Nuclear Radiation and the Shroud: Head Image

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Abstract: Previous studies using the collection of vertically aligned gamma radiation were able to convincingly demonstrate many specific similarities between nuclear images and Shroud images. [1,2]. The current study builds upon the foundation of these previous studies, however, with important modifications of technique, notably, summations of the coronal planes. Many of the complex and subtle details of the head and face images seen on the Shroud are elucidated, both qualitatively and quantitatively.

Keywords: Nuclear radiation, coronal planar summation.

Introduction: Many have noted radiation-like qualities within the Shroud image [3,4,5] and likewise research models employing such an imaging mechanism and source have yielded the most promising results thus far. [1,6,9]

In our previous series of studies, nuclear imaging of the anterio-posterio torso, (fig. 1) and extremities, (fig. 2)

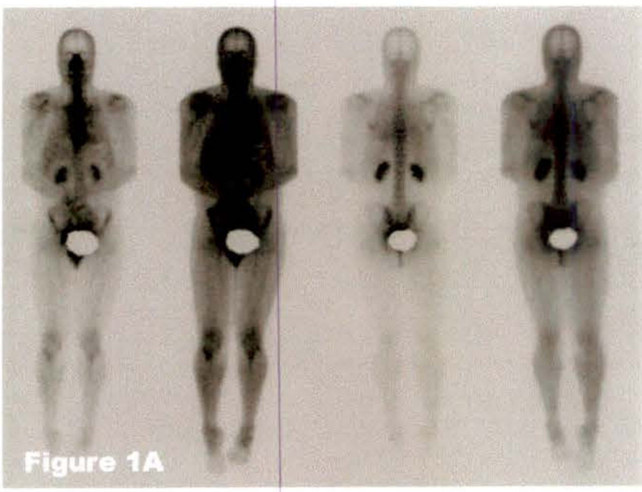

Figure 1A

Figure 1B

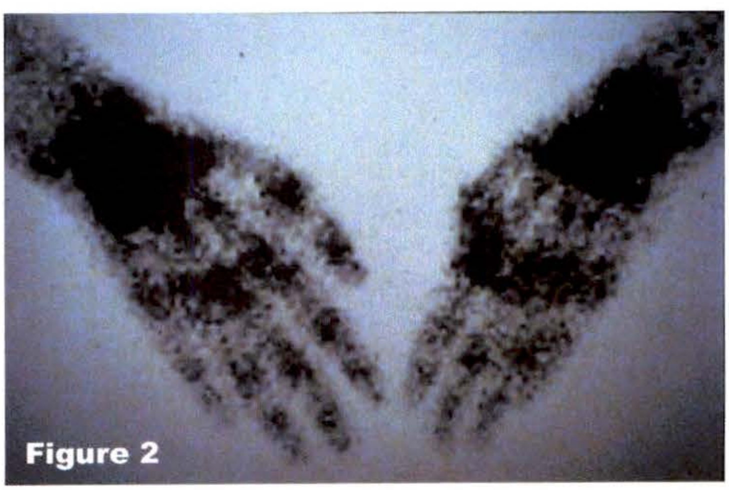

Figure 2

resulted in images which resemble those of the Turin Shroud in many specific areas such as vertical alignment, absence of body outline, absence of light focus, demonstration of soft tissue, skeletal information and pathology. In addition, the thumbs beneath the palmar surfaces were also demonstrated (fig. 4). Though recent objections to the purported thumb image on the Shroud have been raised by

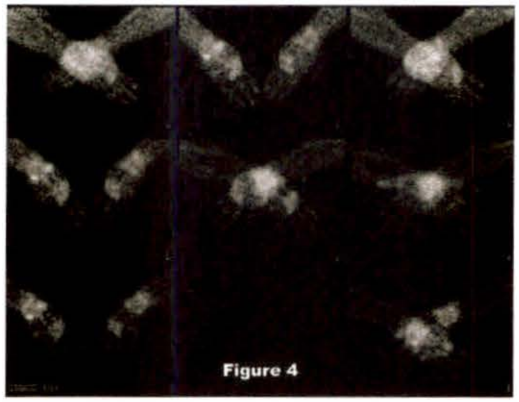
Figure 4

excellent scholarship [7], these authors feel that the image seen in the left palmar region is that of the left thumb. Along with Zugibe, [7], we acknowledge the palmar furrow as the most likely placement of the nail, however, we believe the final position of the thumb can be explained due to the physiology of tetanic contractures of the hands along with the mechanical effect of hanging on a nail placed through this anatomical region.

Quantifiable similarities such as the vertical drop-off of the left fingers at the right lateral palmar edge seen with VP-8 imaging were likewise reproduced (fig. 5A fig. 5B).

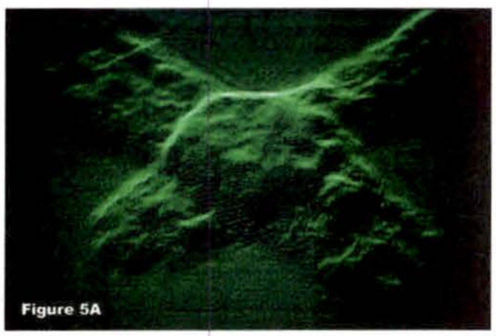
Figure 5A

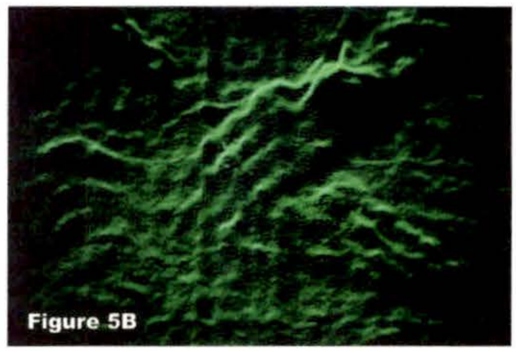
Figure 5B

Our previous studies ended with an introduction to the imaging of the head. When examining the results of the anatomy depicted as well as the VP-8 characteristics of the face and head, it became readily apparent that a total collection of emitted radiation did not come close in comparison to the Shroud head image and VP-8 reliefs of the same (fig. 6,7).
In particular, the eye sockets in our experimental images were round as opposed to the Shroud's oval


Figure 6A

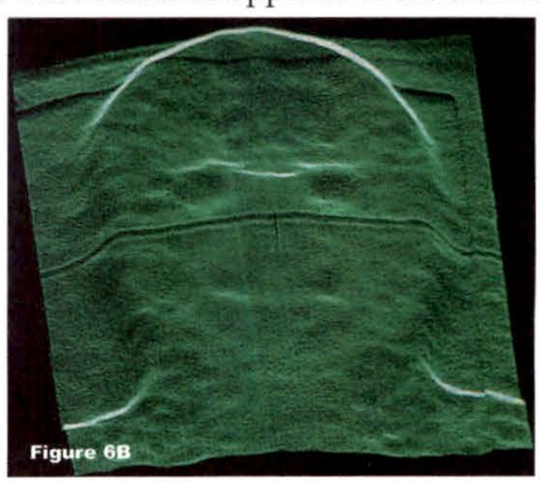
Figure 6B

Figure 7A

Figure 7B

appearance. The VP-8 experimental images were flattened and highly distorted, as opposed to the uniquely conforming reliefs seen on the Shroud. In addition, a rectangular image in the area of the mouth (later determined to be a characteristic of the posterior hard palate) was dissimilar to what is seen as a hemi-circular image of the same region on the Shroud (fig. 8). In this study, our goal was to achieve greater similarities to the uniqueness of the Shroud face.

Figure 8

Following much investigation with the skeletal anatomy of the head, it became apparent that the oval shape of the eye sockets, (presumed teeth), and hemi-circular image in the mouth region of the Shroud, (fig. 8) correlate to those seen on experimental nuclear images and VP-8 when and only when a summation of emitted radiation of a depth not exceeding 36 mm in a coronal plane is achieved (fig. 9,10,11,7).

See diagram A

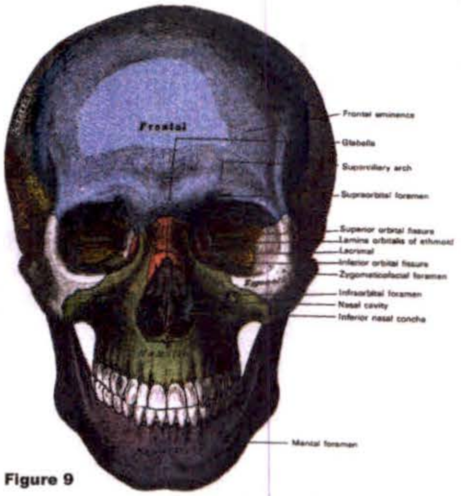

Figure 9

Figure 10A

Figure 10B

Figure 11

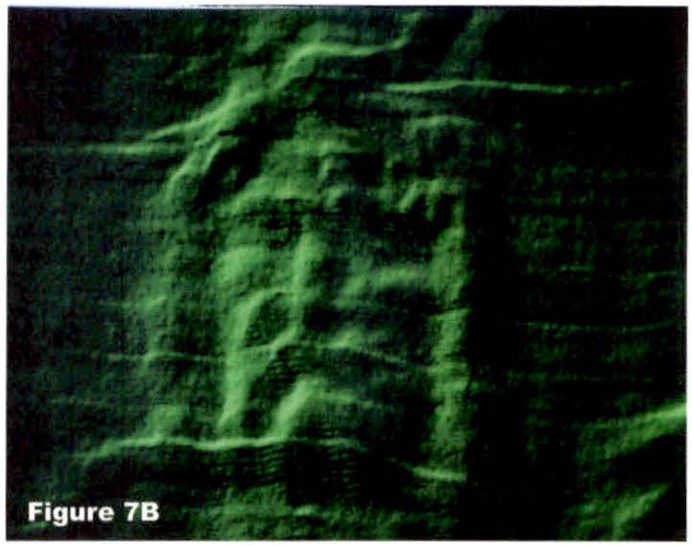

Figure 7B

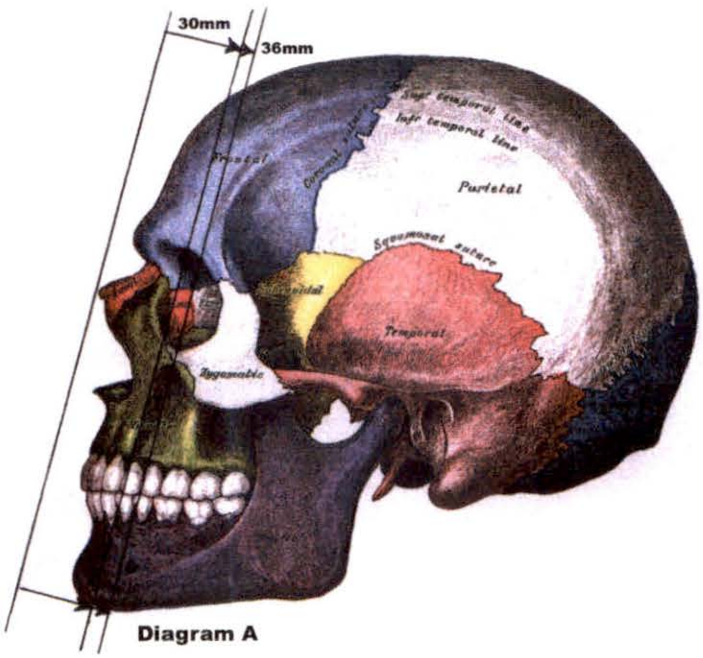

Diagram A

Materials and Methods: An adult male human subject was injected with 20 millicuries of Tc-99m intravenously followed by scanning the subject with a gamma camera within 30 minutes post injection (fig. 12). This "early scanning" allowed images to be obtained with a relatively high soft tissue to bone (target to background) ratio. We used a dual headed high resolution gamma camera with a 3/8 inch thick, wide field, sodium iodide crystal which is optimized to yield high resolution images derived from the 140kev energy of Tc-99mMDP. The energy resolution is 9.8% FWHM, and sensitivity is 135 cpm/microcurie. To acquire multiple angle emission data, sets were reconstructed and displayed in coronal planes 6mm thick. These coronal planes of 6mm each were summated up to 48mm in the A/P direction (fig. 13). A long bore ultra-high resolution collimator was used yielding a system resolution of 7.5mm at 10cm and 11mm at 15cm. The long septal length preserves resolution at a depth of 11mm at 15cm.

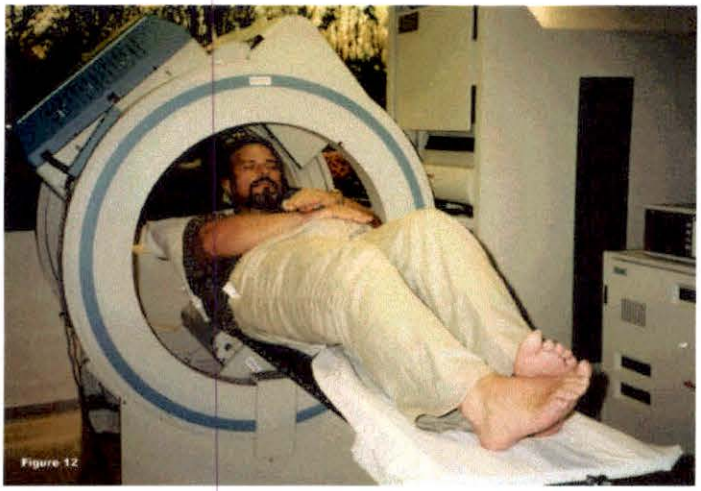

Figure 12

The Tc-99mMDP binds to bone via chemisorption. Approximately 50% of the injected Tc-99mMDP is eventually taken up in the bones. Initially, however, the Tc-99mMDP flows throughout the circulatory system binding to proteins, red blood cells and other soft tissues. At 2 hours post injection, about 10% of the Tc-99mMDP is protein bound. At 4 hours post injection, about 3% is bound. Thereafter, the gamma scanning results in primarily a bone scan.

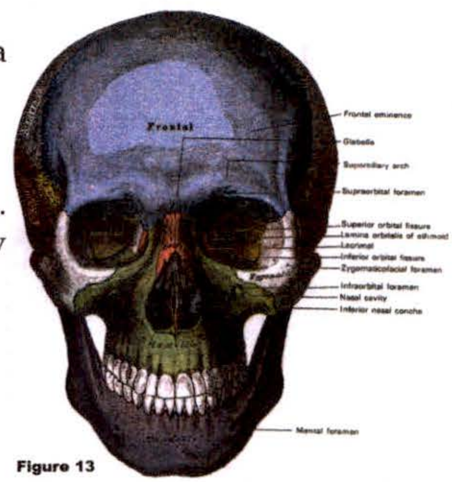

Figure 13

For the purpose of this experiment, we desired a relatively high soft tissue component (early emission), and contrariwise a relatively low, yet appreciable bone component. As described above, the summation of coronal planes 1-8 were compared to specific anatomic similarities of the Shroud face. The anterior-posterior full radiation emission image was used for the control in this experiment (fig.14A, B).

Figure 14A

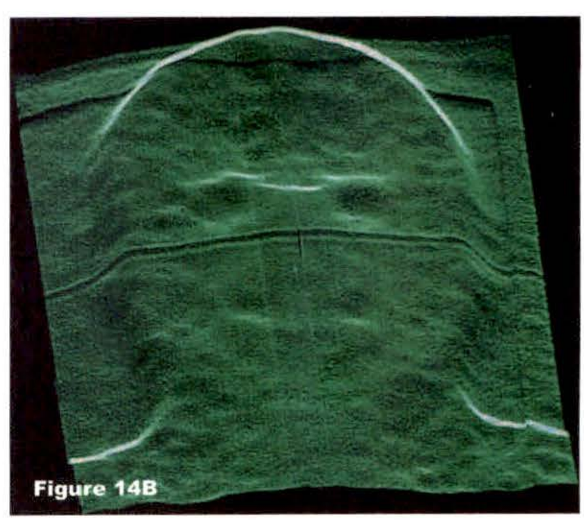

Figure 14B

Results: The primary features we were seeking to simulate were the exact depth within the eye sockets from which to obtain the same anatomic analogue on the Shroud; namely the same height and width. In addition, we sought for images, which would yield the same width and shape of the face on the Shroud. We determined that only at a depth of 30-36mm could we reproduce these same features. Less than 30mm resulted in dissimilarities such as incomplete visualization of the eye sockets as well as the inability to access the width of the face sought for. VP-8 analysis was sub-satisfactory due to the lack of facial data. A depth of greater than 36mm resulted in distinctly different features (fig.15) as those seen on the Shroud in that the orbits assumed a round shape as opposed to the oval shape of the same on the Shroud (figs.16, 17). In addition the shape of the face began to take on oval features as opposed to the distinct sharpness of features seen at the level of the cheekbones on the Shroud. VP-8 imaging at a depth greater than 36mm began growing more distorted in the direction of the control (fig.18B,C).

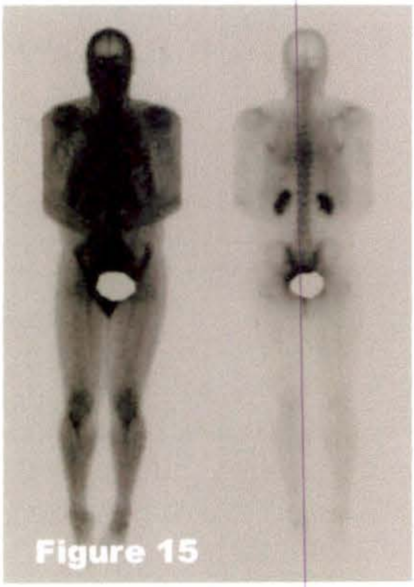

Figure 15

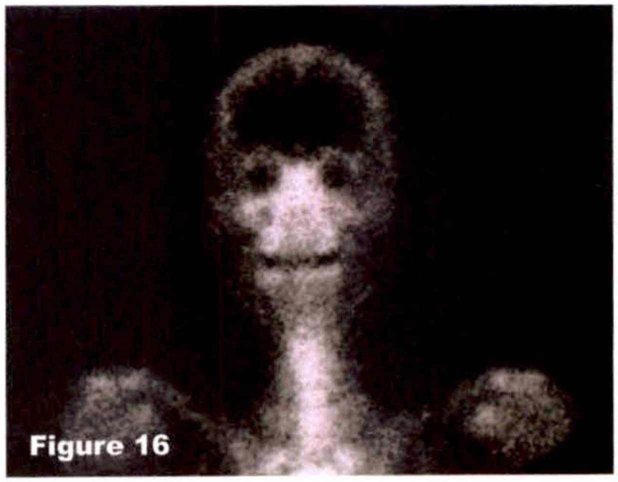

Figure 16

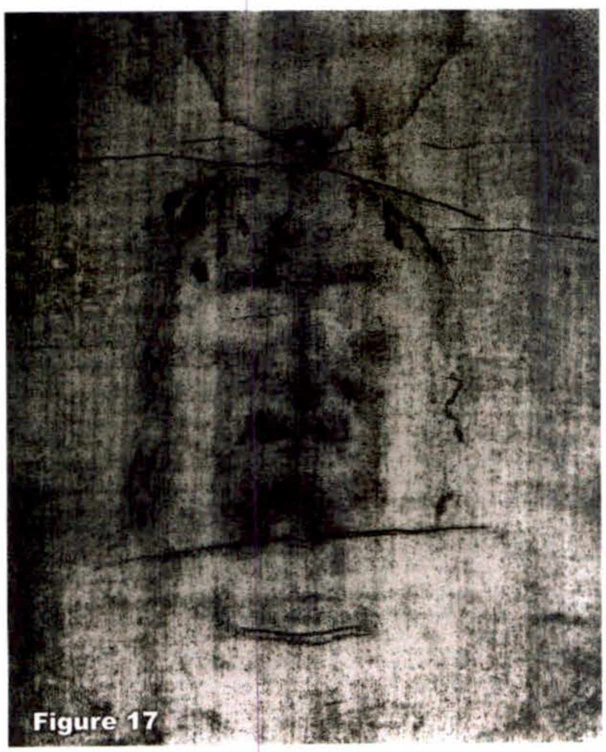

Figure 17

Figure 18A

Figure 18B

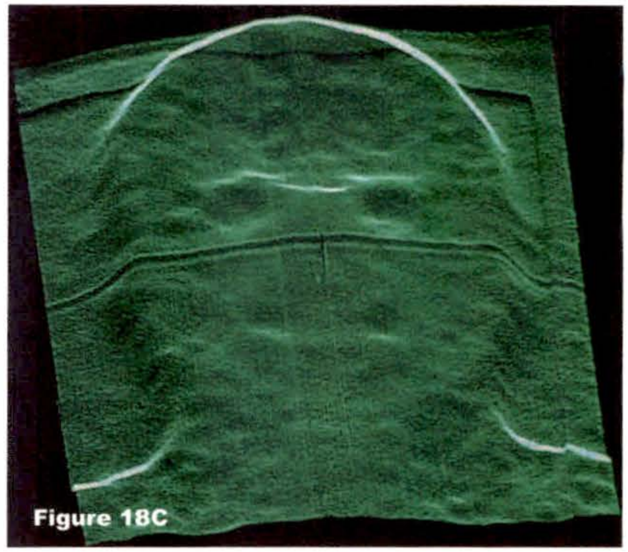

Figure 18C

At this point what I feel was the most significant observation of the study must be discussed. While examining multiple VP-8 images of the face we were shocked when a semicircular shape appeared quite clearly within the mouth region of the experimental images (fig19) and at 30mm matched very closely the semicircular image in the mouth region of the Shroud (fig8, 20A).

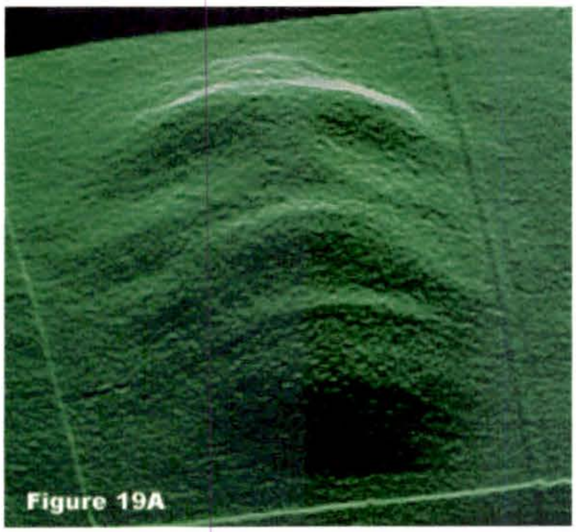

Figure 19A

Figure 19B

Figure 20A

Figure 20B

Notice this shape, which appears as if the subject's mouth is wide open, when in fact, his lips are closed, and compare this with the Shroud image. It is known unequivocally that this shape in the experimental image is due to the shape of the oral cavity and most notably the hard palate delimited just behind the front teeth but no further. At this point, the hard palate is clearly semicircular, (fig. 21) with the dimensions of this image being very close to that of the Shroud. As one proceeds inwards greater than 36mm, the hard palate drops inferiorly and the resulting image becomes rectangular, in addition, the eye sockets at this level become near perfectly circular as opposed to oval.

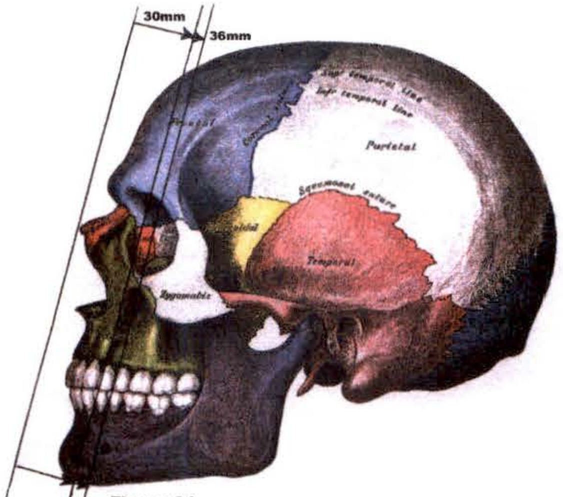

Figure 21

Notable differences between our experimental images and those of the Shroud are the lack of all hair and teeth since these do not take up the radioisotope due to a lack of circulation in these structures. These are quite important dissimilarities in that while the Shroud image manifests many features characteristic of radiation, the process of exhibiting hair for certain and teeth for near certain is radically opposed to a natural scientific explanation.

It must be stressed however, that the precision of the corollaries mentioned are strongly suggestive of a vertical collection of anatomical data up to 36mm. (depending on the shape and size of the individual head studied). The cut-off, when taking into account the other anatomical details mentioned in the earlier papers [1,2] such as the thumb and metacarpal bones, yet lack of anatomy at a depth greater than 36mm, such as kidneys, liver, and spleen, e.g., appears to be quite abrupt and specific, as opposed to a vague fogging or phasing out of certain anatomy. The most specific example of this is demonstrated in the left hand whereby the apparent thumb image can be seen crossing under the metacarpal bones, (fig. 22A), with its distal phalanx terminating between the proximal fourth and fifth phalanxes (fig. 22B,C,D). The image intensity of each metacarpal is greater only in the region of the

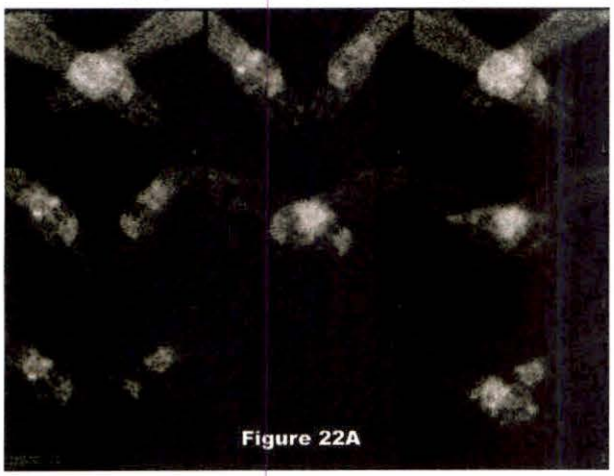
Figure 22A

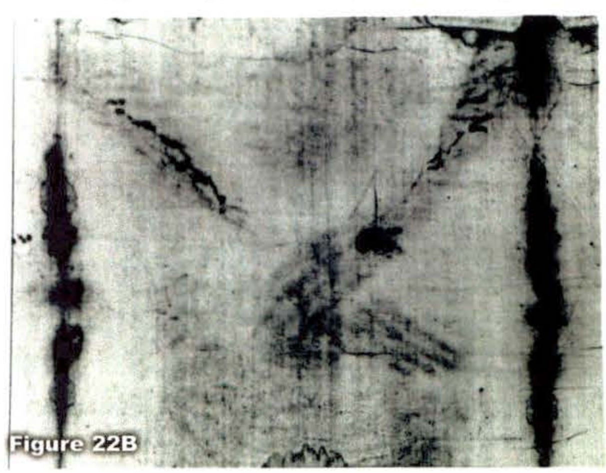
Figure 22B

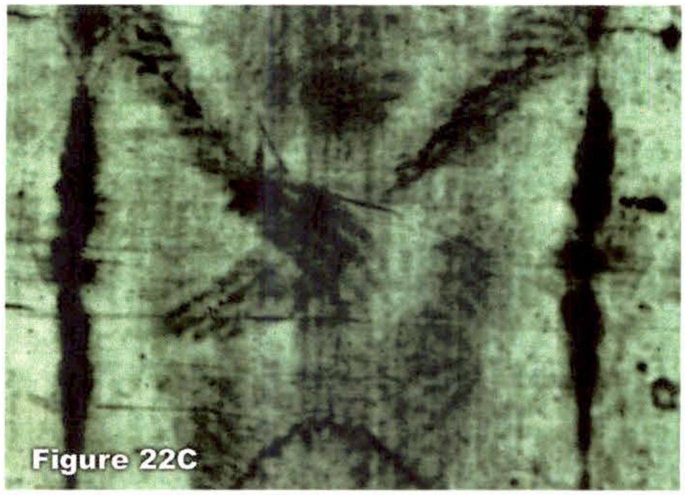

Figure 22C

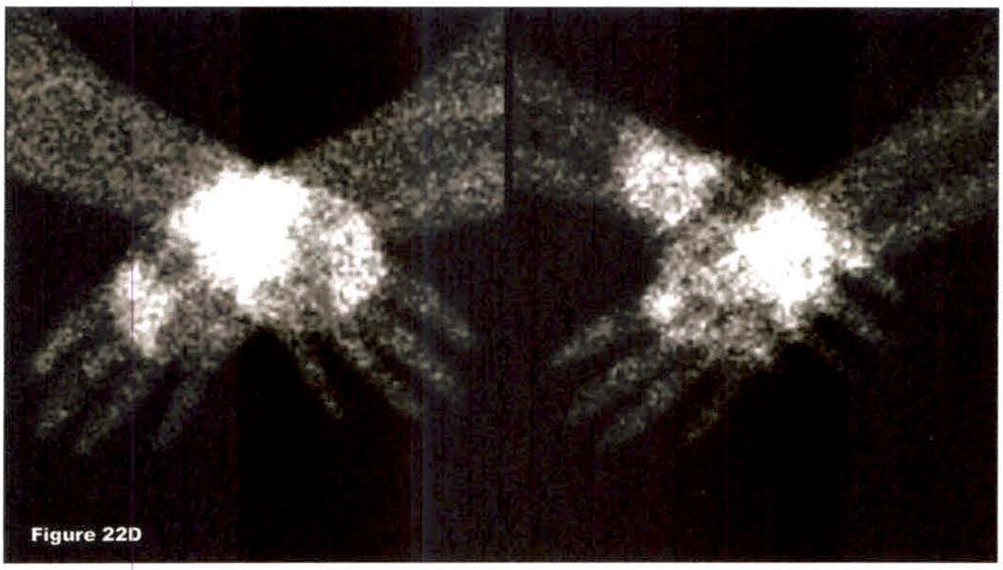

Figure 22D

postulated thumb, yet the proximal second metacarpal lacks this increase of intensity due to the depth of the first metacarpal which likely lies greater than 36mm inferior to the surface of the hand.

Conclusion: For each of our experiments, we elected to use Tc-99mMDP due to its biodistribution and chemisorption properties, which fit our purposes of soft tissue to bone ratio best. As we enter our fifth year of researching nuclear medical images and the Shroud, it is becoming more apparent that the Shroud image is nearly all soft tissue with only a minimal component due to bone. This in no way negates the appreciation of a volumetric component (i.e. 3-D seen with VP-8). As we have tried to demonstrate, the anterior image does seem to have been derived from approximately 36mm of vertically inward body data.

There are observations, which are more perplexing than others. While the 36mm coronal depth of the image explains many of the characteristics described above, there is the absence of other structures such as the forearm bones (radii and ulnae), as well as many of the ribs, which appear to be within this 36mm depth of imaging potential. Jackson [6] attempts to explain this lack of particular images in light of a collapsing cloth model, which, in effect of a centrobaric force of gravity would collapse the cloth towards its midline, causing a ribbon effect, which may move the cloth away from the body laterally. These theorized movements of the cloth do account for many of the blood clots, which appear to be out of phase with the body image, particularly in the head region.[8]

We hope to elucidate these and other enigmas in future studies where we plan to use various isotopes, which have a variety of chemisorption and biodistribution properties. Varying these isotopes, we may be able to attain a stronger semblance to specific Shroud features with which we had more difficulty in these experiments.

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