Wednesday, 24th February 1999

R V Paul Hobson

SB 10.30.

MR KERR: It is proposed to interpose Professor Crane. His evidence is at page 90, but effectively the evidence will be given from his report exhibit 10, page 50 of the papers.

PROFESSOR JACK CRANE. Sworn

Examination in chief by MR KERR:

Q. Professor, would you please, for the record, state your qualifications and the appointments that you hold.

A. Bachelor of medicine, bachelor of surgery, a Fellow of the Royal College of Pathologists. I hold the diploma in medical jurisprudence in clinical forensic medicine and in forensic pathology. I am a Fellow of the Faculty of Pathology of the Royal College of Physicians of Ireland. I am the State Pathologist for Northern Ireland, Professor of forensic medicine at the Queen's University of Belfast and a consultant in pathology to the Northern Ireland Health and Social Services Boards.

Q. Professor, did you conduct the post mortem examination of the body of Robert Hamill on the 9th of May 1997 at 2.30 pm?

A. I did, my Lord.

Q. Was that at the mortuary, Royal Victoria Hospital in Belfast?

A. That's correct.

Q. Was the deceased identified to you by [redacted] from RUC Lurgan?

A. Yes, my Lord.

Q. During the course of the autopsy were photographs taken at

your direction by [redacted] from photography branch?

A. That's correct, my Lord.

Q. And was one item of clothing first removed from the body, a pair of red boxer shorts?

A. That is correct.

Q. Did you conduct an external examination of the body?

A. Yes, I did.

Q. What did you find on your external examination?

A. This was a body of a young man of average build weighing 75 kilogrammes and measuring 175 centimetres in length. That probably equates to about 11 and a half stone, my Lord, and probably about five feet ten inches in height.

Q. Yes?

A. Rigor mortis, which is a stiffening of the body that occurs after death, was present. And there was hypostasis on the back of the body. This is the purple discolouration that occurs due to the pooling of blood after death.

Q. Did you discover any injuries present?

A. Yes, I did, my Lord. First of all, on the head, there was an area of red abrasion, 15 millimetres diameter on the left side of the forehead above the temple and close to the hairline. Within its centre was a fine linear pinkish red scar, two centimetres long.

Q. Yes?

A. There was a resolving reddish purple bruise, 25 millimetres long and up to nine millimetres broad, across the upper eyelid of the left eye. And thirdly there was a spot of abrasion, two millimetres diameter, on the nasolabial fold close to the left nostril.

MR KERR: Just stopping there, Professor. Could he please be

shown exhibit number 5, the post mortem photographs.

(To the witness): I wonder perhaps with reference to photographs number 3 on to six, could you indicate those three injuries to the court, please.

A. Looking at photograph number 3, my Lord, you will see the area of abrasion on the forehead, and you can see the fine scar running across it. And still on the same photograph if you look at the left eye you can see the bruising of the eyelid. This bruising was resolving, indicating that it was beginning to fade, it was not recent. And similarly on the same photograph if you look just at the left nostril you will see a small dark reddish brown spot. That's a small portion of bruising.

Q. Moving on then, Professor, did you examine the trunk?

A. Yes, I did, my Lord. There was a fading yellowish purple bruise, probably associated with a surgical suture, two centimetres diameter on the front on the front of the right shoulder. That injury, my Lord, I think was as a result of surgical treatment. I don't think that it was as a result of anything else. I think it was because they had inserted a stitch into the skin there.

Q. And any further?

A. Yes, there was a fading yellowish green bruise, two centimetres by one centimetre on the front of the abdomen, eight centimetres to the left of and one centimetre above the umbilicus, or naval.

Q. Perhaps photograph number 8, Professor.

A. Yes, my Lord. That bruise there. (Indicating).

Q. Moving on, did you then find anything in relation to the upper limbs, firstly the left upper limb, Professor?

A. Yes, when I examined the left upper limb there were two fading greenish purple bruises. One was one centimetre in diameter and the other was two and a half by one and a half centimetres diameter on the outer side of the upper arm. And there were a number of blotchy fading bruises, the largest three by two centimetres on the back of the left forearm, the wrist and the back of the left hand.

Q. Perhaps if you could refer to photographs number 9 and ten, Professor.

A. Photograph number 9 shows the fading bruises on the outer side of the upper arm, just below the tattoo, my Lord. And photograph number 10 shows the forearm, the wrist and the back of the hand, and you will see there are a number of bruises. Again these are fading indicating that they are some days old.

Q. The right upper limb?

A. There was a fading greenish yellow bruise, three and a half by two centimetres on the outer side of the upper arm. There was another fading bruise, about two centimetres diameter, on the front of the forearm close to the fold of the elbow. There was a further fading bruise, 15 millimetres diameter, possibly related to needle punctures, on the back of the hand just proximal to the metacarpo-phalangeal joint of the index finger.

Q. And are there photographs of that limb in 11 and 12?

A. Photograph number 11, my Lord, shows the fading bruise on the outer side of the upper arm, just below the shoulder area. Photograph number 12 shows the bruise near the fold of the elbow.

Q. And you have referred to photograph 13 perhaps in relation

to the puncture marks?

A. Yes, there was a bruise on the back of the hand. I think, my Lord, there are two small marks in the centre of that bruise, I think that's been caused when he's been receiving treatment and they have possibly tried to remove blood or give an injection into a vein there. So I think that's related to treatment as opposed to an actual injury.

Q. Finally, externally the right right lower limb.

A. Yes, there was an area of indistinct yellow bruising, 1212 centimetres by 14 centimetres, with more definite resolving bruising at its posterior extremity on the outer side of the pelvis and extending onto the right buttock.

Q. Perhaps if one would refer to photograph number 14, Professor.

A. Yes, my Lord. This yellowish discoloured area and the more definite bruising below it in the region of the buttock.

Q. Now, were there signs of treatment present on your external examination in relation to the body?

A. Yes, there were, my Lord. There were multiple needle puncture wounds on the sides of the neck, above the inner end of the right collar bone and below the outer half of the collar bone. There were further needle puncture marks in the fold of the elbow, on the thumb side of the wrist and on the back of the hand. There were cannulae, intravenous cannulae projecting from the right forearm and the back of the right wrist. There were needle puncture marks on the top of the left foot. There was a needle puncture mark on the top of the right foot and a cannula projected from the inner side of the right foot. These were all associated with treatment

in hospital, giving drugs, removing blood and so forth, my Lord. And finally there was a catheter, which was draining urine, projecting from the penis.

Q. Moving on then to the eyes and conjunctivae.

A. There was nothing wrong with the eyeballs or the lining of the eyes themselves. Similarly the ears were normal. There was a little scabbed excoriation of the left nostril. I found a tattoo on the outer side of the left upper arm and the letters 'RH' had been tatooed on the outer side of the right upper arm. The scrotum was examined and the testes were present.

Q. Did you then conduct an internal examination, Professor?

A. Yes, I did, my Lord. Firstly the head. The scalp was reflected and I found an area of bruising, six centimetres by three centimetres, so that's about two and a half inches by about an inch and a half, in the left temporalis muscle, that's the muscle on the left side of the head, this sort of area here, my Lord, above the ear. (Indicating). And another smaller area of bruising, three centimetres by one centimetre, over the right parietal region. The right parietal region is slightly lower down on the right-hand side of the scalp.

Q. Just for the record, were you indicating an area just behind and above the level of the ear?

A. Yes, both were roughly similar areas on each side of the head, near the ear, my Lord.

Q. Yes?

A. I then examined the skull. It was of normal thickness and density, its thickness varying between three millimetres and ten millimetres. I found that in the relatively thin frontal

bone on the left side there was a fissure or hairline fissured or hairline fracture, seven centimetres long, which extended downwards and medially into the roof of the left orbit, that would be the roof of the eye socket, my Lord. And there was a little associated bleeding, what we call extradural haemorrhage, in that area. It can be seen in the photograph, my Lord.

[redacted]: Which photograph?

THE WITNESS: Photograph number 17 and 18, my Lord. We are looking at the base of the skull, my Lord, after the top of the skull has been taken off, and you will see that there's a small hairline fracture running across. And you will see there's a spot of bleeding just to its side, to its left extremity.

[redacted]: Would that relate in any way positionally to the abrasion?

THE WITNESS: It didn't relate to the bruising of the scalp, those were on the side of the head, this was more to the front.

[redacted]: The bruising, could it be seen externally?

THE WITNESS: Well, there was some bruising abrasion on the eye, my Lord, but I don't think that this was directly related to that.

MR KERR: Sorry, could you perhaps just indicate that to Mr Allister, please.

A. That's the fracture and then we have a little bit of bleeding. (Indicating).

Q. Thank you, Professor.

A. I then examined the brain. It weighed 1,548 grams. It

seemed rather bulky with a with flattening of the convolutions and grooving of the cerebellar tonsils. The convolutions, my Lord, are the little grooving on the surface of the brain and they seemed somewhat more flattened than normal.

[redacted]: What about the cerebellar tonsils? It's a new one on me, I'm afraid.

THE WITNESS: The cerebellar is the hind part of the brain, and if the brain undergoes any degree of swelling, part of the cerebellum known as the tonsils are sometimes grooved. So it may be an indication that the brain has undergone some degree of swelling.

[redacted]: Is that really it shows some form of compression, does it?

THE WITNESS: Well, if the brain swells it's in a rather confined space and, therefore, it pushes down on the cerebellum and, therefore, you get a lot of grooving of it.

MR KERR: Yes?

A. The meninges, which are the surface covering of the brain, were examined. They were congested but transluscent, in other words they were quite clear. The fluid which lines the brain, the cerebra spinal fluid, appeared a little cloudy. I was concerned about that and the reason why I mention it, my Lord, was the possibility that there might have been some infection of the brain. The commonest infection being meningitis which every one is familiar with.

Q. You will be coming back to that at a later stage?

A. Yes, I will.

Q. Just continue then if you would, Professor.

A. I examined the mouth. There was no bruising of the

mouth and it contained natural teeth in fair condition in each in both jaws. The tongue and the back of the throat were normal. There was no damage to the hyoid bone or the laryngeal cartilages, the hyoid bone being the small bone in the upper part of the neck, the laryngeal cartilages being the voice box and Adams apple. The thyroid gland was normal, as was the heart sac. I then examined the heart. It was of normal size. There was some small haemorrhages on its surface, probably of no significance, probably a terminal event, my Lord. The remainder of the heart was normal, as was the aeorta, which is the main blood vessel in the body. The chest cavity was normal. The larynx, or voice box, showed slight swelling of its opening and a little bleeding below the vocal folds. This was probably related to treatment, my Lord, a tube is normally put down the throat to protect the airway and there's a cuff on this and the cuff presses on the voice box.

Q. So that's a treatment mark you believe?

A. That is correct, yes.

Q. Yes?

A. The wind pipe and the main air passages to the lungs were examined. Apart from containing a little frothy fluid they were otherwise normal. The lungs were examined. The left lung weighed 567 grams and the and the right lung 813 grams. They were deep purple in colour with a heavy jelly-like texture. Section revealed a dark congested oedematous tissue. Oedematous means that the lungs were rather wet, there was a lot of fluid in them. The gullet was normal.

I then examined the abdominal cavity and found a little bruising in the muscles of the front wall on the right side.

The stomach was normal. It contained a little bile stained fluid. The intestines were normal, as was the duodenum and the appendix and rectum. The liver and gall bladder were normal. The spleen was soft but otherwise nothing of significance. The pancreas, adrenal glands and kidneys were all normal. The bladder contained some urine and its lining was reddened, but again this was probably due to the fact that there had been a catheter in the bladder as a result of treatment. The prostate was normal. I then examined the ribs, the bony spine and the pelvis, and they were intact, there was no evidence of any fractures there.

Q. Did your autopsy conclude then at 4.10 pm and did you hand to the scenes of crime officer samples of head hair, blood and fingernail clippings?

A. Yes, that's correct, my Lord.

Q. Did you subsequently carry out a further examination and have your examination carried out in relation to the brain?

A. Yes, I did, my Lord. The brain wasn't further examined at the time of the post mortem because it was quite soft. So the normal procedure is, my Lord, is that the brain is then fixed in preserve tiff to make it easier to examine. And that was done. When it was examined there was no evidence of bleeding over its surface, in other words there was no subdural or subarachnoid haemorrhage, and there was no menengitis, in other words there was no infection.

Q. Does that refer back to the cloudiness of the fluid that you had referred to?

A. Yes, as I said, I was a little bit concerned that the fluid was cloudy and the possibility of infection. There was no surface bruising to the brain itself nor was there any

evidence of swelling of one side as opposed to the other. So there was no what we call aysmmetrical swelling. There was no evidence of uncal or tonsular herniation or necrosis. I mentioned earlier that the cerebellar tonsils were grooved. If the degree of swelling is very severe then these parts of the brain can actually undergo degeneration. That wasn't present.

[redacted]: What does uncal refer to?

THE WITNESS: The uncii are also small areas of the brain, my Lord, which can become compressed when the brain swells.

MR KERR: Yes?

A. The vessels crossing the base of the brain were examined and they were normal. The brain was then sectioned. The most significant finding was the presence of small focal haemorrhages within the deep white matter of both the frontal lobes in what we call the parasagittal location. The sagittal location would be the midline going from front to back, so these areas were close to the midline in the white matter. And they were also present in an area of the brain known as the left thalmus and the internal capsule area. In addition there was diffuse vascular congestion throughout the white matter of the brain. There was no haemorrhage on the corpus callosum although it appeared congested. That is a band of brain tissue which runs between the two hemispheres across the brain from side to side, my Lord. There was no evidence of midline shift or internal herniations but there was a mild degree of ventricular compression. The ventricals, my Lord, are the spaces inside the brain, and if the brain undergoes any degree of swelling then the size of these ventricals, or spaces, is reduced. So

there was some evidence that they were not as large as normal, suggesting that there might have been some degree, albeit slight, of brain swelling.

Q. Yes?

A. There was no caudal discent of the mamillary bodies. Again that's a part of the brain that may be compressed when the brain swells. The brain stem, which is that part of the brain which controls respiration and other vital functions, was examined, and there were small diffuse punctate haemorrhages within it. The cerebellum, which is the hind part of the brain, was examined, but it appeared normal.

Q. Was there then an examination of various organs by microscopy?

A. Yes. The normal procedure then is to examine some of the tissues under the microscope, my Lord. The heart fibres were examined and they were normal. The lungs were examined. There was a lot of fluid in the lungs, as I indicated, both grossly, and this was seen whenever they were seen whenever they were looked at under the microscope, and there were areas of haemorrhage within the lungs. In one of the sections of the lungs that I examined, not only was there haemorrhage but the tissue was disolving out and this was probably associated with the aspiration of stomach contents. The as I had contents of the stomach can cause the lung tissue to undergo disolution and haemorrhage. So that probably was a terminal event, my Lord, close to or round about the time of death. There was no evidence of pneumonia in the lungs, in other words there was no infection there. The liver and kidneys were both examined. In the liver there was no evidence of acute degeneration. There was a specific

reason for looking at that, I will come onto that later, my Lord. The kidneys were examined and they seemed normal. Again I looked for casts in the kidneys and again there was a specific for doing that.

Q. Then were sections of the brain examined under microscopy?

A. Yes, multiple sections of the brain were examined. The frontal lobes, first of all, and these showed the presence of small contusion or bruises within the white matter. These were associated with areas of acute degeneration within the white matter and the finding of what we call diffuse axonal damage.

[redacted]: What's the significance of the word axonal?

THE WITNESS: I can perhaps come on to explain that later on.

[redacted]: Yes, indeed.

THE WITNESS: There was no evidence of hypoxic or ischaemic necrosis of the cortex. In other words if there was evidence that the brain had been starved of oxygen for any prolonged period of time, for example, at the time the head injury was sustained, you might examine expect to see damage in the frontal part of the brain and there wasn't any evidence of that. And again there was no evidence of either meningitis or encephalitis.

The corpus callosum was examined, that's the part of the brain that crosses from one side to the other, and it showed diffuse axonal damage. And there was further acute axonal damage in the left internal capsule. The hypothalmus was examined and there was some axonal damage in that area. That might be significant, my Lord, because the hypothalmus is the part of the brain that regulates your body

temperature and if it can be damaged then the temperature regulation of the body can become deranged.

Q. Yes?

A. The mid-brain was examined, that's part of the brain stem, and it showed diffuse axonal damage. There was no evidence of secondary brain stem haemorrhage. Sometimes what can happen is that if the brain becomes swollen then the brain stem can suffer damage and you can get a large haemorrhage within it. There was no evidence of that. The pons, which is another part of the brain stem, was examined, and it showed features of severe diffuse axonal damage. The cerebellum was examined, which is the back part of the brain. There was no evidence of cortical necrosis and the Purkinje cells were preserved. Again the Purkinje cells were sensitive to lack of oxygen and if there had have been a prolonged period of deprivation of oxygen to the brain one might have examined to see damage there.

SB to BC 11.00

PROFESSOR J CRANE: EXAMINATION IN CHIEF BY MR KERR (Contd.)

MR KERR: Yes? A. There was only a small scar in the white matter of the cerebellum. There were some further tests done on brain sections to confirm the distribution and severity of the diffuse axonal damage. I can explain what that is.

Q. Yes? A. The axons are like part of the brain cells. They are one type of brain cell. They consist of a central portion, and there is usually a tail leading from the central portion. In certain types of injury to the brain the axons may become damaged. They can leak fluid and the fibres retract, and when you look at the brain under the microscope you can see little retraction bulbs. This type of head injury is well documented. It probably occurs at the time that the head injury is sustained, but it takes some time for the changes to become apparent, either closely when you look at the brain, or, indeed, when you look at the brain under the microscope. So, although the damage to the axons has occurred immediately, if you like, we cannot see those changes until some time ... the very earliest are a few hours after the injury, using normal techniques it is some days. The work that has been done on this type of brain injury shows that it is most commonly associated with acceleration/deceleration injury. In other words, that the brain is moving and it comes to a sudden stop. It is being shaken around inside the skull, and one of the commonest

causes would be in road traffic accidents, and this is where it has been most widely seen.

Q. I will be asking you to give your full commentary later, but can I ask you something about the mechanism of the injury. For example, can you say whether or not this injury would be caused by punching, for example, punching in someone like a boxer? A. There is very clear evidence, documented work, to show that this type of injury occurs in assaults.

THE JUDGE: Would I be right in getting the idea that it is more from violent movements of the head itself rather than the external effect of a blow per se?

A. Yes, that is correct.

Q. I know that I am simplifying it, but that is the way that I like it? A. What My Lord is saying is correct. In other words, a simple blow where the head is stationary and remains stationary is not thought to be associated with diffuse axonal injury. It is, however, recognised as occurring in assaults, but curiously this lesion has not be described in any of the work which has been done on boxers.

MR KERR: It has not been described?

A. Correct. The brains of boxers have been subject to close scrutiny. The view is that perhaps simple punching alone might not be sufficient to cause this injury because in people who are subject to repeated blows to the head, i.e. boxers, this is not found.

Q. Would it be consistent with multiple kicks to the head, causing the head to go from side to side?

B.C.3

A. Yes, it would, because the violence has to be associated with the head being moved violently, and certainly if the head was kicked violently causing it to move then diffuse axonal injury could occur and has been described.

THE JUDGE: Could a factor be whether the person was conscious or unconscious? You might keep your head more still if you were conscious, I suppose, whereas unconscious .....? A. If the head is not moving for whatever reason then that may be a factor. Obviously if the head is moving, if it is unsupported, then that is more likely, and is probably a pre-requisite for this injury to occur. The literature indicates that simple falls are not associated with diffuse axonal injury. In other words, if you are standing and fall to the ground and strike your head, then the view is that you do not get diffuse axonal injury. It has been associated with two types of falls. These are falls from a height, and the greater the height the more severe the degree of axonal injury is. Secondly, in what we call accelerated falls, in other words, if the person is propelled to the ground, so, if you are standing, My Lord, and fall and hit your head, it is thought that diffuse axonal injury does not occur, but if you are standing and you are punched violently causing a rapid movement to the ground, that certainly may cause it.

MR KERR: I think, unless I missed it, I think that you carried out or had work carried out – reports from the bacteriology lab? A. Yes, I did. Although I found no evidence of pneumonia in the lungs, I sent along

tissue to the laboratory. That grew from spinal fluid and bacteria but I understand that they are not thought to be significant. Because the fluid around the brain was cloudy again I sent some of that off for bacteriological examination. Some organisms were found but they were not thought to be significant and were thought to be contaminants, and when the brain was examined there was no evidence of infection. I think that we can exclude infection of the brain as being a feature of the case.

Q. Taking all your examination, the work and the reports that you received, did you come to an Opinion?

A. Yes, I did. This young man died in hospital eleven days after he had been assaulted. Death was as a result of the head injuries which he had sustained. Externally his injuries appeared trivial; there was a small area of abrasion on the left side of the forehead, a bruise on the upper eyelid of the left eye and a small spot of abrasion close to the left nostril. Even internally the injuries did not seem particularly severe with only two areas of bruising on each side of the under surface of the scalp and a small almost hairline fracture in the front part of the skull running into the roof of the left eye socket. Detailed examination of the brain, however, and in particular its microscopic examination, revealed widespread damage within its substance of a type known as diffuse axonal injury. This condition, most frequently encountered in acceleration/decelaration injury as a result of road traffic accidents, is also well recognised as occurring as the result of repeated blows to the head, such as by punching or

kicking, and this would seem the most likely mechanism of injury in this case. It was ultimately the effects of the brain injury which were eventually responsible for his death in hospital. He has also sustained some other injuries although none of these were serious enough to have played any part in his death. There was a fading bruise on the front of the abdomen and some further bruising in the muscles of the abdominal wall which could have been due to blows during the assault. There were numerous bruises on the left upper limb, particularly on the forearm and hand, which could have been sustained if the arm was struck whilst raised in a defensive gesture. A few further bruises were located on the right upper limb but some of these were probably related to injections given whilst in hospital. A fairly large area of bruising overlying the right side of the pelvis was due to blunt force and might have been caused by a kick. The autopsy also revealed some changed in the lungs caused in part probably by a period of assisted ventilation and also by the terminal aspiration of stomach contents but these findings are unlikely to have contributed to or accelerated death. In view of the lapse of time between the assault and his death, an analysis for the presence of alcohol was not carried out following the autopsy. On his initial admission to hospital, however, an analysis carried out at that time revealed an alcohol concentration of 221 mg per 100 ml. Such a level would leave no doubt that he was moderately intoxicated at the time of the incident. Also, it is well recognised that alcohol intoxication exacerbates the effects of head injuries

and may well have played a part in the fatal outcome in this case.

Q. Arising out of that, if I can ask a number of supplementary questions. In cross-examination you were not present at the time of the Senior in the Neuropathology Ward. He was asked to read some comments from the report of [redacted]. One of the comments was that this was a minor injury. Can I ask you a two-barrelled question? Can you comment on the description from [redacted] point of view of a minor injury, and can you say whether in fact that description is justified? A. This was not a minor injury, this was a very serious head injury which this man sustained. It might appear to have been a minor injury. In other words, the external findings, ie, the paucity of injuries, might have suggested to the clinicians that perhaps the underlying brain's injury was not as serious as it was, and certainly my initial examination of the brain suggested perhaps that it did not appear to be a serious injury. However, the severity of it was confirmed whenever the brain was subjected to a more detailed examination.

THE JUDGE: Functional tests would have probably shown that the brain was not showing any sign of serious damage? A. Yes, certainly from my reading of the hospital notes and so forth perhaps there did not appear to be the serious functional effects which you might have expected in a more serious injury. However, in saying that, I think it was apparent while Mr Hamill was in hospital there still was evidence of cerebral damage and

irritation, and he wasn't fully conscious. He was agitated and disorientated, so there was some evidence, although perhaps not as obvious as one might have expected with this degree of injury.

MR KERR: There was questions in relation to pulmonary embolism. Can you say whether or not you are in a position to deal with that? A. Pulmonary embolism is a condition whereby blood clots form usually in the deep veins of the legs because the person is immobile, lying around. These clots become detached and travel in the circulation to the heart and then go to the lungs where they block the major arteries at the root of the lungs. It is well recognised as a sudden death. At autopsy these are easily detected and found. There were no emboli in the lungs and I can exclude that as a cause or contributory factor in the death.

Q. You then said that you had obviously read medical notes and records in relation to it, and on the day of his death he received an injection of a drug to calm his irritation. There were questions as to whether that may have contributed or caused the death? A. The drug that he was given is Chlorpromazine, and he was given Haloperidol. There is a condition associated with both these drugs. It is a rare condition. It is an unusual allergic reaction to these drugs which is occasionally seen in some individuals known as the malignant neuroliptic syndrome. It is characterised by a high temperature and various changes in both the brain, the liver and the kidney. Mr Hamill did have a raised temperature, and I think that the

doctors, looking after him, were concerned that there was the possibility that this could have been a factor in the death. Whilst the condition of malignant neuroliptic syndrome is not associated with specific changes at autopsy there are some changes that occurred and are recognised both in the brain, and the liver, where you can see acute degeneration, and in the kidneys, where you can see the breakdown of red blood cells. We were keen to ascertain whether that was the case or not. There were no findings either in the brain, the liver or kidneys to indicate that the malignant neuroliptic syndrome associated with the drugs administered contributed to his death.

Q. One further matter which I think you have dealt with but if we deal with it now was a suggestion of septicaemia? A. Yes, that is a form of blood poisoning which is associated with a generalised infection in the body. Blood was taken whilst he was in hospital when he developed the high temperature to look for infection, and my understanding is that there was no infection in the blood. One may see some change at post mortem associated with that. I did not examine the blood or send the blood off for examination because post mortem examination of blood for infection is unreliable and any results are meaningless. I relied upon the fact that that had been done during life and there was no evidence of infection at that time.

Q. I think, to draw conclusions together, can you say whether or not this man would have died but for the head injury? A. I think this is the crucial question,

B.C.9

My Lord, so far as I am concerned, and the one which I considered. The view which I take is that this man would not have died had he not sustained the head injury, and his death I can only ascribe to the effects of the head injury.

Q. Thank you.

CROSS-EXAMINATION BY [redacted]:

[redacted]: Before you started your post mortem you were briefed by Detective Inspector Monteith?

A. Correct.

Q. You made notes of what he told you?

A. Yes, I did.

Q. Among those notes is a record that he told you that this victim had left a certain licensed premises at about 1.45 A.m.? A. I will have to refresh my memory from my notes. Yes that is correct.

Q. He described to you the fact that he had been assaulted and included in that description the possibility that two or three men had jumped on his head?

A. Yes.

Q. When you came then to examine externally the body of Mr Hamill all that you found externally were trivial injuries? A. Yes, the injuries on the surface of the head were trivial.

Q. You found the abrasion at the left temple and a bruise on the eyelid and that was the essence of it?

A. That is correct, there was a small abrasion just at the left nostril.

Q. There was no facial bone damage?

A. There wasn't, My Lord.

Q. Indeed, the injuries found elsewhere were likewise very minor, or trivial externally? A. Correct.

Q. Indeed, many of the recorded bruises could be due to treatment, injections and testing?

A. Some were. I think I have indicated where I think those marks were. Others were not. Some of them in my view were defensive injuries.

Q. Dealing with some of the defensive injuries on the arms, they were all quite small? A. Correct.

Q. About thumb size? A. Correct.

Q. That was the general description of them. They were about the size of a thumb? A. Correct.

Q. Some were yellow, some were purple. There were various colours? A. Yes. These were fading injuries.

Q. Does the various colour delineations tell us anything on when they were inflicted – the timing?

A. It tells us that they are not recent, but it is impossible to precisely age bruises. What we can say is that they were not recent and they are the sort of fading bruises one might have if they had been sustained a number of days prior to death.

Q. Mr Hamill was moved to hospital eleven days before death? A. Correct.

Q. Some of the bruises on the arms may have been bruises obtained in the intervening period?

A. That is a possibility, but one has to consider why then did these bruises occur in the intervening period.

B.C.11

Q. If he were very agitated and had to be restrained to obtain injections would he have to be held firmly?

A. Yes, that is a possibility.

Q. Held firmly by the arms? A. Yes, that is a possibility.

Q. Would some of the bruising, remembering the size of them and the location on the arms, be consistent with having firmly been restrained? A. I can't say whether they would or would not. That is a possibility. I don't know whether he was restrained with having his arms grasped or not. Normally, if a person requires restraint the technique in hospital is not to grab them by the forearms.

Q. But if a man is in an agitated state and one needs to inject his arm or treat him one may be compelled to do that? A. That is a possibility.

Q. Dealing with the generality of the external injuries that you found which you have agreed can be classified as trivial did he have the external injuries which you would expect for a man if he had been jumped on by three men, especially around the head and shoulder area?

A. I don't know that one can necessarily say what injuries you might expect, but there wasn't certainly any serious facial injury which might occur if someone had been, for example, trodden on or jumped on.

Q. If someone was lying on his back with his head jumped upon one would expect at the very least nasal injuries and facial bone injuries? A. Yes,

certainly one could expect to see damage to the facial structures.

Q. If one was jumped on in the shoulder area one would expect to see substantial bruising? A. Well, it is a possibility, but the shoulder area is also quite muscular, so one might not necessarily expect to find ....

Q. Looking at the photographs of the facial injuries, it would be surprising if those were all the injuries sustained by a man jumped upon by three other men?

A. Yes, I think it is fair comment to say that one might have expected to see more injuries. It depends on the amount of force used, applied to the head.

Q. Is it fair to say that in the external injuries you could find nothing that would sustain or corroborate a suggestion that he had been jumped upon by two or three men? A. Yes, I don't think from considering the external injuries alone that I could have drawn a conclusion that he had been jumped on.

Q. Considering the external injuries in themselves, would it be fair to say that they would be suggestive of only light force being used upon the injured party?

A. The surface injuries were trivial and they could be in keeping with the application of slight force.

Q. In the type of external injuries that one finds on someone if the attacker is trying to do him really serious harm? A. I don't necessarily think that the pathologist can answer that as to what is in the mind of the attacker.

B.C.13

Q. If that manifests itself into a viciousness in attack one would expect to find corresponding injuries, would you not? A. You certainly could, but that does not mean to say that he had the intent to cause vicious harm. In other words, I could take a very substantial kick at My Lord's head, but if it only glances off his head he might have very trivial injuries, but that does not mean that my assault was not intended to be vicious.

Q. Does the left temple injury appear to be one that might be a glancing blow? A. That is a possibility, yes.

Q. Is it a matter of fact that all the external injuries noted in the autopsy, except the facial injuries, are nowhere recorded on the hospital notes? A. I don't think they would record the external injuries to any detail. I would need to refresh my memory on that.

Q. The internal injuries one would not describe them as severe? A. Well, ...

Q. That is in your commentary. 'Even internally, injuries did not seem particularly severe.'?

A. Yes, I think I said that they did not appear particularly severe.

Q. What the internal examination revealed were two relatively modest bruises below the scalp, one to the left and one to the right? A. There were two areas of bruising on the sides of the scalp.

Q. And then you found this almost hairline fracture on the left front of the scalp? A. On the skull, that is correct.

B.C.14

Q. Was there any overlying bruises on the under-surface of the scalp in the location of the almost hairline fracture? A. There wasn't, My Lord. There was what we call bleeding around it, and that can be seen in the photograph, but the scalp itself showed no bruising at that location.

Q. Is that an unusual finding to find a fracture but without overlying bruising? A. Yes, it can be. Here was the abrasion to the left forehead area and it is possible that that was associated although a little bit away from the site of the fracture.

Q. Demonstrate on your own head?

A. The abrasion was here, near the hairline. The fracture was slightly lower down.

Q. Point to where the fracture was?

A. The difficulty with a fracture is that it is in the base of the skull as opposed to outside the skull, but considering the roof of the orbit where one's eyebrow is, it is lower down than where the abrasion was, which was higher up towards the hairline.

THE JUDGE: How did the fracture run?

A. It was going side to side, so from the left side towards the right side.

[redacted]: Horizontally? A. Yes.

TO S.B. 11.30 a.m.

Wednesday, 24th February 1999

R V Paul Hobson

PROFESSOR JACK CRANE

(Cont'd) Cross-examination by [redacted]

Q. Would it be normal when you have a fracture to find above it under surface bruising and then above that the external injury?

A. Yes. That is normally the case. I think one particularly with fractures in this area, at the base of the skull, has to consider another mechanism, my Lord, in that the skull fracture does not always, particularly with basal skull fractures, necessarily appear subjacent to the injury, which is I think the point you are trying to make. And the reason for that is that if you have force transmitted through the base of the skull, then the part of the skull that is weakest and thinest may fracture. And I suspect that in this case what has happened is that the force has been transmitted probably from the side or the front of the head, that part of the skull which is fairly firm and rigid has stood up to the force, but the thinner part of the skull, which is that part forming the roof of the orbit and which is really shell thin, fractured.

Q. But the force applied, if it were the force where you find the abrasion, wasn't even sufficient to break the skin.

A. Yes, that's not necessarily surprising. The skull may fracture without the skin being broken.

Q. Well, do you relate the actual area of abrasion conclusively to the finding of the fracture?

A. No, I'm not specifically, what I am saying is that that is a possibility as to the injury. The other possibility is

the actual injury to the eye itself might have been the injury that resulted in the skull fracture, I don't specifically know.

Q. But you found no overlying bruising on the under surface of the scalp in the location of the fracture?

A. No. Again, to explain this, the fracture is mainly in the base of the skull. There is no overlying scalp there to bruise. I think if you see on the photograph, my Lord, we are looking at the base part of the skull. We're not looking at the side of it which is covered by scalp, we are looking at the base. There's no scalp there. What you can see quite definitely is bleeding in that area indicating that force has been applied and that the rather thin bone there has fractured.

[redacted]: How is the skull facing, as it were, in photograph 17?

THE WITNESS: The front of the head is at the top of the photograph, my Lord. And what has been done is the top of the skull has been removed. If you were slicing the top of an egg.

[redacted]: At what point roughly?

THE WITNESS: Well, we tend to take it round.

[redacted]: Round the eyebrow, forehead.

THE WITNESS: Yes. So what you're seeing there, that part of the skull at the front is in fact --

[redacted]: And you are looking down on it here?

THE WITNESS: You are looking straight down inside the head. The bone that you see at the front there, which is forming the arc at the top, is in fact the bone of the forehead area.

[redacted]: Yes, that's the frontal part.

THE WITNESS: The frontal region. Now, as you look down you are seeing the roof of the eye socket, and you can see the roof of the eye socket on the left side and you can see the fracture running through it and the bleeding over it. This is the base of the skull.

[redacted]: If we had a slightly different view you would see the sort of the cavities for the eyes.

THE WITNESS: The eye is directly underneath this. If you lift up that bone the eyeball is directly beneath that.

[redacted]: You have described it as almost a hairline fracture.

A. That is correct.

Q. So it obviously wasn't a substantial fracture.

A. No. The bone here is thin and does fracture relatively easily with force applied.

Q. And, therefore, if it's thin at that point, and significant force is applied, one might expect more than a hairline fracture.

A. Well, you might. Again it depends on how the force is transmitted.

Q. It's the easiest part of the skull to fracture, is that right?

A. No, it's not. The bone is thin and, therefore, does fracture easily, in fact it's so thin you could put your thumb through it, but it is protected because this is in the base of the skull and, therefore, the force has to be transmitted to it and that might be significant force. It doesn't necessarily mean that it's minor force. It is the transmission of the force to that thin bone causing it to fracture.

Q. At what depth is the fracture?

A. Sorry, I don't understand.

Q. From the outside in, as it were.

A. I'm sorry, I don't understand.

Q. You don't understand. Is it a surface fracture?

A. Well, again I'm not quite sure.

[redacted]: Where does it start relative to the skin of the face, as it were?

THE WITNESS: It probably, well, a fracture is a lesion that runs from two points, we'll call A and B. But one doesn't know whether it starts at A and goes to B or starts at B and goes to A. So what we can say is that it's running across roughly, if you like, from left to right across. But one doesn't know whether it starts towards the middle, towards the outside, or from the outside towards the middle.

[redacted]: But its near nearest point to the face, as it were, would be what sort of distance?

THE WITNESS: Well, its nearest point is probably the temple region, if you like, of the head, this sort of area here. (Indicating).

[redacted]: Now, is it correct that there is little to note externally in the brain apart from some minimal swelling?

A. That is correct, my Lord.

Q. Was there any surface bleeding?

A. No, there wasn't.

Q. Was there any surface bruising at all?

A. No, there wasn't.

Q. Would surface bleeding and bruising not invariably be associated with significant brain damage?

A. No, my Lord.

Q. So one can have a distinct absence of external bruising, a distinct absence of under surface bruising, and a distinct absence of any surface bleeding in the brain?

A. That is correct, my Lord.

Q. And still have a significant brain injury?

A. Yes, this is very well recognised and well documented. It is seen particularly in young children who are subjected to accel/deceleration injuries.

Q. The shaking syndrome?

A. Well, shaking, but also in road accidents. It's often the finding in young children who have died as a result of road traffic accidents that there is nothing to see on their brain at all. And yet if you look closely at the brain you find evidence of diffuse axonal injury.

Q. Let's come to this idea of diffuse axonal injury. It, as you have described, is the product of acceleration and deceleration.

A. That is the general feeling, that is correct, yes. It is movement of the head causing sheering of the axoes.

Q. And I think you said in terms of kicking it would require violent kicking if kicked violently then diffuse axonal injury could occur.

A. Yes. The evidence is that assault such as by punching and kicking can cause this injury.

Q. It would be of considerable force required?

A. Yes, I think it has to be considerable force, yes.

Q. Because you have said interestingly that boxers who subject themselves obviously to receiving substantial punches thrown with all the might that the opponent can muster, are not regarded as those who suffer this type of injury.

A. That's correct. The examination of the brains of boxers have failed to reveal diffuse axonal injury.

Q. That would appear to be fairly strong in suggesting that even a violent punch is not enough.

A. Well, I think one has to be careful in saying that, but the view that I take is that if the literature says that this hasn't been ascribed, probably it is perhaps more than just punching is required to cause the injury. One of course doesn't always know the exact scenario in relation to the injury sustained. The point that my Lord made earlier, the boxer who is conscious and who's been subjected to blows might very well be able to control the movements of his head, whereas perhaps someone else who is perhaps unconscious or semi-conscious might not be able to do that in an assault. So whilst it's not described simply in boxers who are subjected to punching blows, I couldn't exclude the possibility --

Q. Professor, you said boxer who is conscious might be able to control his head, but within a very limited plain he can move it one way or the other, but if the blow connects it connects, is that right?

A. Oh, yes, yes.

Q. So whether one's conscious or unconscious there has to be a relationship to that magnitude of the blow, is there not?

A. I think that's reasonable, yes.

Q. And to suffer this injury the magnitude of the blow has to be severe.

A. I think that is correct, yes.

Q. So severe that that normally obtained in the boxing ring wouldn't be enough.

A. Yes. As I said, this lesion has not been described in boxers.

Q. So translating from punching to kicking it would follow, would it, that the kick involved would have to be of great magnitude?

A. Well, I think significant force has to be applied, yes.

Q. And in applying significant force am I correct it would have to be to the head?

A. Yes, my Lord.

Q. And if applied, if the force we're talking about is applied to the head would one not expect in those circumstances to find external tell tale signs of that?

A. Yes, you might, my Lord.

Q. And, therefore, to get a kick of sufficient magnitude to do the type of damage we're talking about, you would expect to have the external signs of that.

A. You may have, my Lord.

Q. You would expect to have?

A. I don't know that one could say one would expect to have. What I am saying is that you may have.

Q. Would you agree that a glancing blow would be unlikely to do this sort of damage?

A. Well, one of the things about a glancing blow may be to cause the head to move violently. What I think is unlikely is that a single glancing blow, a single blow is unlikely to do it.

Q. A single glancing blow.

A. But the point of a glancing blow to cause a head violently to move could be a factor.

Q. And indeed in terms of kicking are we talking about a

repeated kicking in order to inflict this type of injury?
A. Well, again, my Lord, we don't know just how much force is required to do this, but the view is that probably not a single blow and probably a number of blows have to be applied to the head to cause this type of injury.
Q. And if I understand you correctly to get the momentum one is speaking of the head probably moving from left to right, does that mean that jumping on the head is unlikely to be a cause?
A. I think, if you like, simple jumping alone with the head remaining stationary is unlikely to cause this injury. I think there would have to be some degree of movement of the head to cause it. That's correct.
Q. And did you say other circumstances where it arises in road traffic accidents, we're not talking about the typical rear end shunt of a road traffic accident, are we, we're talking about a high velocity accident?
A. Well, there has to be significant acceleration, deceleration in road accidents, that's correct.
Q. So a head on collision between two fast moving cars could cause this?
A. Yes, it could, my Lord.
Q. And one really has to manifest that degree of force and momentum to do this type of injury.
A. Yes. I mean, it does, we think, require significant force, that's correct.
Q. So bringing it back to kicking or punching, or kicking, it would have to be sustained vicious kicking.
A. Well, again I don't know that I can say that. What I can say is that in my view, and from my knowledge of the

condition and from reading the literature, there probably have to be multiple blows to the head. Now, I cannot exclude the possibility that punching alone could not do it, or that a combination of punching and kicking could not do it. And that's why I have included both those in my commentary.

Q. Could I bring you back to the point; if one requires multiple blows, or multiple kicks, would it not be very surprising not to find any external evidence of such multiplicity of blows?

A. Well again one may expect to find evidence of those, and particularly so if they are applied to the face. Perhaps less so if they are applied to the sides of the head, in other words to the scalp, one may not necessarily see external injuries.

[redacted]: If the victim were trying to protect himself with his arms and the blows were delivered to the arms, could the force be transmitted to the head that way?

THE WITNESS: No, my Lord.

[redacted]: Would the effect of the arms be to cushion the blows?

A. Yes, it would if anything protect the head, to cause the force to be transmitted.

Q. If there had been a violent kicking, acceleration deceleration, the head swinging from one side to the other, would you expect to find any signs within the neck of damage?

A. You may do. In my experience it's not a major feature of kicks to the head region. I mean, if you get a kick to the neck area you may well find injury there, both either on the outside or on the inside.

Q. Bearing in mind the degree of violence, the degree of momentum that's required and the swift acceleration and deceleration, would there be any transmitted injury through to the neck?

A. Well again it is a possibility, but in my experience people who have blows to the head from kicking and so forth, neck injury isn't that common.

Q. Now, you obviously have access to all the hospital notes and the scans, etc., that were done on this man.

A. I did, my Lord.

Q. And you acquainted yourself with the clinical history.

A. Yes, I did, my Lord.

Q. And indeed you made notes on it in your original report. You said that one mightn't see the initial signs of this diffuse injury in the first few hours without really specialist examination, is that right?

A. Yes, as a pathologist, in other words if someone died rapidly after sustaining this injury the pathologist may not be able to detect it.

Q. As a neurologist attending to someone, if they had sustained such an injury would you expect to see signs that would alert you to it?

A. I really think that you would be better addressing that to a neurologist rather than a pathologist, my Lord.

Q. Well, do you not think you can help me here?

A. Well, I don't think I should. I mean, it's not my field and, therefore, I think it is a field for the clinicians not for a pathologist.

Q. It is quite clear that the neurologist in this case didn't contemplate that there was this type of injury that you say

existed, is that right?
A. Yes, my Lord.
Q. Now, would, for example, a CT scan be likely to show up the type of injury of which you speak?
A. My Lord, I think again that question should be directed to the clinicians, not the pathologist.
Q. No, no, do you think a CT scan would show that up?
A. I do not think, my Lord, it is appropriate for my as a pathologist to answer questions about a CT scan.
Q. Well, surely you can say whether or not a CT scan would show you this.
A. But, my Lord, it is not my field. I am not an expert at looking at CT scans.
Q. Let me put it to you another way; if the CT scans, there were two of them in this case, one on the 27th and one on the 30th of April, showed up nothing other than soft tissue swelling of the scalp and nothing thought to be of significance, would that be compatible with Mr Hamill having suffered the type of injury that you say he had?
A. My Lord, again it is not for me to comment on the CT scans. That is a question that should be directed to clinicians.
Q. If the CT scans only showed up soft tissue swelling of the scalp, but no apparent inter cranial abnormality, that would be inconsistent, would it not, with this man having suffered the diffuse axonal injury?
A. I do not know, my Lord, that is a question that needs to be put to clinicians, not to pathologists.
Q. This man had begun to improve according to the hospital clinical records, is that right?

A. That's my understanding, yes.

Q. He had begun to make purposeful limb movements, he was breathing unaided, he was reacting to painful stimulii and he was sufficiently conscious on the 28th of April to be trying to get out of bed.

A. Yes, my Lord.

Q. And at that stage he was transferred out of the intensive care ward.

A. That's correct.

Q. So until the day of his death he appears to have been making progress, is that correct?

A. I believed the clinicians believed he was making progress, that's correct.

Q. And then in their view suddenly and unexpectedly he deteriorated.

A. Yes, my Lord.

Q. And that is timed in the notes as being at 3.40 pm, the deterioration.

A. That is correct.

Q. And he's certified dead less than an hour and a half later.

A. That's correct, my Lord.

Q. It appears he turned blue, respiratory difficulties and ultimately suffered cardiac arrest.

A. Yes, my Lord.

[redacted]: In a simple and easy to understand terms as are available, what does cause death from axonal damage, how does it result in death?

THE WITNESS: Well, I think there are probably a number of mechanisms involved, and I think some of these are not precisely understood. I concede that in this case the

rapidity of death is unusual, I think that it's fair to say the clinicians were surprised that his death was so rapid. Whether it is related to the damage to the vital centres in the brain stem is one possibility. It is recognised that these people do succumb to infection. It's also recognised that they frequently aspirate. So what the precise mechanism of death in this case, I must say I'm at a loss to explain the rapidity of death. What I can say is that the severity of the injury was such that I am not surprised that he died and the brain injury is such that in my view was sufficient to cause his death, albeit that the mechanism may appear somewhat obscure.

[redacted]: Professor, are you saying that you cannot explain the dramatic deterioration from improving clinical state to rapid death?

A. That is correct.

Q. If he had suffered diffuse axonal damage at the time of the assault why would he have been clinically improving for several days?

A. Well, I think, first of all, that can occur and is recognised in that the level of consciousness can change. These people may appear to improve and often what can happen is if the improvement continues then they develop the condition known as persistent vegetative state which is described as a consequence of diffuse axonal injury. So clinically I think there are differences in the progress of this condition. They may die very quickly from it, their death may be delayed. I think that the precise mechanism, as I say, is incompletely understood and I certainly cannot give you a precise reason why.

Q. A progression of improvement would be an unlikely sequence towards death, would it not?

A. Yes, although in saying that from my perusal of the medical records, although there did seem to be some improvement, there still seemed to be evidence of ongoing cerebellum damage. He never fully regained consciousness.

Q. But he was getting there.

A. That might have been the case but he still remained showing signs of cerebral damage, of irritation, of aggitation, requiring sedation.

Q. You have agreed, Professor, he was improving.

A. That was the view of the clinicians, yes.

Q. Why then at this point did he suddenly die?

A. Well, I have explained to my Lord that I don't know the precise mechanism why he died.

Q. It is something of a mystery.

A. Yes, it is, my Lord. What one normally does in these circumstances is to consider the various possibilities, both what the clinicians had thought of and that I consider. By excluding them we, I formed the view that in view of the presence of very significant head injury that that was sufficient to be responsible for his death. As I indicated to counsel earlier, had he not sustained the head injury then he would still be still be alive.

Q. If it had been recognised that what you say existed, there had been diffuse diffuse injury, would his treatment have been any different?

A. Well, again that is a question probably should be directed to the clinicians.

Q. Doing the best you can.

A. My understanding is, however, that there is no treatment for diffuse axonal injury, that if these people survive, as they can do, they may, if it's severe, be left in this persistent vegetative state.

Q. But if one is showing clinical signs of improvement one is not heading towards a vegetative state.

A. Well, there is always of course what the other side that one may improve, one may fully recover, I accept that.

Q. And if his death then is a mystery to you as to why he deteriorated and died --

A. With respect, my Lord, I didn't say his death was a mystery.

Q. Sorry, you agreed that why he should suddenly die was a mystery.

A. The precise mechanism of his death.

Q. Now, you ruled out Mr Fannon's options, you said the clot option would have shown up at post mortem.

A. Yes, there was no question, there was no pulmonary embolism.

Q. You said that the septicemia would have had some tell-tale signs, is that right?

A. Yes, there would have been signs, I think at post mortem, and secondly blood cultures were taken whilst he was still alive and when his temperature became elevated.

Q. But the blood sample that you took after death you never had examined.

A. No, I didn't.

Q. Why take it?

A. I didn't take blood for blood culture.

Q. You took a sample.

A. Yes, I did.

Q. Why take it?

A. I think that was requested by the police for DNA examination. It wasn't sent to the laboratory.

Q. You said that analysis can be unreliable, but might there have not in these circumstances been some value in carrying out an analysis?

A. No, I didn't think so, my Lord, for the two reasons that I gave. First of all, blood was taken for culture whilst he was alive and, secondly, post mortem blood cultures are notoriously unreliable.

Q. But September seem I can't, which is really a blood poisoning, isn't it?

A. That's correct.

Q. That would show up in his blood samples during, before death?

A. That's correct, yes.

Q. Would it not still show up after death?

A. No, the difficulty is that after death the blood quickly becomes contaminated, my Lord, and indeed there was evidence of that in the fluid that I took from his cerebrospinal fluid, that had become contaminated. Both from within the body and secondly simply from the post mortem. So post mortem examination for infection can be unreliable and particularly examination of blood for infection can be unreliable.

Q. Can you authoritatively exclude the possibility of infection?

A. Well, one can exclude it in that there was no sign; A, during life, that he had infection, and, secondly, there

wasn't any evidence at post mortem to definitely indicate it. If he had have died from septicaemia then obviously we would have to consider why that septicaemia would have occurred. And one would have to consider that it again must have been some way related to the underlying head injury. One source, for example, of infection might be the fracture of the skull, where it's recognised that infection can get into the body through a skull fracture. One would expect then to find perhaps then either localised infection around the brain in that area, or generalised infection in the brain, and that was why I examined the cerebrospinal fluid to rule out the possibility of an infection having gained entry.

SB to BC 12.00

B.C.15 12 noon

PROFESSOR J CRANE: CROSS-EXAMINED BY MR ALLISTER (CONTD.)

[redacted]: Did you ever find any explanation for the fluids being cloudy? A. No, I didn't, but that is not an altogether uncommon finding that the fluid may be a little bit cloudy.

Q. Cloudy fluid can be a symptom of infection?

A. It can be.

Q. Including meningitis? A. Yes.

Q. And other consequences?

A. Meningitis means a generalised infection, so the cerebral spinal fluid in meningitis can become cloudy.

Q. Cerebral spinal fluid, cloudy fluid, is suggestible ...?

A. It is an indication that there might be infection there.

Q. You never found an explanation for it?

A. No. There was no evidence for meningitis. The fluid was examined and the brain was examined and if there was infection it would have been seen on the sections of the brain.

Q. Dealing with Mr Fannon's other suggestion of the drug-induced reaction, it is a fact that at 3.10 pm he is given an injection of Clopromazine? A. Yes.

Q. And thirty minutes later at 3.40 he goes into crisis? A. Yes, My Lord.

Q. The dosage was quite substantial?

A. I am just not sure what it was.

B.C.16

Q. It was 100 mg. That was quite substantial?

A. That is a significant dosage, but within the therapeutic range.

Q. A side effect of that drug, which is quite a powerful drug, is that it can cause breathing difficulties?

A. It can cause some degree of respiratory (inaudible).

Q. And some cardiac difficulties? A. It is a possibility, My Lord.

Q. And with therefore a very high temperature?

A. Yes.

Q. This man's temperature went to 42 degrees, 107 F?

A. Yes.

Q. So, all of those factors would be consistent with malignant neuroliptic syndrome? A. It was something which I had to consider.

Q. I know that you are going to say that you test other things but all of those factors up to this point would be consistent with that syndrome? A. He was already receiving Clopromazine for about a week prior to the dose being given and if he was going to develop malignant neuroliptic syndrome we would have had signs. He was given the drug previously and had no side effects.

Q. Is it not correct that the dosage should have been half? A. Yes.

Q. Suddenly the dosage was double?

A. The dosage we do not think is an important factor in relation to the syndrome. In other words, it seems to be

a reaction to the drug as opposed to the amount of the drug.

Q. The fact that he already had some that day, would that be a factor?

MR KERR: I think that the evidence yesterday was that there was an entry for an earlier dosage but it wasn't signed and he concluded that it may not have been given. [redacted] It remains unclear. If he was given an earlier dosage would that have had any effect? If earlier that morning he already had his regular dosage, his 50 mg, and then at 3.10 in the afternoon he is given a further 100 mg, would the combination of that be likely to have any effect? A. I'm not sure. In relation to malignant neuroliptic syndrome?

Q. Yes? A. I don't think so. He had the drug earlier and if he was going to show signs he would have done so at that time.

Q. Of course, he had been showing very high temperature? A. I'm not sure. That may have been the case.

Q. So that might have been a tell tale sign?

A. It is one of the signs. I think there are various possibilities as to why his temperature might be raised. (1) certainly, malignant neuroliptic syndrome; (2) infection. The other one was damage to the hypothalamus, which is the temperature regulator mechanism of the brain.

Q. You say if he died from this syndrome I would have expected to make relevant findings in the kidneys and the liver and the brain? A. Yes.

Q. The fact that he died so rapidly, in other words, he gets the drug at 3.10 and goes into crisis at 3.40, and he is certified dead at 5.03, and I think the clinical notes would suggest that he probably was dead some time before that. There is a 20 minute attempted resuscitation which did not work which was at an earlier stage? A. Yes.

Q. It may be that he died within an hour of getting the drug? A. Yes.

Q. The fact if he died within an hour of getting the drug would there have been time for the manifestations which you would expect to find in the bladder, kidney and the brain to work through? A. No, there would not, but the syndrome doesn't develop as rapidly as that. What tends to happen is that these people get a very high temperature, then they go through a course of fitting. They often lose consciousness, and then they start to develop the changes in the kidneys and liver, so its not a syndrome which occurs within thirty minutes of giving the drug. It takes a while to develop.

Q. Is there any reason why he deteriorated as rapidly as he did? Is there any reason why he should not have so deteriorated? A. My understanding is that the syndrome is not associated with such a rapid demise.

Q. But you can't associate anything with such a rapid demise? A. I am happy to concede that I don't know why his deterioration should have been so rapid, but my note of the syndrome is that it doesn't cause rapid death.

B.C.19

Q. But the fact that you didn't find any tell tale signs in the kidneys, the brain or the liver do not help us one way or the other because he died so quickly that those symptoms would not have been showing? A. I think if he developed the syndrome which he may have developed because he had been on the drug then we should have had evidence of that. He did have a high temperature before his demise. If the high temperature was a feature of the development of the syndrome then there was sufficient time for all the other changes to have developed.

Q. Have you ever known of a case of diffuse axonal damage where the patient has been improving and where death has been so rapid? A. No, I have not.

Q. Is the normal progression that one drifts downwards and eventually simply dies?

A. That is correct.

Q. How many years have you been conducting examinations? A. Probably about eighteen years as a forensic pathologist.

Q. In that time how many diffuse axonal brain injuries would you have found? A. I don't think that we have seen very many. I have to say this condition has only been recently recognised in the literature so there were probably cases of death which we were not quite sure what the mechanism of death was so I have to say that this syndrome is a relatively recent one which has been described in the literature, and one that I suppose we didn't look for in the past probably as often as we should have.

B.C.20

THE JUDGE: Would this be the first one which you would have identified? A. No, I have had others particularly in children in road accidents but this is probably the first one that I have personally had in relation to an assault and that was one of the reasons why I was keen to check the literature to see whether this syndrome was associated with assault. I was aware that it was associated with the rapid acceleration/deceleration injuries.

Q. You have never experienced one where death has come so unexpectedly quickly? A. Yes, I can't explain the precise mechanism as to why that happened.

Q. Have you taken soundings with others?

A. Yes. I have discussed it with neuropathologists.

Q. Are you aware of any case from any source of death being as rapid as here? A. Well, I have not had an opportunity to discuss it with other forensic pathologists, so I don't know whether others have had similar cases or not.

Q. Can I suggest you being unable to explain why he should suddenly deteriorate and die that there has to be some doubt as to the cause of death in this case?

A. As I indicated to My Lord earlier, I take the view that this man has evidence of very severe head injury, the severity which in my view is sufficient to have accounted for his death.

THE JUDGE: Very severe head injury sufficient to account for his death? A. Yes, My Lord.

MR ALLISTER: Would it also be fair to say that given the element of mystery there could be other unknown

causes for his death? A. One always has to consider the unknown. What one does as a pathologist is to consider the various possibilities that one is aware of and to see if one can exclude those various possibilities and that is what I have tried to do to the best of my ability.

Q. Are you saying that it is possible that he died for another reason which you can't explain? A. I don't know of any other reason to account for the death. I have considered the various possibilities both that clinicians thought of and as I thought of.

Q. But you can't explain why this progressing man should suddenly ....?? A. I can't understand why there was a sudden deterioration in his condition.

Q. I want to suggest in conclusion the fact that he was improving might well be thought to be a pointer that death would be unexpected from this injury and therefore one does have to find explanation elsewhere?

A. I sought to consider other possible explanations for this man's death. I am still satisfied that his death was caused by the head injury and I am satisfied as to the severity of that injury and the likely mechanism by which it occurred.

Q. Is there a possibility that death was by another cause? A. I don't know of another cause. I have considered the other possibilities.

Q. In terms of the drug reaction, you do concede that the confirmatory organs that one goes to, to see if there is something and to confirm, it would not be of

assistance one way or the other because of the rapidity of death?

A. No, I didn't say that, My Lord, at all. What I said was that this syndrome is not associated with a sudden rapid demise in the space of a matter of minutes. It is a condition that develops often over a period of days and in which these signs become emphasised, and which can then be seen at post mortem.

Q. If he had very high temperature over the previous days it may have been? A. Then one would have expected to have seen changes in the liver, kidneys and brain at post mortem.

Q. Or there is an alternative possibility that it manifested itself with great rapidity because of the dosage? A. I don't know of any case that that has occurred. In my experience of dealing with this syndrome and we have had some is that there are changes that are apparent and can be detected. In the cases that have been examined in the Department of Neuropathology in the Royal, there were all changes apparent in the brain.

Q. Likewise in none of those cases was there a rapid death from improvement? A. Correct.

Q. Finally, in terms of the circumstances that might have given rise to this axonal injury, you said that a fall accelerated by a punch could cause it?

A. Yes. What I said was that the view taken again is that a simple fall from a person's own height, in other words, if you fall down onto the ground will not cause this,

but an accelerated fall or fall from a height may be associated with diffuse axonal injury.

Q. Or if one was running and fell in liquid and fell fast, could one suffer this injury? A. I think it is a possibility because that would be an accelerated fall.

Q. Did you find a bruise at the back of the scalp at the right side? A. I would need to refresh my memory. No. There was no bruising at the back of the scalp. The bruising was on each side, on the left side and right side. There was none at the back.

Q. And either of those bruises might be associated with the mechanism that gives rise to the injury?

A. Sorry?

Q. Might either be associated with the mechanism which gave rise to the injury? A. The bruising on the scalp indicates that there was blunt force applied to the sides of the head.

Q. Which could be the head hitting a surface?

A. That is a possibility.

Q. And a man running and slipping could hit his head and could suffer this injury? A. That is a possibility.

Q. Particularly a man running away in fear?

A. Yes. That is a possibility if someone was running and fell and struck their head on the ground that diffuse axonal injury could occur.

Q. Thank you.

B.C.24

RE-EXAMINATION BY MR KERR:

MR KERR: Just one matter. My Friend suggested in relation to the rapid death related to the dosage given of the drug concerned. Is there any correlation between the dosage given and the onset of this syndrome?

A. My understanding is that there is not. In other words, this is a reaction to the drug and it is not simply because you give more and more of it. That is my understanding of it.

Q. Thank you.

THE JUDGE: What function to the axons play?

A. The axons serve for the transmission of nerve impulses throughout the brain, so they are a key player in the brain function and the brain cannot function without them. I mean, there are millions of these cells in the brain.

Q. Are they a part of the structure, as it were, of the brain? They are fixed? Each one is fixed?

A. They are part of the structure of the brain, that is correct.

Q. Thank you.

(CONSTABLE NEILL: RECALLED)