NOTES ABOUT ROBERT S. LEDLEY

The following text from Eddie Gowler is an appendix to his unpublished history of the early years of CT scanning. In May 1972 he set up and ran the business unit at EMI which launched the EMIs scanner.

Another myth surrounding the story of the development of the first CT scanner is that of Dr. Robert S Ledley who claimed to have been the Father of the Whole Body Scanner. (Ref. 1). Robert S Ledley (June 28 1926 to July 24 2012) was an American scientist who claimed to be the inventor of the Whole Body CT Scanner and is widely credited with this in various web sites on the Internet.

Study of the many references to Ledley on the web and in the literature show him to have been a very energetic man who became involved in many projects over the years, much of this as the head of The National Biomedical Research Foundation that, at the time we are considering, had a staff of about 50.

A reference to Ledley in a You Tube video (Ref. 2) calls him a “creative opportunist” and this description certainly seems to apply to his actions in relation to CT scanning, where he was very public in the promotion of his own activities and scornful of the EMIs scanner results (Ref. 1) that had genuinely revolutionized the world of Radiology.

The history of Science and Invention is littered with many people who have latched on to initial ideas of someone else and worked to copy, improve, enhance or even steal them. It is on this basis that Ledley’s involvement in CT scanning can be studied.

The facts are that Ledley did not invent the Whole Body CT Scanner but copied the original EMI Brain Scanner and, by making the hole in its structure slightly bigger, used it to scan the whole human body. The image processing method used by Ledley in his first public announcement of the ACTA scanner on October 9th 1973 in an American TV programme and on October 10th 1973 in the Washington Post and the New York Times is not known. However, the key point about the machine he announced in October 1973 was that its scan time for best results was 4 minutes, exactly the same as the first EMI Brain Scanner. The 4 minute scan time was the fastest possible with the mechanical and electronic design that could give good results. Faster scans could be made but the results were much inferior to those made with a 4 minute scan.

Staff at EMI were first aware of Dr Ledley when he made an appointment to see the original EMIs scanner brain machine and purported to be interested in buying one for his hospital in Georgetown University, Washington DC in the USA. At that time in May 1973, a multitude of genuine possible customers was visiting the EMI headquarters at Hayes in West London and were given the standard tour by sales staff. The visit by Dr Ledley was totally different from the above scenario. He somehow managed to get into the Central Research Laboratories of EMI and spoke to either both or one of Godfrey Hounsfield and Bob Froggatt, Assistant Director and Hounsfield’s boss. Ledley asked questions of a technical rather than a medical nature. He then asked that an engineer be made available to escort him to the Atkinson Morley’s hospital.

The engineering development manager of the brain scanner took him to Atkinson Morley’s but was immediately concerned at his questions. These included a request to remove some of the covers from the machine so that he could take photographs and measure various technical details. Once this was done, Dr Ledley proceeded to ask technical questions in much more detail. The engineering manager, by this time very concerned that this was not a genuine customer visit but an attempt at industrial espionage, referred Dr Ledley to Godfrey Hounsfield’s patent for more details. It was obvious that anyone could have built a scanner from the information given in the patent. This first patent was published on August 2nd 1972 and Ledley could have seen it well before his visit on 16th May 1973.

In October 1973, EMI were asked to send representatives to the USA to appear before a committee that wished to evaluate the EMIs scanner for use in American hospitals. On October 9th 1973, two senior members of the EMIs scanner team arrived in Washington DC for a meeting with the committee on the following day. During that evening, they stumbled on a television news broadcast announcing the ACTA whole body scanner made by Dr Ledley. The next morning the Washington Post carried a prominent article on the same theme. It later transpired that the New York Times had also carried an article on the ACTA scanner on October 10th 1973.

When the two EMI representatives met the committee, one of their first questions to them was about the ACTA scanner and, fortuitously, they were able to make suitable comments. The fact that Ledley publicized his work on the very day that the EMI representatives were due to present the EMIs scanner to an

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influential committee in Radiology must be suspect of an attempt at spoiling their presentation. In the event, he did not succeed in doing so.

Ledley established Digital Information Science Corporation (DISCO) in 1974, which offered for sale the ACTA 0100 scanners for $300,000 each. In 1975, DISCO sold the ACTA rights to Pfizer for $1.5 million in cash and $10 million in guaranteed research funding (paid out over 10 years) for The National Biological Research Foundation. Pfizer’s ACTA 0100 and its successor, the 200FS, were sold with limited success. In 1978 Pfizer bought American Science and Engineering for their third generation scanner that was of superior design to the now outdated ACTA scanner.

From the outset, it does seem that Dr Ledley was trying to glorify his own work on CT scanning and denigrate the work of Hounsfield and EMI.

Most references to Ledley’s work on the ACTA scanner cite his “patent” and give the impression that this is an all embracing patent but if the patent is actually studied in detail the only claims involve various mechanical features that do not materially affect the results obtainable from the equipment. In making the scanner that Ledley showed in October 1973, he appears to have made a machine that embodied most of the features in Hounsfield’s Patent of August 2nd 1972.

The fact that Ledley has been described as the Father of the Whole Body Scanner is very much down to his own self publicity of a machine that he copied from the Hounsfield patent with minor modifications such as increasing the hole size and removing the water bags. In doing so he merely reverted to what had been the well documented original intention of Godfrey Hounsfield in his first approach to the DHSS in 1968. Hounsfield was persuaded by them that it would be much better to concentrate on brain scanning for the two reasons that this was an area that would benefit more patients and because with the then available scan time of 4 minutes any body scans would have been of poor quality because the patient would not be able to keep still for that time.

The first body scan results of the ACTA scanner amply demonstrate that this had been the correct strategy because they were uniformly of poor quality because of the problem of keeping the patient still for 4 minutes. When Hounsfield disclosed his first body scans in 1975 they were of vastly better quality than those produced by the ACTA scanner, mainly because the scan time was only 20 seconds.

Evidence of the impact on body scans of the very slow (4 minute) scan time of the ACTA scanner can be seen in results published in the journal "Radiology" in February 1975. This is an early example of published results from the ACTA scanner, so one might expect it to emphasise scans of the body, to differentiate it from the brain CT scans which were already well-known from the EMI scanner. In fact, the document shows that 81% of scans in this study using the ACTA scanner were of the brain, and only 19% were of other parts of the body. The reason for this disparity is almost certainly because of problems with breathing and other movement during the 4 minute scan time. Subsequent CT scanners showed that patients can keep their lungs and abdomen still enough for a useful picture for 20 seconds, but not for 4 minutes. However, most patients can easily hold their heads still for 4 minutes. Thus a CT scanner with a 4 minute exposure time is not useful for scanning the abdomen, but it is useful for scanning the brain.

All in all, therefore, Ledley did nothing more than copy the original EMI scanner, modifying it in an inappropriate way and produced poor results. His claim to be the Father of the Whole Body Scanner is, therefore, somewhat spurious. In essence he put a cherry on top of the cake and claimed credit for the whole cake. In this case, however, that cherry was rather mouldy.

The final act in this drama is noted in The Wall Street Journal of August 9th 1977 when EMI sued Pfizer in the Wilmington federal court in Delaware for using six of its patents in the ACTA scanner. Pfizer settled in about 1980 and paid a lump sum for past royalties for infringing EMI’s patents.

REFERENCES:
2. A YouTube video found under the name of The Morris F Collen award for Medical Informatics. At 6 minutes 20 seconds into this video, Milton Corn MD refers to Ledley as a “Creative Opportunist”.

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