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Short Communication

### Pathophysiological Consideration on the Man of Turin Shroud

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### ABSTRACT

This Study, focused on explaining the possible cause of death of the Man of the Turin Shroud, highlights the genesis of the erythrocytes (mostly microcytes) found and related aspects of physiopathology.

A complex picture of acute anemia with severe dehydration is assumed, in association with acute heart failure linked to insufficient venous return to the heart.

**Keywords:** Turin Shroud; Thalassaemia; Echinocytes; Acute heart failure

### Introduction

The sacred cloth of Turin represents, for science, a laboratory of great intensity<sup>1</sup>. In the centuries the term Man of the Shroud leads back to the Gospels. The comparison with them should be seen as mandatory, considering that it is the only historical source on this extraordinary event of the Crucifixion and Resurrection of Christ (in addition to considerations of a religious nature and faith). Assuming that we consider the connection between the Man of the Shroud and the Jesus of the Gospels reliable.

Therefore, the experimental scientific data must be able to find confirmation in the Scriptures, in particular if we think that the Turin Shroud may be the linen which wrapped the body of Jesus once laid in the tomb.

The finding of human blood material substantiates that group of Studies that believes the Shroud the cloth that has wrapped post-mortem a man flagellated and died on the cross. It is hypothetic to establish that this is not also a matter of blood material which has subsequently been.

In this essay, having to deal with the meager of the material, the Author makes substantial assumptions, some of which have

already been confirmed but to a large extent still to be confirmed with absolute veracity.

Will be possible?

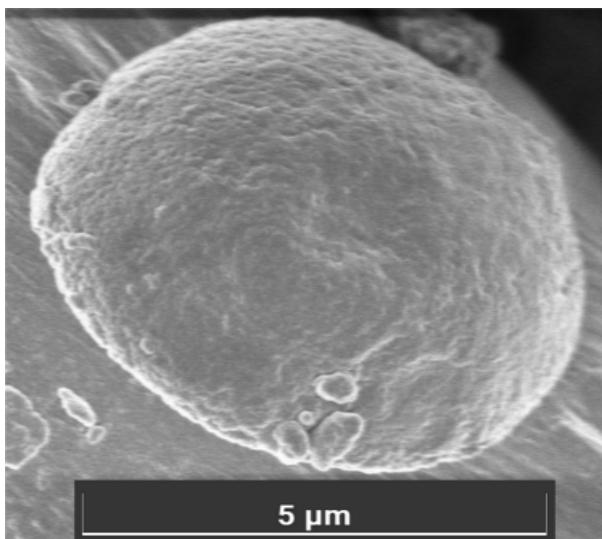
### Characteristics of the Blood Material

Heller and Adler<sup>2</sup> in their 1980 essay confirmed the presence, thanks to spectroscopic and chemical tests (conversion of heme to porphyrin), of blood on the sacred cloth. McCrone<sup>3</sup> claims, relative to the same material - colored in red - that instead they are pigments, in open contrast.

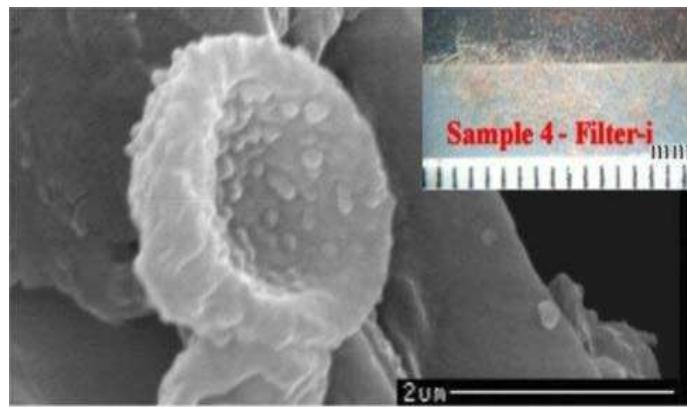
It is quite logical that the researcher cannot trace the histopathological finding back to a well-defined person, unless a survey of any detected genetic material is carried out. In this Study I limit myself to a formal description of the erythrocytes found and refer to the finding of biochemical compounds such as creatinine and ferritin, normally present in the circulating blood (observation of Carlino and De Caro). The erythrocytes are mature red blood cells without a cell nucleus, and therefore deoxyribonucleic acid. The white blood cells (leukocytes, lymphocytes) do not appear on the tissue of the Shroud. This is assumed to be due to early post-mortem cell lysis<sup>4</sup>.

The cells of the white series have a well-defined nucleus with genetic material - deoxyribonucleic acid - which can enable the identification of genetic abnormalities such as those related to the presence of beta-thalassemia, main cause together with sideropenia of a microcytic anemia (with erythrocytes of smaller diameter than normal). The high prevalence of beta-thalassemia or Mediterranean anemia in the territories of the Eastern Mediterranean is known<sup>5</sup>.

I have analyzed in particular microcytes (with diameters very variable from 0,5  $\mu$ m to 5  $\mu$ m) (Figure 1) and echinocytes (erythrocytes of "spinous" shape) (Figure 2). Some of these erythrocyte cells, exposed in vitro to urea, exhibited greatly reduced diameters compared with normal erythrocytes (normocytes)<sup>6</sup>.



**Figure 1:** Microcyte from the Turin Shroud - Electron Microscopy.



**Figure 2:** Echinocyte from the Turin Shroud – Electron Microscopy.

The area of the head of the Man of the Shroud is particularly rich in these finds (see erythrocytes type C according to Fanti)<sup>7</sup>.

The reason for finding echinocytes, with a diameter slightly smaller than normocytes (5  $\mu$ m vs 7,5  $\mu$ m), could be traced to a condition sometimes causing altered morphology of the erythrocyte membrane. The complex picture of thoracic trauma, in particular due to the flagellation and the subsequent ascent to the calvary, associated with a strong algal component and anxiety can have determined in Jesus (if we believe that the Man of the Shroud is Him), a severe tachypnea. This respiratory condition, with superficial and frequent breathing acts, causes hypocapnia from respiratory alkalosis. The latter may have in

turn caused acute hypophosphatemia and a consequent action on the cell membrane of erythrocytes by varying its morphology. A low level of phosphate in serum depletes the levels of ATP - adenosine triphosphate - in red blood cells, with reduced energy use: in alkaline pH environment these globules tend to reduce their diameters and take a form called "spinous" - echinocytes<sup>8</sup> (Figure 2).

### The Passion in the Garden of Gethsemane

In the throes of anguish, he prayed more intensely; and his sweat became like drops of blood falling to the ground. Lc. 22:44.

The doctor asks himself: did the Evangelist pass on a clinical fact that really happened to Jesus (the Man of the Shroud)?

The description of very rare cases of haematohydrosis<sup>9</sup> would confirm the Gospel of Luke. The pathophysiology of the appearance of sweat mixed with blood under conditions of strong psycho-physical stress is not yet well defined.

As regards the sacred flax, the presence of echinocytes could suggest that these have escaped from the skin of a seriously distressed man, in organic conditions of tachypnoea and consequent respiratory alkalosis. All this accompanied by a picture of severe dehydration, undoubtedly linked to the highly stressful events of those moments, described in the Gospels.

### The Flagellation

Hundreds of injuries and wounds were caused by flagella blows on the body of the Shroud Man. A severe acute anaemia, linked to the appearance of muscle and internal hematomas.

The creatinine and ferritin found on the sacrum cloth confirm the traumatic impairment of internal organs such as liver and kidneys, in addition to the devastation of the skeletal muscle.

Quite miraculous, even for a man of high stature and in good health (man with a height of about 20 centimetres higher than the average of ancient times), this survival to such extended and intense flogging. A survival that "allowed" death on the cross.

### The Ascent to the Calvary

Carry the cross - very heavy - , fall, rise again, fall again. We are allowed to believe that multiple costal trauma, resulting in respiratory failure and hypoxia, and dislocation of the scapular cingulate have made the ascent of Jesus to the place of His crucifixion.

They forced to carry His cross a man who passed by, a certain Simon of Cyrene, who came from the country, father of Alexander and Rufus. Mc. 15:21.

### The Death of the Cross

Incredible the prolonged survival on the cross of a man so severely wounded and in conditions of severe hypoxia.

The possible cause of death is acute heart failure, due to an impossibility of venous return to the heart and the presence of micro-infarctions developed in the terrible hours before the crucifixion.

The abnormal venous return to the heart, related to a condition forced in orthostatism as that of a crucified man, also finds its genesis in the marked hypovolemia and a probable presence of phlebothrombosis in the pelvic site and lower limbs. This last

hypothesis is linked to the intense trauma of the flagellation with the possible lesion of the venous walls and a slowed and vortical blood flow. It is necessary to remember that in shock conditions (insufficient perfusion of tissues) there are hemocoagulative abnormalities that can cause phenomena of disseminated micro thrombosis.

Also, verisimilar the presence of hydrothorax (serous fluid in the pleural cavity) from right cardiac decompensation associated or not with a posttraumatic hemopneumothorax. The whole complicated by a deep dehydration, a vast plasma leakage and a haemorrhagic shock.

...but one of the soldiers hit him on the side and immediately out blood and water. Gv. 19:34.

## Conclusion

We are unable to identify nuclear cellular material (nucleic acids) from the findings obtained from sacred flax. Obviously, this presence would allow to put a hypothesis on the precise genesis of microcythemia in blood stains present on the tissue.

The Gospel narrative may of the Passione and Death of Jesus, in association with the findings of the Shroud, lead to specific hypotheses on the terminal conditions and cause of death of the Man of the Shroud. Of course, if the researcher takes an attitude that is not prejudicial and free from strictly religious connotations.

The Fanti studies<sup>7</sup>, more precisely the subdivision into three groups - A, B and C - of the blood material found, with relation to both the cell diameters of the erythrocytes and the site of interest on the tissue, confirmed the possibility of a differentiation in the characteristics of bleeding in relation to the different phases of Passion. The finding of a beta-radioactivity (electron emission) on type A erythrocytes<sup>10</sup>, characterized by a very small diameter, adds a note of absolute particularity concerning the blood stains of Turin Shroud.

This work, even in the small amount of material analysed - however confirming with a good degree of confidence a morphological aspect typical of erythrocytes -, supports the possibility of making scientific assumptions about blood material from the Shroud<sup>11</sup>, excluding that this material is due to pigments or the overlay of inorganic compound.

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