G Chir Vol. 39 - n. 5 - pp. 272-275
September-October 2018

editorial article

A probable case of doping in an Olympic athlete coming back from ancient Greece (V cent. B.C.)

G. BAGGIERI

SUMMARY: **A probable case of doping in an Olympic Athlete coming back from ancient Greece (V cent. B.C.).**

G. BAGGIERI

We present here the hypothesis of doping in an athlete coming back from the ancient Greece, dating back to V century B.C. There are some bone alterations due to the sports that he probably practiced, and that are represented on the amphorae (prices of his victories) found near his sepulchre. The skeleton shows a considerable mass and bone density. The chemical analyses performed on the bone emphasized the presence of arsenic, while the X-ray and CAT scan examinations revealed a quite big sella turcica. These two aspects might have influenced the performances of this athlete, and in the same time might have provoked his death at the age of about 30 years.

KEY WORDS: Sella turcica - Bone density - Arsenic - Hypophysis.

Background

It is the skeleton of a male deceased at the age of 27-35 years (Figure 1) (1). This skeleton belongs to an athlete from Ancient Greece and was discovered in Taranto (Southern Italy) in 1959 (1, 2).

It was found in a sepulchre adorned with four amphorae (one of which was almost completely destroyed) which were decorated with some scenes of the pentathlon, as prizes for his victories (2-4).

His cranial capacity, obtained through filling the skull with sand, is 1380 cc (5). His height is mt.1.69 (6). All the teeth are present and there is no trace of any dental decay, which gives us an important clue of what his diet consisted of (7).

First of all we noted the thickening on the margin of the right glenoid cavity and the robust corresponding humerus (8). Also the clavicles reveal signs of stress due to a significant hypertrophy of the sternocleidomastoid muscle and of the pectoralis major muscles, but also the probable hypertrophy of the gastrocnemius, viewed in the particular morphology of the tibias, which explains the combat hypothesis (8, 9).

There is an evident hypertrophy of the right ulna and radius which is evidence of the power of the following muscles (8). But it also indicates the propulsion used during discus throwing (the weight of the discus was around 1.5-5 kilograms) (9, 10).

The stress which is present on the femurs and tibiae, along with the morphology of both fibulas confirm the powerful musculature which was suitable for jumping and running (8-10). We also note some small bone proliferations on the anterior and posterior side of the margins

"Museo Nazionale di Storia dell'Arte Sanitaria", Roma, Italia; Museo delle Civiltà", Roma, Italy

Corresponding author: Gaspare Baggieri, e-mail: gaspare.baggieri@beniculturali.it

Figure 1 - Skeleton of the athlete of Taranto. The structure and mass of the bones belong to an individual who was robust during his lifetime.

of both the obturator foramina, due to micro-traumas (Figure 2); along with a slight bone degeneration of the rachis, on the anterior margins of the bodies of the lumbar vertebrae. All these alterations are due to the stress caused by the release of the muscular power in the take-off, flight and landing during the long jump (8, 9). A slight degree of thickening of the margin of the left glenoid cavity, along with the alterations already noted on the right cavity allows us to surmise that he used the halteres (1.6-4.6 kilograms) (11, 12). The scene of running and combat were probably represented on the fourth amphora.

The X-ray and the CAT scan examination and the dental scanner, confirm the good state of preservation of the bone structure (Figure 3) (7, 13).

The sella turcica, whose anterior-posterior diameter is 14.416 mm, probably contained a quite big hypophysis (14, 15). The sella turcica pavement is slightly sclerotic, the clinoid processes are well formed-robust-big and they protect the sella itself (15). This big hypophysis might have produced a big quantity of the GH hormone, in this way influencing the density and thickness of the compact bone of tibias and femurs (Figure 4) and dental hypoplasiae (16). Some fragments of the compact bone of the femur, and of the cortical bone of the costae have been subjected to examination of the spectrophotometer of (ad) atomic absorption.

The elements such as calcium, strontium, zinc and copper might indicate that he ate a lot of vegetables, cereals, meat. The elevated value of strontium (566 ppm), copper (15,6 ppm), zinc (420 ppm) and especially arsenic (8,3 ppm) might indicate that he ate many small fish, shellfish and crustacean (17).

Arsenic, which is contained in small fish (18), ingested in small doses, might have favourably contributed to the development of the bones. Analogously, but in less measure, compared with phosphorus (19, 20). Arsenic increased vascularization and stimulated the blood formative effects-processes, affecting the cellular apoptosis (20, 21). Arsenic acted as a corroborant, it concurred to improve the athlete performances. At last, its continuing intake might have provoked its death, without his knowing.

Figure 2 - Osteophytes on the obturator foramina of the ischiatic bone.

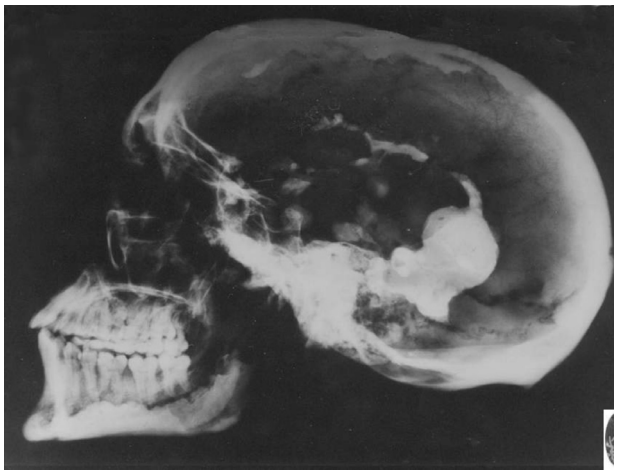

Figure 3 - Lateral X-ray of the skull. The sella turcica is on display, showing a considerable width, it is protected by the clinoid processes.

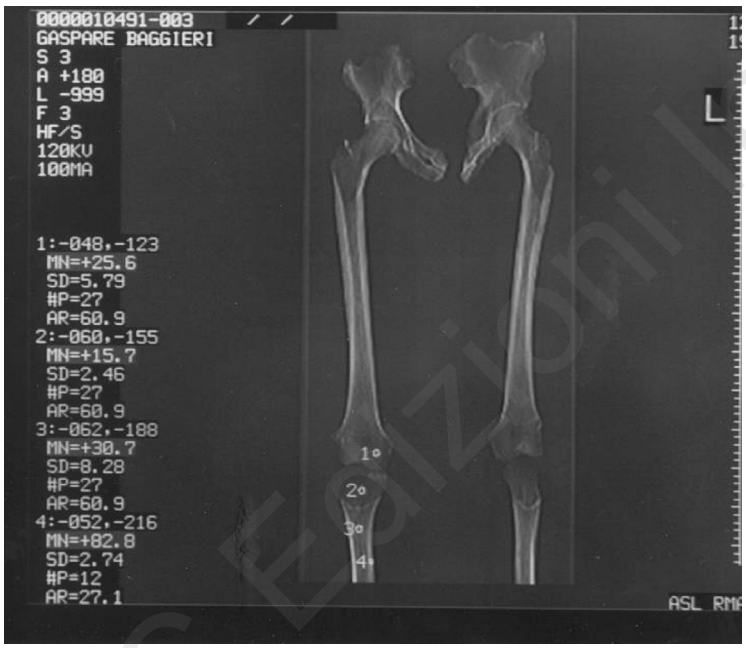

Figure 4 - CAT scan with densitometry. We can note the excellent state of preservation of the structure of the bone.

References

1. Ubelaker D. (Todd A. in Human Skeletal Remains, 2nd (Ed. Washington D.C.), Taraxacum, 1978:75-77.
2. Lo Porto FG. Atti e memorie della Società Magna Grecia. 1967;8:69-84.
3. Giboni G, et al. Atleti e Guerrieri - Tradizioni aristocratiche a Taranto tra VI e V sec. a.C., Taranto, 1997:314-316.
4. Vanohe Doris, Editit D. Vanohe. Sport in Hellas: Van spel tot competitie. Bruxelles, 1992:102-114.
5. Martin R, Saller K. Systematischer Darstellun, Band 1-2. Fischer Verlag, Stuttgart, 1956.
6. Trotter M, Glaser GC. A reevaluation of estimation of stature based on measurements of stature taken during life and of long bones after death. American Journal of Physical Antropology. 1958;16:79-124.
7. Brothwell D. Digging up bones. London, 1981.
8. Capasso L, Kenneth A.R. Kennedy, Cyntia A. Wilczak, Atlas of occupational Markers on Human Remains. Edigrafital S.p.a, Teramo, 1999:59, 65-67, 72-74.
9. Bedeschi P, Polacco A. Atlopatie Osteo-Articolari. Leonardo Ed. Scientifiche Leonardo. Roma, 1964:38, 41, 53, 77, 78.

10. Mallegni F. Archivio per l'Antropologia e la Etnologia. 1978:108, 279-298.
11. Vanohe Doris. Arte y Olimpismo. Fondacion La Caix. Barcelona, 1999:43-9.
12. Minetti AE, Ardigò LP. Biomechanics Halteres used in ancient olympic long jump. Nature. 2002:141, 142, 420.
13. Berkovitz BKB, Holland GR, Moxham BJ. A Colour Atlas and Textbook of Oral Anatomy. Ed. It. Lombardo, Roma, 1982.
14. Netter FH, Commento Ragionato all'Atlante di Anatomia Umana. Ed. Ciba Geigy. 1994;3, tav.140.
15. Lenzi M, Salvolini U. Neuroradiologia. Ed. Minerva Medica. Modena, 1978;49, 129-139.
16. Netter F. Anatomia, fisiolologia e Turbe Metaboliche. Ed. Ciba Geigy. 1996;Vol. 8 part.1:199-201.
17. Gilbert RJ Jr. Stress, paleonutrition and trace elements. Accademic Press. Orlando, 1985:339-357.
18. Michel P. Arsenic in the marine environment. Rev. Trav. Inst. Peches marit. 1985;49:175-185.
19. Kennedy LJ, Kaplan JH. Arsenate substitutes for phosphate in the human red cell sodium pomp and anion Exchange. J. Biol. Chem. 1988;263:7954-7960.
20. Manfredi L. Istituto della Enciclopedia Italiana G. Treccani. 1929;Vol. IV:617-619, VIII.
21. Cell Therapeutics, Inc CTI, 9° Congress Association Emathology European Ginevra 11-13 giugno 2004.