CLINICAL

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THE EFFECT OF A MIXTURE OF ESSENTIAL AMINO ACIDS ON SPERM MORPHOLOGY IN INFERTILE COUPLES

The morphology of sperm is one of the most significant indices of male fertility in spontaneous fertilisation and of the success of intrauterine insemination and *in vitro* fertilisation (1).

– The first description of the morphologically normal sperm was given in the Third Edition of the WHO Manual (2); in the Fifth Edition (3) the characters that are still valid today for the definition of the normal sperm are identified: *"The head should be smooth, regularly contoured and generally oval in shape. There should be a well-defined acrosomal region comprising 40–70% of the head area. The acrosomal region should contain no large vacuoles, and not more than two small vacuoles.The post-acrosomal region should not contain any vacuoles. The midpiece should be slender, regular and about the same length as the sperm head. Residual cytoplasm is considered an anomaly only when in excess, i.e. when it exceeds one third of the sperm head size. The principal piece should have a uniform calibre along its length, be thinner than the midpiece, and be approximately 45µm long (about 10 times the head length)."*
– The lower limit of normal sperm shapes is set at **4%**, a much lower limit than previous WHO recommendations.

In France, the reference value for the percentage of normal forms sets the lower limit at **23%** (4).

– In an Italian study (5) and another Belgian one (6), it is shown that in the **morphology/fertility correlation** there is a much greater variability than for the other two parameters: sperm count and motility.

The staining technique is important; Papanicolau's is one of the techniques recommended by the WHO (1).
– Spermatogenesis, and as a result sperm morphology, is adversely affected by lifestyles (7), pollutants (8), diseases (9-11), drugs (12) and urogenital infections (13).

• The aim of this work is to study the effect of the administration of a mixture of essential amino acids (**Gunaminoformula**) on sperm morphology and the fertility of couples who participated in the study for infertility problems in the period between 2005 and 2020.

– From June 2005 to June 2020, **58 couples** were brought to my attention due to **infertility problems**, in which, on the basis of ultrasound, radiological, hysteroscopic, haematochemical and seminal examinations, the only apparent causes were **issues with semen**.
The morphology of the sperm was assessed both in hospital-university laboratories and in qualified private laboratories where Papanicolau's staining technique was adopted.
The number of sperm before the start of therapy was within normal limits.
Sperm motility, if lacking, was treated according to the guidelines of the European Association of Urology (14).

– The morphological changes in sperm before the start of therapy in the treated **58 cases** are shown in TAB. 1.

Diseases and altered lifestyles that may have been the cause of the morphological changes in sperm are shown in TAB. 2.

TAB. 1
The morphological alterations of sperm.

Morphological alterations	No. of cases	Percentage of total treated cases
head anomalies	26	44.8
tail anomalies	15	25.8
globospermia	6	10.3
wide neck	5	8.6
residual cytoplasmic material	4	6.8
presence of two or more large vacuoles	2	3.4

Altered lifestyles (smoking, smoking cannabis or wearing tight boxer shorts) were corrected, self-medication with male hormones was discontinued, pollutants were removed, proper nutrition was promoted, and cell and organ drainage systems were activated with BrSM drugs.
In the case of pathologies (urogenital infections, varicocele, diabetes, obesity), I availed myself of the specific specialists.

– The amino acid treatment was performed with **Gunaminoformula** at a dosage of **six 1.01 g tablets per day** or **one 6.5 g sachet per day** for between **3** and **6 months**.

• The composition per 100 g of Gunaminoformula sachets is as follows: 15.4 g of L-Leucine, 12.3 g of L-Valine, 11.5 g of L-Isoleucine, 10.8 g of L-Lysine, 10.0 g of L-Phenylalanine, 8.5 g of L-Threonine, 5.4 g of L-Methionine and 3.1 g of L-Tryptophane. One sachet contains 5 g of amino acid mixture.

The age of the 58 treated cases, at the time of diagnosis, ranged from 26 to 41 years old, with a mean of 33.58 ± 4.3 years old.

– The number and motility of the sperm were not affected by amino acid therapy.
The percentage of sperm with a normal morphology before the start of therapy ranged between **0.7%** and **2%**.

After 3-6 months of therapy, the percentage of normal sperm rose to between **20%** and **50%**; this result was achieved in all treated cases.

Fertility was achieved by natural fertilisation in **30** of the **58 couples** (**51.72%** of the cases treated).
The age of the treated cases that were able to get pregnant ranged from **28** to **41 years old**, with an average of **33.03 ± 3.82 years old**.

– For more than twenty years, the issue of the real impact of sperm morphology detected in laboratory tests on couple in-

TAB. 2
Pathologies and altered lifestyles
(one or more in the same individual).

Pathologies and altered lifestyles	No. of cases	Percentage of total treated cases
smoking	21	36.2
testosterone usage	15	25.8
wearing tight boxers	10	17.2
urogenital infections	8	13.7
smoking cannabis	8	13.7
varicocele	5	8.6
DHEA usage	4	6.9
diabetes	4	6.9
obesity	4	6.9
exposure to PCBs	4	6.9

fertility has been debated.

• The result of this trial was the birth of **30 live foetuses** after the amino acid treatment of **58 male partners** previously suffering from morphological alterations of the sperm.

It is known that diet can play a role in testicular function, improving seminal parameters (sperm number, motility and morphology) (15) with potentially increased fertility (16-19).

– Essential amino acids must be supplied by diet or oral administration (Gunaminoformula) and regulate key metabolic pathways for many physiological functions, including reproduction.

This essential amino acid pool is limitedly oxidised by enterocytes (20) and enters the portal circulation.
Most exceed their use for protein synthesis and are used for the synthesis of non-essential amino acids, which are required for the specific functions of each tissue, including in tissues deputed to reproductive functions (21).

– Essential amino acids control important metabolic functions: Leucine plays a role in gene expression that can be mediated by transcription factors resulting in the stimulation of protein synthesis and the inhibition of protein lysis (22); Methionine acts in acetylation, methylation and phosphorylation of histones, important for the epigenetic regulation of gene expression and physiological functions (23).

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