes on continually without either erection of the penis taking place or any sexual desire. For this condition he recommends the herb rue.

Alexander of Tralles[35] (6th century A.D.) gives a more complete definition of gonorrhea, writing that it is usually caused by the plentiful sperm unable to be retained in the spermatic vessels which cannot keep back the sperm they have produced. In rare cases it can be due to the acidity and wateriness of the sperm. He believes that we should ask the patient for details referring to the colour and consistency of the sperm and the patient's diet and behaviour up to that time. Because if he is accustomed to excess of sexual activity and he has recently changed his behaviour to moderation, the genital organs cannot tolerate the abundance of sperm. If, however, this has not happened but the sperm is rather characterised by acidity and bile, then we must realise that the genital organs have become irritated and the sperm is ejaculated because it becomes still more watery and then weakens the power of retention (καθεκτική, *kathektike*). Alexander distinguishes the treatment according to the cause; that is, in case of plentiful sperm the patient must carefully refrain from too much food and drugs, especially food containing a lot of *pneuma* which causes irritation provoking the ejaculation of this substance. The writer gives a list of these foods and drugs in line with those of the earlier Byzantine writers, adding concoctions of seeds of turnips (*brassica*) and carrots (*Daukus sativus*) for drinking. The same writer adds a list of drugs which produce sperm and are aphrodisiacs. Among these are nettle seed (*urtica*) and costus diluted in wine and honey and drinks prepared from the large root of the herb *orchis* (Greek word for testicle); the author writes that this herb is called by some *dog's testicle*. We must note that there is an etymologically homeopatic relationship in the administration of this drug.

Further, Alexander provides a list of foods and drugs which dry the sperm, according to the temperament of the single patient. Among these are concoctions and poultices of various plants already known by earlier authors. He adds a potion of the small root of the herb *orchis* which, when drunk, inhibits the sperm; and the leaves and fruits of the honeysuckle dissolved in strong black wine which, when drunk, dry sperm provoking infertility. If the patient's sperm is watery and acid, we must administer drugs and foods which cool and dry. Furthermore, he suggests lukewarm baths so as to make the sperm thicker and warmer so it is not automatically ejaculated.

As regards gonorrhea, Paul of Aegina[36] gives the same definition and adds that its cause is the weakness of the power of retention (καθεκτική δύναμις) of the sperm; for this disorder he suggests tranquillity and use the compresses applied to the back and pubes, using attar of roses, apple oil and oil from vine buds. However, he also suggests poultices of dates, apples, flowers of vine, sumach[37], cytinus[38], acacia and other similar substances. Subsequently, he suggests the patient should sit and bathe in concoctions of leaves of brambles and lentisk

with wine and dry food. After some time, Paul recommends gymnastics which strengthens not only the affected parts but the all body.

The philosopher and physician Leo[39] (9th century A.D.), in his *Conspectus medicinae*, characterises gonorrhea as the involuntary loss of sperm without erotic fantasy and pleasure, which may occur during epileptic or other spasms. He accepts the causes propounded by earlier doctors (coolness and lack of power of retention).

For treatment of *oneirogmus* (nocturnal ejaculations) Oribasius[40] recommends a suitable simple diet, not rich and not warm, together with avoidance of stress. He also recommends the mattress should be cool; to sleep on one's side not on one's back; and inunctions of cold drugs to the patient's back, such as coriander[41], celery[42], hemlock[43], lead carbonate and purslane[44]. All these are better if mixed with vinegar.

Oribasius believes that excessive loss of sperm due to lust affects the whole body. As he writes[45], men who concentrate a large quantity of warm sperm and then frequently eject it during intercourse become slim, weak, dry and their eyes become shrunken. When avoiding intercourse they feel heavyheaded and nauseated but later they have oneirogmus and present similar symptoms of fatigue. In such a case they must follow the right diet and not assume food which produces considerable sperm (πολύσπερμα, *polysperma* in Greek); on the contrary they must take foods and drugs which destroy the sperm and after bathing must rub the back with atar of roses, apple oil and oil from vineshoots; these oils become better and thicker if mixed with wax or paste from something cool and become wax oil (κηρελαίον, *kerelaeon* in Greek).

Cool paste is constituted from the herb amaranth (orpine, stonecrop)[46] and cotyledons of strychnos[47] and psyllium (plantain) [48]. Such pastes are prepared from these ingredients in the summer, while in the other seasons they are prepared from lettuce and linseed[49] which is heated in water and becomes paste. All these oils are mixed in a mortar by hand for a long time and then the cool paste is added and mixed, finally becoming wax oil.

The same physician[50], for *oneirogmus*, also suggests poultices of lead shavings applied to the lower back (on the area of *psoas*) and cold herbs which are spread on the mattress, such as rue and the tops of wicker; patients should also eat seeds of these same herbs but should be careful not to overcool the back, which could result in damage to the kidneys. He further suggests taking the fruit of wild cannabis which in large quantities dries the sperm; also, the application of a lead leaf to the area of the psoas and the administration of leads and roots of the water lily and leads of anise (dill)[51] which are drunk in concoctions with black dry wine.

For *oneirogmus* Alexander[52] suggests *peganum* because it is warm and thickens the sperm. He also suggests a suitable diet in cases of priapism; that is, the patient must avoid warmer foods which produce sperm because he considers the production of sperm a cause of this disease. The writer states that whoever fails to follow these directions is not healed and is found, even in death, with an erect penis.

The great Byzantine writer of the tenth century Theophanes Chryssobalantes[53] (incorrectly known as Nonnus) dealt with the diseases of gonorrhea and *oneirogmus* following the definitions and instructions of earlier Byzantine writers, especially Alexander of Tralles. He adds, among the concoctions of herbs for sitting baths, that of roses and myrtle.

The celebrated Byzantine physician, Joannis Actuarius[54], in his book *De Diagnosi Lib. I*, deals with the differential diagnosis of the diseases gonorrhea, priapism and paresis of the penis. His definition for gonorrhea is the same given by earlier physicians. Its causes are the broadening of the spermatic vessels, incontinence and dyscrasia, that is an irritating superfluous humour.

In Joannis' opinion, priapism provokes disorder of the sperm because a warm and thick *pneuma* collects in the penis, which causes a violent enlargening with production of little or no sperm.

Aetius[55] further believes that infertility can affect man and woman equally. He states that male infertility is due to disorders of the sperm which must be very warm and have a thick density. On the contrary, the sperm which is cold, watery and of thin

density, exactly as that produced by the very old, or excessively dense, is weak.

Male infertility is due to various diseases, such as hypospadias or a small penis, that make the ejaculation of the sperm into the womb impossible.

He further remarks that those suffering from hypospadias could have children after their operation and sufferers from gonorrhea could do so after treatment[56].

Other conditions which cause infertility are, according to Aetius, the destruction of the spermiducts during a lithotomy operation. Also those with narrow spermiducts and eunuchs can not ejaculate the sperm[57].

Conclusion

The Byzantine writers meticulously dealt with the disorders of the sperm causing infertility and compiled significant information from the medical texts of the Hippocratic, Hellenistic and Roman eras. These concepts were enriched by their personal experience and influenced medieval European medicine and, through it, that of the rest of the world[58].

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14. *Agnus castus*.
15. *Eruca sativa*.
16. *Lactuca sativa*.
17. *Amarantus* or *Albersia bletum*.
18. *Agathophytum*.
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34. RAEDER I., ref. 21, pp. 299-300. See also Gal. *De loc. aff.*, K. 8, 438-439.
35. PUSCHMANN T., ref. 12.
36. HEIBERG I.L., ref. 31, p. 267.
37. *Rhus cotinus*.
38. *Cytinus hypocystis*.
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40. RAEDER I., ref. 21, p. 300. See also RAEDER I., ref.22.
41. *Coriandrum sativum*.
42. *Apium graviolens*.
43. *Conium maculatum*.
44. *Portulaca oleracea*.

45. RAEDER I., ref. 21, pp. 329-330.
46. Possibly *Sedum stelatum, sempervivum.*
47. *Solanum nigrum.*
48. *Plantago psyllium.*
49. *Semina lini, Linum usitatissimum.*
50. RAEDER I., ref. 21, p. 485.
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56. ZERVOS S., ref. 24, p. 38.
57. ZERVOS S., ref. 24, p. 38. The philosopher Alexander Aphrodisiensis (2nd - 3nd century) in his *Problemata* deals with various questions on sperm in eunuchs. In one of his problems he wonders why women and eunuchs quickly become grey - haired. He replies that women do because they are by nature cool, do often sit, collect a lot of excrement (περιττώματα) and mainly materials from menstruation; eunuchs, do not secrete sperm and thus the fertile excrement of the sperm which is phlegmatic is spread by the blood to the whole body. On another problem, he wonders why some eunuchs do not desire aphrodisiacs and replies that their penises shrivel because of a lack of the *pneuma* which enlarges them and which is created by the sperm. The sperm is produced in the spermiducts which are from the area of the hip but in eunuchs, who have suffered castration or crushing of the testicles in childhood, the spermiducts are blocked as their walls are joined together. IDELER I.L., ref. 39, pp. 7-8.
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Articoli/*Articles*

SEMEN NELLE OPERE DI ILDEGARDA DI BINGEN

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SUMMARY

SEMEN *IN THE WORKS OF HILDEGARD OF BINGEN*

Hildegard of Bingen (1098-1179), versatile female figure of the late Middle Ages, a passionate lover of music, a mystic, an expert of herbs and medicine, and an abbess in the monastery of Eibingen, besides transmitting the divine word, dedicated her entire life to the study of the natural world. She composed a true encyclopedia of the knowledge of her times, whether it be in regards to natural sciences or medicine, with the convinction that a cure or medical practice could not exist without a theoretical system. The handwritten tradition of her medical achievements relate to the 13th Century; the biographical sources and the protocol of the case for canonization, mention the existence of a medicine handbook entitled Liber subtilitatum diversarum naturarum, *handed down from tradition in the form of two distinguished topics:* Physica, *or Book of medicine for the simple, and* Causae et curae, *or Composite medicine book. From the reading of her works one gains a vast knowledge of Medieval medicine, basically associated with Galen and Aristotle's philosophy. The analysis of sexuality, which has a very close relationship with astrology, assumes an obvious appearance. If on one hand an affliction for the flesh emerges, on the other hand sexuality is seen a divine theorem. Moreover, much space is dedicated to the disorder of sexual life and male impotence, not seen anymore as a remedy to sinful lust, but as a pathology to cure.*

Ildegarda di Bingen è una delle figure femminili più autorevoli dell'alto Medioevo, mistica, appassionata di musica, esperta

Key words: Hildegard of Bingen – Andrology –Sexuality – Medieval medicine