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May 22nd, 2017

Mr. A. MacLeod,
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Crown Office and Procurator Fiscal Service,
Procurator Fiscal's Office,
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HAMILTON
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Dear Mr. MacLeod,

Re: Sheku Ahmed Tejan BAYOH (deceased)

Thank you for inviting me to review the various reports obtained in relation to the above case (and particularly those dealing with the cause of death) and to comment upon the pathological aspects of this case, including “methodology and approach adopted”; in your very helpful letter of instruction, dated March 28th, 2017, you specifically ask me whether, or to what extent, I agree with the conclusions and findings of the others who have been instructed.

MATERIALS

I have read all the documents and examined all the images which you sent to me on the encrypted pen drive. These can be summarised as follows – viz.

- Copy of Redacted Civilian Witness Statements
- Copy of Redacted Police Statements
- Expert Witness Pack, including
 - Briefing paper for expert witnesses
 - Post mortem examination report

- Neuropathology report
- Toxicology report
- Drug Control Centre Independent Analysis Report
- Police Scotland Use of Force Standard Operating Procedure
- GP Notes relating to the deceased
- Hospital A & E Department Notes relating to the deceased
- Images of deceased in hospital after death
- Images of deceased before and during post mortem examination
- A compilation video (25' 34'')
- Expert Witness Reports from:-
 - Anthony BLEETMAN (dated 12.05.16)
 - Nathaniel CARY (23.10.15)
 - Elizabeth SOILLEUX (14.02.16)
 - John PARKES (22.01.16)
 - Maurice LIPSEGE (18.01.16)
 - Jason PAYNE-JAMES (24.09.15)
 - Jack CRANE (undated)
 - Mary SHEPPARD (01.12.15)
 - Steven KARCH (two, both 10.09.15).

I have also read the subsequently submitted report from Professor Anthony FREEMONT (dated 03.05.17) and the paper which he provided (Sakellaridis *et al*, British Journal of Sports Medicine, 2004).

BACKGROUND

This is extremely well documented in many of the documents which I have read, and I see very little point in repeating it in detail here. Perhaps it would be most helpful if I were to select the various points which I consider to be relevant to me as a forensic pathologist.

a) THE DECEASED'S BACKGROUND

The deceased (Sheku Ahmed Tejan BAYOH) was born on September 30th, 1983, and he was therefore 31 years of age at the time of his death on May 3rd, 2015.

I understand that he had no significant or relevant medical history and that he regularly attended a gym, although he was a regular user of illicit drugs, including MDMA and anabolic steroids.

No obvious problems appear to have been documented during the day and the evening of 02.05.15 (although he was drinking alcohol during this time), but by the early hours of 03.05.15, his behaviour, personality and mood changed significantly; aggression and violence appear to have been the predominant features. By 06.00, he was outdoors, and his abnormal behaviour was seen by several independent witnesses, many of whom referred to him as carrying a large kitchen knife.

As a consequence, Police Scotland were contacted at approximately 07.14, and police officers were sent to investigate.

b) THE INCIDENT

The first police officer (Officer A) on the scene found the deceased walking towards him; the deceased refused to go down to the ground and continued walking towards him. This officer pressed his red emergency button (at **07:20:42**) and deployed his CS spray; the latter had no effect on the deceased, although some was blown by the wind back into the officer's face and affected his orientation and vision.

Very shortly afterwards, the second officer on the scene (Officer B) deployed his PAVA Captor 2 spray at the deceased, but this also had no effect.

Officers C and D arrived very shortly afterwards. The deceased continued to behave aggressively, and at one point, he assaulted Officer D (female).

The deceased was knocked to the ground by a shoulder charge by Officer B. A struggle ensued, during which Officer B and other officers restrained the deceased. At **07:21:37**, it was broadcast, by Officer F, that the deceased was "secure on the ground".

The restraint is described by all the police officers present and also by some civilian witnesses. The extent to which the deceased was struggling and showing considerable strength is well documented, as is the difficulty encountered in applying handcuffs and leg restraints. There is no doubt that the deceased was punched and struck by officers, and that, on at least one occasion, one of the officers was lying on his chest in order to try to prevent him from moving.

By **07:25:16**, it had become apparent to the police officers that the deceased was unresponsive and unconscious, although, at that time, he was thought to be breathing spontaneously; consequently, an ambulance was summoned.

By **07:29:29**, it was apparent that the deceased had stopped breathing, and CPR had therefore been initiated.

All attempts at resuscitation, by the police officers, ambulance personnel and staff in the Accident and Emergency Department at the local hospital, were unsuccessful, and death was certified at 09.04 on 03.05.15.

THE AUTOPSY

This was carried out on 04.05.15, by Dr. Kerryanne Shearer and Dr. Ralph BouHaidar; their findings and conclusions are in their final report dated 18.06.15.

It is, I think, easiest to appreciate the totality of the autopsy findings if they are considered under a series of subheadings; I think that the important, relevant positive and negative findings are as follows:-

a) EXTERNAL FINDINGS

The deceased was well built – 178 cm (5 ft 10 ins) tall, 81 kg (12 stones 10 lbs) in weight, and with a BMI of 25.6.

A relatively small number of petechial and slightly larger haemorrhages was seen in the conjunctivae of all four eyelids and on both eye globes; none was found elsewhere on the face.

Apparently recent injuries were located as follows:-

- **Left side of forehead** – two abrasions (3.5 x 3.5 and 3 x 2 cm)
- **Mouth** – at the inner aspects of both lips – several small bruises, lacerations and abrasions
- **Front of lower chest** – across the midline – an irregular, interrupted abrasion (over 8 x 5 cm)

- **Back of right hand** – a small ‘flapped’ laceration (0.5 x 0.4 cm)
- **Back of left upper arm** – an abrasion, with focal deep bruising on dissection (8 x 5 cm)
- **Back of left elbow** – an abrasion (4 x 2.5 cm)
- **Left forearm** – linear abrasions and a band of discolouration around the lower forearm; there was associated deep bruising on dissection
- **Back of left index finger** – a small ‘flapped’ laceration (0.6 cm)
- **Left leg** – abrasions at the front of the knee (1.5 x 1.5 cm) and the upper part of the lower leg (0.1 x 0.1 cm).

Older, healing abrasions were present at the front of the right lower leg (0.5 x 0.5 and 0.2 x 0.2 cm).

b) INTERNAL FINDINGS

These can also be summarised according to anatomical locations:-

- **Scalp** – there was deep bruising below the forehead abrasions noted externally (2 x 2 cm), and there was a small bruise in the left temporalis muscle (0.5 x 0.5 cm)
- **Face** – bruising was present within the tissues of the right cheek (over 6 x 3 cm), over the left zygoma anteriorly (1 x 1 cm), and directly above both orbits (in total, 6 x 2 cm)
- **Neck** – no bruising was present (front or back); the cervical spine was intact
- **Lungs** – both were congested and oedematous
- **Heart** – this appeared macroscopically normal (430 gms)
- **Ribs** – there was a fracture of the left first rib posteriorly (although this was not considered until a CT scan was performed on 28.05.15); dissection following the CT finding identified the fracture and showed “focal possible soft tissue haemorrhage measuring 0.5 cm in diameter overlying the 1st rib”.

- **Abdomen** – there were no injuries to any intra-abdominal or retroperitoneal organs
- **Subcutaneous tissues** – in addition to deep bruising associated with injuries noted externally (v.s.), there were deep bruises present:-
 - Over the left upper back (1 x 1 cm)
 - At the radial aspect of the right wrist (0.2 x 0.2 cm)
 - Over the back of the middle third of the left upper arm (2 x 2 cm)
 - At the inner aspect of the upper third of the right thigh (4 x 1 cm)
 - Over the outer aspect of the middle third of the right lower leg (7 x 4 cm)
 - At the inner aspect of the lower third of the left thigh (7 x 4 cm)
 - At the front of the upper third of the left lower leg (3 x 1 cm).

c) NEUROPATHOLOGY

The deceased's brain and cervical spinal cord were retained intact and submitted to Dr. Colin SMITH, a Consultant Neuropathologist.

He documented “changes consistent with an evolving global ischaemic brain injury”, but there was “no evidence of any significant traumatic injury”, “no infectious disease” and “no natural disease”. He concluded that “the changes all appear secondary to cardiac arrest with resuscitation and short survival period”.

d) CARDIAC PATHOLOGY

Drs. Shearer and BouHaidar saw no significant pathological abnormalities on histological examination of the deceased's heart.

Their microscope sections were reviewed, by Professor Mary SHEPPARD, and her conclusions are seen in her report dated 01.12.15. She comments that there are changes associated with cardiac arrest and resuscitation, but she identifies no other abnormalities; in particular, she says that there is no damage from drug usage or any natural disease, although she adds that her findings do “not rule out sudden cardiac death due to an electrical abnormality [such as] the cardiac channelopathies”.

e) HISTOLOGY

Drs. Shearer and BouHaidar saw no significant pathological abnormalities on their routine histological examination of the deceased's other organs.

All these histology slides were reviewed by Dr. Elizabeth SOILLEUX, a Consultant Histopathologist, and her report is dated 14.02.16. She also saw no significant pathological abnormalities (including of the heart).

f) MICROBIOLOGY

A swab and a piece of brain tissue were submitted for bacteriological culture. The results obtained were considered to represent post mortem contamination and not evidence of any ante mortem infection.

A brain swab was also submitted for virological testing; all PCR tests carried out were negative.

g) TOXICOLOGY

Blood samples taken during the resuscitation in hospital, together with blood and urine samples taken during the post mortem examination, were submitted to the Toxicology Unit of the Department of Forensic Medicine and Science of the University of Glasgow, and the results are in the statement provided by Hazel TORRANCE and Denise McKEOWN dated 12.06.15.

Only the following three substances were identified:-

- **Methylenedioxyamphetamines** (ecstasy; MDMA) at blood concentrations of approximately 0.6 mg/L;
- **Methylenedioxyamphetamine** (MDA) at blood concentrations of approximately 0.2 mg/L;
- **Alpha-pyrrolidinovalerophenone** (Alpha-PVP) at blood concentrations reported as being approximately between 0.07 and 0.3 mg/L.

Dr. Torrance and Ms. McKeown comment that MDA is formed from MDMA by metabolism; that when its presence is due to metabolism, it is

usually present at a lower concentration than MDMA (as here); that alpha-PVP is a synthetic cathinone related to mephedrone; and that it is not clear from the literature available what effects would be expected from specific blood concentrations of alpha-PVP.

A sample of urine taken at post mortem examination was sent to the Drug Control Centre of King's College, London, for hormone analysis, and it was found to contain nandrolone and its metabolites.

h) OSTEOPATHOLOGY

The microscope sections of the left first rib fracture prepared for Drs. Shearer and BouHaidar have been reviewed by Professor Anthony FREEMONT, an osteo-articular pathologist, and his opinions are in his report dated 03.05.17.

Professor Freemont concludes that “This man sustained an isolated fracture of the left first rib. Further interpretation has been made difficult by the degree of post mortem decomposition. However, on balance, I felt that the residual histological features indicated that the fracture occurred during life, certainly within twelve hours of death and probably within six”.

i) CAUSE OF DEATH

Having taken into consideration their autopsy findings and the findings and the opinions of other experts available to them at the time they issued their report (18.06.15), Drs. Shearer and BouHaidar provided a ‘narrative’ cause of death – *viz.*

“1a) Sudden death in a man intoxicated by MDMA (ecstasy) and alpha-PVP, whilst being restrained.”

COMMENTS AND OPINIONS

I have been asked, as a forensic pathologist, to comment upon the pathological aspects of this case, including “methodology and approach adopted”, and, specifically, whether, or to what extent, I agree with the conclusions and findings of the others who have been instructed.

May I say at the outset, that I have no criticisms of either the methodology or the approach adopted by Drs. Shearer and BouHaidar in this case (or, indeed, of anyone else instructed)?

With regard to the autopsy carried out by Drs. Shearer and BouHaidar, I would, I think, wish to make three points:-

1. I might have chosen to submit the deceased's heart, intact and in its entirety, to a specialist cardiac pathologist, but they sampled it very widely for histological examination, and I am sure that all those who subsequently reviewed the microscope sections did not feel that they had, in any way, been disadvantaged.
2. Given that the deceased was of West African descent, I think, for the sake of completeness, that it would have been worth checking to see whether he may have had one of the haemoglobinopathies (specifically sickle cell disease) – even though I acknowledge that there does not appear to be anything in his medical history to suggest such a diagnosis. [This point was also made by Dr. Soilleux in her report – *v.i.*].
3. At this point, whilst considering the autopsy carried out by Drs. Shearer and BouHaidar, I think that some comment about the fracture of the left first rib would be appropriate. I note that it was not suspected during their post mortem examination – despite their evisceration of the thoracic contents and their performing subcutaneous dissections of the deceased's chest – and I therefore conclude that there could not have been any significant associated local bruising to attract their attention to this area. I also note that “no bony abnormality” was seen on the radiological skeletal survey which was carried out following the post mortem examination. It was only as a consequence of abnormalities seen on the CT scan on 28.05.15 (performed, I think, because, for whatever reason, some visualisation of the lateral spine was not possible using conventional X-rays) that attention was drawn to the left first rib, and the fracture was found during further dissection of the area concerned. This delay in finding the fracture (and, therefore, in removing it for histological examination) meant that, as Professor Freemont recently stated, having examined the microscope sections, “interpretation has been made difficult by the degree of post mortem decomposition”, but I do not think that any criticisms can or should be levelled at Drs. Shearer and BouHaidar for this delay.

Before attempting to provide an overview in which I try to distil my own opinions and conclusions in this case, it would, I think, be most useful if I were to attempt to summarise, and then, as instructed, to comment upon, the conclusions and findings of the others who have been consulted and whose reports have been provided to me.

1) Dr. John PARKES

Dr. Parkes provides expertise “in the safety and effectiveness of restraint and particularly ‘positional asphyxia’”.

He considers the presence of illicit drugs (alpha-PVP and MDMA) to be a significant risk increasing factor in this case.

He notes the petechial haemorrhages seen at post mortem examination, and he comments that “where a person has been restrained on the ground with officers holding them down to the ground, petechial bleeds would most likely result from compression of the deceased, but do not necessarily prove that the compression was of a nature and duration sufficient to cause asphyxia. Due to the presence of petechial bleeds it is more likely than not that Sheku Beyoh was subject to compression during restraint”.

He comments that there were “three positions in which the deceased was restrained:-

1. Face down, held to the ground by one officer
2. On his side, held down to the ground, initially by one officer. Subsequently restrained by more than one officer and handcuffed in front of his body.
3. On his back, face upwards, handcuffed in front of his body”.

He concludes that positions 1 and 2 “would reduce the restrained person’s ability to breathe”, although he then calculates that “the duration of forcible restraint on the ground prior to unconsciousness was less than four minutes”, and he adds “even where a person’s breathing is severely restricted by restraint and compression, the length of time for which they are unable to breathe must be long enough to cause harm before this could be seen as directly causing death. A relatively short period of restraint, such as in this case, would make it much less likely that death could occur due to restraint asphyxia alone”.

He opines that:-

1. The precise contribution of restraint to the death cannot be determined with certainty.
2. It is unlikely that the nature and the duration of the restraint would be directly and solely causal of death.
3. It is unlikely that ... the restraint made no contribution to the death.
4. On balance of probabilities, the most likely impact of restraint is that the restraint contributed to the death of a man who was also at risk of sudden death due to the consumption of illicit drugs”.

I note that he considers that “the restraint measures were a reasonable and proportionate use of force in the circumstances” and that “the use of restraint was proportionate and in compliance with the standard operating procedure”.

COMMENTS: Almost all of what Dr. Parkes discusses is outwith my field of expertise, and so I include it only to provide an overview. I would, however, make three brief points:-

1. Dr. Parkes’s description of the restraint accords with what I have (seen and) read.
2. Like Dr. Parkes, I am impressed by the relatively short period of restraint (less than four minutes) before collapse.
3. Whilst there seems to me to be no real doubt that the deceased must have been subjected to significant compression on one or more occasions during the restraint, I do not think that it can be concluded, even on the balance of probabilities, that the petechial haemorrhages are likely to have resulted from that compression, although I do accept that some could have done.

2) Dr. Maurice LIPSEGE

Dr. Lipsedge is an emeritus Consultant Psychiatrist, and he addresses the deceased mental state, particularly in the context of the drugs which he was known to have taken.

I note the following:-

1. Dr. Lipsedge concludes that the deceased was suffering from “psychostimulant psychosis” due to “psychostimulant intoxication”.
2. He prefers this terminology to the use of the term “excited delirium” when there is toxicological evidence of the use of amphetamines, cocaine or cathinones.
3. He says that “the deceased’s previous use of stimulants might have sensitized him to the psychosis-inducing potential of these drugs”.
4. He adds that “alcohol consumption can be associated with the development of violent and aggressive behaviour through its psychostimulant effects, diminished anxiety and pain perception and impaired inhibition, compounded by additional drugs”.
5. He opines that “anabolic androgenic steroids are unlikely to have contributed significantly to the paranoid and violent behaviour which can be better accounted for by the combination of psychostimulants and alcohol”.

COMMENTS: This expert confirms what I (as an acknowledged non-expert in this field) had concluded – that the deceased was suffering from some form of severe acute behavioural disturbance on the morning of 03.05.15 prior to his involvement with police officers. Furthermore, he opines that the deceased’s acute psychosis was related directly to the drugs which he had taken.

3) Dr. Anthony BLEETMAN

Dr. Bleetman is a Consultant in Emergency Medicine. He refers to the deceased’s psychiatric problem immediately prior to the incident on 03.05.15 as “excited delirium”, and although he acknowledges that there is much debate over the terms used in cases like this, he emphasises that there is a well-recognised psychotic condition with many of the features displayed by this deceased.

Dr. Bleetman emphasises that individuals in this psychotic state become hyperthermic, acidotic and hypoxic, that it is important to terminate these psychotic episodes as soon as possible, and that failure to do so significantly increases the oxygen debt, the acidosis, the dehydration and the risk of developing potentially life-threatening cardiac arrhythmias.

It is because of their bizarre behaviour and violence that these individuals require restraint, usually by police officers, and Dr. Bleetman emphasises that “before any restraint, the individual will have already accrued a significant oxygen debt, and any immobilisation carries the risk of restricting chest and diaphragmatic movement. This, even if modest, may compromise the individual’s ability to restore adequate oxygenation and address the oxygen debt”; he adds that “a prolonged struggle on the ground will compound the individual’s physiological derangements and increase the risk of death. In this state, a restraint which compromises breathing efforts may exacerbate an already grave situation”.

At page 42 of his report, Dr. Bleetman says “In an individual already in a severe oxygen debt due to the excited delirium state, further compromise of breathing efforts through either prone restraint (possibly) or restriction of chest wall movement by putting weight across the torso (certainly) will put the restrained individual at more risk of asphyxia and will hinder recovery from hypoxia and acidosis. This may reach a critical point at which cardiac arrest occurs. Given the poor physiological state of these individuals at the onset of cardiac arrest, recovery is rare in spite of adequate resuscitation attempts”.

At the end of his report (page 44), Dr. Bleetman observes that the restraint was relatively short; he concludes that, “On first contact with the police, the deceased was already at very high risk of cardiovascular collapse due to fatigue, the effects of excited delirium and powerful potentiating drugs, even had there been no restraint”; and he opines that “It is reasonable to assume that the actions of police officers are likely to have had a contributory role in the evolution of the deceased’s collapse and subsequent cardiac arrest by adding one more factor to an already lethal brew. In effect, the restraint precipitated the cardiovascular collapse that was already likely to have occurred”.

In addition to his comments in relation to ‘excited delirium’, Dr. Bleetman addresses two other points – viz:-

1. He notes that, during the resuscitation, a pneumatic device (a ‘thumper’) was used to provide chest compressions, and he thinks that this is the most likely explanation for the isolated first rib fracture.
2. He believes that the petechial haemorrhages in the eyes are consistent with the use of the pneumatic chest compression device, although he adds that they are also consistent with either straining during the restraint or the effects of pressure applied to the upper body during the restraint.

COMMENTS: Dr. Bleetman provides what I, as a non-expert, consider to be a good review of the entity which he designates ‘excited delirium’ and, in particular, he addresses the sequence of events which occur with or without restraint, and how the restraint, however appropriate, may well inevitably make matters worse. In doing so, he has, in my view, tried to put the restraint into the context of the deceased’s pre-existing abnormal physiological state caused by his psychosis – something which I consider to be very important.

I note Dr. Bleetman’s conclusions about the pneumatic chest compression device (with which I cannot disagree), and I agree with his comments about the possible causes of the deceased’s petechial haemorrhages.

4) Dr. Jason PAYNE-JAMES

Dr. Payne-James is a forensic physician. He also reviews the ‘excited delirium syndrome’, together with the effects of the drugs the deceased was known to have taken and the incapacitant sprays used by the police officers.

His comments and conclusions include the following:-

1. The drugs present in the deceased at the time of his death (MDMA, MDA and alpha-PVP), alone or in combination, “can be associated with behavioural disorder such as that exhibited” (paragraph 837), even if he does “not consider that his condition as described at the time of police contact represented excited delirium syndrome” (paragraph 854).
2. “Fractures of ribs may be sustained during cardio-pulmonary resuscitation” (paragraph 845), although a first rib fracture is not a recognised complication and it is associated with severe direct blunt force trauma (paragraphs 847 and 848).
3. The petechial “haemorrhages such as those seen in the eyes may be associated with mechanical asphyxia or chest compression” (paragraph 849).
4. The lack of effect makes it unlikely that the incapacitant sprays used on the deceased (CS and PAVA) were significantly implicated in his death (paragraph 857).

5. “The weight of officers on his [the deceased’s] upper torso may have reduced his capacity to breathe properly resulting in his cardio-respiratory arrest” (paragraph 858).

6. “The petechial haemorrhages to the eyes may represent chest compression, although they can be incidental post mortem findings. The history from the accounts provided and the presence of the petechial haemorrhages would be consistent with a mechanical asphyxia” (paragraph 858).

7. The first rib fracture “is not likely to be caused in resuscitation settings. It is more likely to be caused by direct blunt force contact – for example from a heavy police officer landing on his upper torso” (paragraph 862).

COMMENTS: I am not in a position to comment as to the exact nature of (or the nomenclature for) the deceased’s psychotic state, but I agree with Dr. Payne-James that it must have been related to the drugs which he had taken.

When, in paragraph 849 as quoted *in toto* above [“Haemorrhages such as those seen in the eyes may be associated with mechanical asphyxia or chest compression”] Dr. Payne-James refers to ‘mechanical asphyxia’ and ‘chest compression’, I am uncertain as to whether he is using them as synonyms or whether he is implying somewhat different meanings.

There seems to be to be a slight imbalance between “haemorrhages such as those seen in the eyes may be associated with mechanical asphyxia or chest compression” (paragraph 849) and “The petechial haemorrhage to the eyes may represent chest compression, although they can be incidental post mortem findings. The history from the accounts provided and the presence of the petechial haemorrhages would be consistent with a mechanical asphyxia” (paragraph 858). I cannot disagree with the essence of Dr. Payne-James’s conclusion, but I do think that it is important to emphasise that petechial haemorrhages can, indeed, be an incidental post mortem finding, and that, if so, they need not reflect mechanical asphyxia or, in a more general sense, chest compression.

5) Dr. Mary SHEPPARD

Dr. Sheppard is an expert cardio-pulmonary pathologist, and she examined all the microscope sections prepared for Drs. Shearer and BouHaidar from tissue retained by them from the deceased's heart.

As noted above (at page 6), she comments that there are changes associated with cardiac arrest and resuscitation, but she identifies no other abnormalities; in particular, she says that there is no damage from drug usage or any natural disease, although she adds that her findings do “not rule out sudden cardiac death due to an electrical abnormality [such as] the cardiac channelopathies”.

COMMENTS: I cannot argue when Dr Sheppard states that “the heart is morphologically normal”.

6) Dr. Elizabeth SOILLEUX

Dr. Soilleux is a Consultant Histopathologist and Morbid Anatomist, and she was asked to consider various aspects of this case.

With regard to her comments and opinions, I note the following:-

1. MDMA and alpha-PVP act on the heart in similar ways – they increase the heart rate, increase the blood pressure and increase the risk of rhythm abnormalities. “The risk of rhythm abnormality will be greatest when there are additional stresses to the cardiorespiratory system”.
2. Restraint may have two impacts – the potential for asphyxia and the fact that it induced the deceased to struggle.

(a) The asphyxia may be positional (such that the position of the body interferes with breathing) and/or mechanical (due to something impeding the body's ability to use muscles for breathing). Dr. Soilleux notes that, in this case, asphyxia is possible as a cause for, or a contributing factor to, death, and that this would fit with the mode of death and the autopsy findings of conjunctival petechial haemorrhages; nevertheless, she says that she does “not feel able to provide definitive comment on whether or not asphyxia occurred”. Had there been an element of positional or mechanical asphyxia, however, the resulting reduction in oxygen gaining access to the blood, whilst the oxygen requirements were increasing due to the struggling against

restraint and possibly the effects of the stimulant drugs, could have led to cerebral ischaemia (and loss of consciousness) and/or myocardial ischaemia (and increased the predisposition to rhythm abnormalities).

(b) The struggle “would have put considerable strain on the heart, as it is likely it would have increased the blood pressure and heart rate”. Given that the deceased had taken MDMA and alpha-PVP, struggling against restraint “would very significantly increase the risk of a rhythm abnormality developing, which may well be what happened in this case”.

3. It is unlikely that the CS and PAVA sprays had a significant effect.

4. Dr. Soilleux found no evidence of any pre-existing heart condition. This indicates that “pre-existing cardiac pathology is unlikely to have contributed to death”, although she does point out that there are rare conditions which can lead to fatal abnormal cardiac rhythms (often collectively known as ‘channelopathies’) where the heart is macroscopically and microscopically normal. She then adds that, given a lack of symptoms attributable to an abnormal heart, “it is relatively unlikely that there was an underlying cardiac abnormality”.

5. In paragraph 63 of her report, Dr. Soilleux raises the possibility of sickle cell disease in this case, and suggests that it should be investigated further. Specifically, she says “I am not suggesting that sickle cell disease alone was responsible for death, but it certainly could have contributed, if present”.

6. Dr. Soilleux wonders whether the fracture of the 1st rib could have occurred during the post mortem examination process. If not, she considers the most likely explanations to be either direct blunt force trauma or stressing under force (e.g. by a weight on the back), although she does add that the former should be associated with local soft tissue bruising, and that none was found.

COMMENTS: I think that the various factors considered by Dr. Soilleux are entirely fair and reasonable, and there is nothing here with which I can strongly disagree. In particular, I think that her dividing the effects of restraint into the potential for asphyxia and the consequences of the struggle is very important.

As stated above, I also think that serious consideration should be given to testing for sickle cell disease – even at this late stage.

7) Professor Jack CRANE

Professor Crane is a forensic pathologist, and he was asked to address specific aspects of this case.

From his opinions and conclusions, I would select the following nine points:-

1. Neither the CS spray nor the PAVA spray would have had any significant effect on the deceased, and neither would have played any part in the fatal outcome.
2. If respiration is not impeded during restraint in cases like this, “it is not the restraint per se which may predispose to the cardiac arrest but its association with the effects of the stimulant drugs along with aggressive and/or violent behaviour, excitability and physical/emotional stress. It is the combination of factors which may be considered albeit that the effects of the drugs must be regarded as the principal contributory factor in the fatal course”.
3. Restraint “which restricts or impedes respiration is potentially life threatening and, if not alleviated, may cause sudden death”. Restraint in situations where the position or posture of the individual is inappropriate may also pose a risk to life.
4. “The induction of asphyxia in such circumstances [of restraint] may be associated with the development of pinhead-sized congestive haemorrhages in the skin and lining of the eyelids and over the eyeballs. These petechial haemorrhages, whilst possibly indicative of asphyxia and the interference with venous return to the heart may also occur in sudden natural deaths and as a result of cardiopulmonary resuscitation. Thus whilst they may be an indicator of asphyxia, they are not pathognomonic of it.”
5. “It is frequently not possible to determine from the post mortem findings alone if positional/postural asphyxia caused or contributed to the fatal outcome. In such cases, it is consideration of the circumstances of the death which are [*sic*] often of crucial importance in determining which role if any restraint played in the death”.
6. “It is my opinion that the combined effects of the MDMA and alpha-PVP would have predisposed to the development of a sudden upset in the heart rhythm including a fatal dysarrhythmia such as ventricular fibrillation”.

7. “The role, if any, of restraint is more problematical and cannot be determined solely from the autopsy findings. If the deceased was being restrained at the time he suffered the cardiac arrest, and if that restraint was such as to have impeded respiration, then it would be reasonable to conclude that such restraint played a part in the fatal outcome”.

8. Professor Crane examined the microscope sections prepared from the deceased’s heart, and he concluded that “there is no evidence of underlying heart disease” and “no cardiac abnormality which would have caused or contributed to death”.

9. Professor Crane considered that the first rib fracture “was caused by localised pressure having been applied to the upper back of the deceased whilst he was being restrained, such as by a person kneeling on the deceased’s upper back whilst he was lying face-downwards on the ground”. He later says that “the application of pressure sufficient to fracture a rib is also likely to have been sufficient, if sustained, to impede breathing”.

COMMENTS: There is nothing in any of Professor Crane’s comments or opinions with which I can disagree.

In particular, I very strongly agree with Professor Crane’s opinion quoted at point 5 above (*viz.* “It is frequently not possible to determine from the post mortem findings alone if positional/postural asphyxia caused or contributed to the fatal outcome. In such cases, it is consideration of the circumstances of the death which are often of crucial importance in determining which role if any restraint played in the death”), and I would add that Professor Crane’s point applies whatever the cause of the asphyxia may be.

8) Dr. Nathaniel CARY

Dr. Cary is also a forensic pathologist; he appears to have been instructed by solicitors involved in this case. He provides an opinion in the form of a commentary on the final autopsy report provided by Drs. Shearer and BouHaidar, and I note the following nine points:-

1. Dr. Cary examined the microscope sections provided for Drs. Shearer and BouHaidar; in particular, I note that he refers to no significant abnormalities

of the heart and concludes that “there is no evidence of any underlying natural disease process that caused or contributed to death”.

2. “The injuries described both externally and internally are of a minor nature and ... there is certainly no evidence of any direct traumatic cause of death”.

3. Both MDMA and alpha-PVP are stimulant in nature and “have the potential to cause or contribute to the development of a heart rhythm disturbance, including a fatal heart rhythm disturbance”.

4. “The described acute behavioural disturbance of the deceased is consistent with him being under the influence of stimulant drugs”.

5. There is no direct role for the involvement of the CS or PAVA sprays in this case.

6. “The petechial haemorrhages in the eyes may indicate a degree of asphyxia, in this case most likely originating from compression of the trunk in a face down position rather than any compression of the neck for which there was no evidence”.

7. “In terms of any role for restraint, this cannot be separately considered from struggling. As is commonly the case in acute behavioural disturbances, the deceased displayed remarkable strength and stamina. Ongoing restraint and struggling in these circumstances is very likely to lead to significant metabolic disturbances, with early breakdown of muscle, releasing potassium which can precipitate cardiac dysrhythmias and the development of metabolic acidosis”.

8. “Given the presence of a background of potent stimulant drugs, this case cannot be viewed simply as an example of a case of sudden death during restraint”.

9. Dr. Cary says that he entirely supports the cause of death proposed by Drs. Shearer and BouHaidar – viz. “Sudden death in a man intoxicated by MDMA (ecstasy) and alpha-PVP, whilst being restrained”, but he then adds that “the only suggestion I would make would be to substitute the phrase “whilst being restrained” with “in association with struggling and restraint”.

COMMENTS: I agree almost totally with Dr. Cary in his interpretations, comments and opinions.

Whilst I cannot disagree with the point which he makes about the petechial haemorrhages (as quoted in point number 6 above), I personally think that it is important to appreciate that petechial haemorrhages can occur in contexts other than asphyxia, and that they therefore need not reflect any asphyxia at all.

I would very strongly support Dr. Cary's suggestion as to a relatively minor modification of the cause of death as given by Drs. Shearer and BouHaidar (point number 9 above), as I believe that the struggling must have been a very important factor in causing the deceased to die when he did.

9) Dr. Steven KARCH

Dr. Karch is a forensic pathologist, based in California, U.S.A. He has provided two separate, partly overlapping reports, both dated 10.09.15, and both extensively referenced.

From the longer report, I would consider the essence of his views to be as follows:-

1. Dr. Karch says that "my review disclosed histological abnormalities that were apparently overlooked at the original autopsy. Because of their presence, I conclude that the decedent suffered from pre-existing heart disease that could have been fatal in its own right". These microscopic cardiac abnormalities "were mostly of a chronic nature, known consequences of both long-term stimulant and steroid abuse, they could have caused sudden death at any time, even in the absence of all drugs". When he makes these comments, Dr. Karch gives no details of the histological features to which he is referring, but slightly later in his report, he does refer to "uneven staining pattern of the myocardium, fragmentation and waviness of fibres, perivascular connective tissue growth, intramuscular fibrosis and scarring, disintegration of cardiomyocytes, nuclear disintegration, loss of cross-striations and thickening of blood vessel wall".

2. "All of the drugs detected (alpha-PVP, MDA and MDMA) cause acute and chronic cardiotoxicity. Any, or all of them, might have been the cause of death, but it is impossible to determine which drug actually did [*sic*]".

3. In the context of alpha-PVP and cardiotoxicity, studies show that "there is no relationship between measured post mortem blood concentrations and

apparent toxicity” and that “alpha-PVP is many times more powerful and more dangerous than either MDMA or MDA”.

4. Dr Karch suggests that the drugs which the deceased had taken would have caused him to suffer not only from the excited (agitated) delirium syndrome but also from the serotonin syndrome and the hyperadrenergic syndrome.

5. High doses of nandrolone produce cardiotoxic effects and the microscopic changes described in this case by Dr. Karch; consequently, “it seems only reasonable to conclude that nandrolone contributed to the process [the histological changes seen], as did all of the other stimulant drugs. There is also evidence that ... nandrolone facilitates the occurrence of myocardial arrhythmias, the apparent cause of Mr. Bayoh’s demise”.

6. “It is reasonable to conclude that neither of these agents found in the sprays [CS and PAVA] contributed to the cause of death”.

7. When asked specifically about the physiological effects of restraint of the deceased in the circumstances of his arrest, Dr. Karch says “Given the details of this situation, the effect of physical restraint would have been *diminimus [sic]*”; indeed, at the end of this report, Dr. Karch concludes that the physiological effect of restraint of the deceased “is irrelevant as there is no proof that such a disease entity exists”. [The concepts of mechanical/restraint asphyxia and prone positioning are dealt with in more detail in Dr. Karch’s other report (please see immediately below).]

Dr. Karch’s shorter report deals in more detail with restraint and also addresses the rib fracture. From this report, I note the following four points:-

a. Recent “studies roundly support the notion that the hypothesis of positional asphyxia [in the context of compromising respiration because of prone positioning during restraint] is nothing more than junk science”.

b. Dr. Karch is extremely critical of the concept of ‘positional asphyxia’ in the context of restraint and specifically when used “when weight, usually the bodies of police officers, has been place [*sic*] across the subject’s back”. Quite simply, he considers it to be “unproven”; he argues that “numerous well-controlled, well designed studies have found no evidence to support this concept”, and he quotes at length from several.

c. With regard to this particular case, Dr. Karch says that the diagnosis of ‘positional asphyxia’, even if its existence, in this context, were to be accepted, “could not be applied with any confidence to Sheku Ahmed Tejan Bayoh because no one can specify how much weight, if any, was exerted to his back, nor how long this weight was applied, nor how much respiratory function was diminished ... there is absolutely no way to establish whether it actually occurred”.

d. Dr. Karch observes that no truncal bruising was noted at autopsy and that the deceased’s rib fracture was not noticed during that examination; he therefore concludes that the fracture must have occurred during attempts at resuscitation.

COMMENTS: Dr Karch is the only one of the pathologists who have examined the microscope sections from the deceased’s heart who considers them to show any significant morphological abnormalities; all the others (including Dr. Shearer, Dr. BouHaidar, Professor Sheppard, Dr. Soilleux, Professor Crane and Dr. Cary) either attribute minor changes seen to cardiac arrest and resuscitation or interpret the appearances as being within normal limits. This means that Dr. Karch is the only one who argues that the deceased must have had significant pre-existing heart disease which could have predisposed him to sudden and relatively unexpected cardiac arrest. I, as a non-specialist in this area, am not in a position to comment or to attempt to arbitrate.

I note Dr. Karch’s considerable strength of feeling about the subject of ‘positional asphyxia’ in the context of restraint in general and the reasons why he dismisses it as a possible factor contributing to death in this particular case.

10) Professor Anthony FREEMONT

Professor Anthony FREEMONT, an osteo-articular pathologist, reviewed the microscope sections prepared for Drs. Shearer and BouHaidar and his conclusions are in his report dated 03.05.17.

He refers to the decomposition present, and he specifically adds that “many of the landmarks used to age fractures, particularly early fractures, were missing as a consequence of tissue decomposition”. He notes that “there were very few intact red cells visible. However, in the marrow and on

the periosteum there was red amorphous material that had all the characteristics (other than the presence of intact red blood cells) of recent haemorrhage”.

Professor Freemont concludes that “This man sustained an isolated fracture of the left first rib. Further interpretation has been made difficult by the degree of post mortem decomposition. However, on balance, I felt that the residual histological features indicated that the fracture occurred during life, certainly within twelve hours of death and probably within six”.

Finally, Professor Freemont comments that isolated fractures of first ribs are rare; he attaches a relevant, helpful 2004 paper to his report and he provides an e-mail address for a review of rib fractures during CPR. As a consequence of reading these documents, he thinks that “it is unlikely that the fracture was caused by CPR”, that “because of the anatomy, whilst a direct blow could cause the injury, it is unlikely in the absence of fractures of other adjacent bones”, and that “the most plausible cause is an indirect injury, such as falling on an outstretched arm or a blow to or fall onto the shoulder away from the bone”.

OVERVIEW

I think that some of my opinions in this case may be apparent from my comments above, but, for the avoidance of doubt, I would state the following:-

1. Although admittedly not within my field of expertise, I am sure that, at the time of his initial contact with the police, the deceased was suffering from some severe form of acute behavioural disturbance – indeed, it was that abnormal behaviour which necessitated police involvement at the request of members of the public.
2. Although different experts have provided different names for this acute behavioural disturbance, there seems to be no doubt that the deceased was severely affected by it.
3. I note that all the experts consider the deceased’s acute behavioural disturbance to have been precipitated by the illicit stimulant drugs which he had recently taken – certainly MDMA, MDA and alpha-PVP, and

also, possibly, nandrolone. I do not disagree, although I acknowledge that it is outwith my field of expertise.

4. The police officers sent to try to deal with the deceased initially deployed their sprays (CS and PAVA). Although the weather conditions do not seem to have been ideal for their use, neither of the sprays was effective in incapacitating him – indeed, neither appears to have had any effect at all on him.
5. The police officers therefore decided, on the basis of all the evidence available to them, to restrain the deceased; it is not for me to comment as to whether that was the correct decision to make or, indeed, whether the techniques which they used were appropriate.
6. Once on the ground, the deceased clearly struggled very forcefully and showed considerable strength; consequently, at one point, at least one of the police officers was lying on his chest in order to effect some restraint. It is not clear to me as to exactly how long the deceased's chest was compressed and whether or not that compression was continuous or intermittent.
7. I think that it is important to note that less than four minutes elapsed between the deceased's being described as "secure on the ground" and his becoming unresponsive and unconscious, because this must mean that any significant chest compression whilst lying on the ground could not have lasted very long.
8. In very broad terms, I think that the deceased collapsed (and, of course, subsequently died) because he developed some form of cardiac arrhythmia, and I am sure that this was as a consequence of several separate, but interrelated, factors.
9. All the drugs identified in the deceased's body (MDMA, MDA, alpha-PVP and nandrolone) are, to a greater or lesser extent, cardiotoxic, and under different circumstances, it is, I think, widely accepted that each could cause death either individually or in combination with one or more of the others. In this case, therefore, I think it reasonable to conclude that they could (probably would: possibly must) have increased the deceased's susceptibility to developing an arrhythmia when other factors (*v.i.*) were introduced.
10. Although "stress" is a rather weak and ambiguous term when in common lay usage, I use it here to cover all the various well-recognised

psychological and physiological stresses which must have been abundant in this case (both before and during the struggle), almost all of which would have had a stimulating effect upon the heart and thus increased its susceptibility to developing an arrhythmia.

11. I think that the struggle, in its totality, is very important in this case because, *per se*, it must have contributed substantially to the various metabolic disturbances associated with the psychological and physiological stresses just referred to.
12. Under these circumstances, therefore, if it is accepted that the struggle *per se* contributed significantly to this man's death, then it must mean that the act of restraint (whether necessary or not, and whether performed appropriately or not) also contributed significantly to his death – if only because it was a significant, albeit indirect, contributor to the total stress burden affecting the deceased in general and his heart in particular.
13. From the purely pathological perspective, I cannot determine whether the deceased's position during the restraint – lying prone or on his side, with one or even more police officer(s) lying on his torso and/or otherwise compressing his chest – may have contributed to his death. I realise that there was a relatively small number of petechial (and some slightly larger) haemorrhages on the conjunctivae of all four eyelids and on both eye globes, but I am impressed partly by the low numbers present and partly by the absence of such haemorrhages elsewhere on the deceased's face.

Given these findings (both positive and negative), I certainly do not think that they must reflect some form of asphyxia – they could be an entirely non-specific finding in association with a cardiac arrhythmia, and they could even have been a consequence of the intense resuscitation which was carried out. In this context, I am also impressed by the relatively short time interval between the onset of the restraint and the deceased's collapse.

My conclusion, therefore, is that whilst it is never going to be possible to exclude completely the possibility that this aspect of the restraint may have made a minimal contribution to collapse and death (being, perhaps, 'the straw which broke the camel's back'), I think it very unlikely, and I do so particularly in the light of the literature quoted extensively in his report by Dr Karch.

14. I do not think that the contents of the sprays used by the police officers (CS and PAVA) contributed significantly to the deceased's death.

15. Like all others instructed in this case, I consider the deceased's injuries, as identified at post mortem examination, to be minor and to be entirely consistent with the restraint/struggling documented. There was nothing to suggest any conventional assault, and I am sure that these injuries did not, in themselves, cause or contribute to death.

16. There is an obvious difference of opinion as to whether the deceased had some significant pre-existing cardiac disease, as seen on histological examination, between Dr. Karch and all the other pathologists who have examined the microscope sections, including Professor Mary Sheppard (an expert cardiopulmonary pathologist), Dr. Elizabeth Soilleux (who states an interest in autopsy cardiac pathology) and Dr. Nathaniel Cary (whose professional pathological background includes cardiac pathology).

In essence, Dr. Karch says that he identified chronic changes which are known consequences of long-term stimulant drug and steroid abuse and which, in his opinion, could have proved fatal in their own right, whereas all the others conclude that no significant changes were present.

Although I have not examined the microscope sections for myself, I do not possess the expertise even to attempt to arbitrate. If Dr. Karch is correct, then the abnormalities which he describes could have been a predisposing factor for the cardiac arrhythmia which I think caused this man's death.

17. I confess that I find interpretations in relation to the deceased's isolated posterior left first rib fracture very difficult. I am impressed by the fact that it appears to have been associated with very little (if any) local bruising – probably the main reason why it was not found during the post mortem examination on 04.05.15. This would suggest to me that it was likely to have occurred after the deceased's circulation had ceased – i.e. during resuscitation attempts or even at some later stage. I am, however, aware of Professor Freemont's opinion that, "on balance", it occurred in life and probably within six hours of death.

From the paper provided by Professor Freemont (Sakellaridis *et al*, British Journal of Sports Medicine, 2004) I note that first rib fractures may occur as a result of direct external trauma, indirect trauma (as from falling onto an outstretched arm, hyperabduction of the arm, or a blow to the shoulder) or as a fatigue/stress fracture. More specifically, however, I also note that **isolated** first rib fractures are rarely the result of direct external violence because, unlike all the other ribs, the first is deeply placed and protected on all sides by the shoulder girdle and by the regional musculature; consequently, localised direct blunt force is likely

to be associated with other fractures (e.g. clavicle, scapula and other ribs).

I can, therefore, understand why Professor Freemont concluded that “the most plausible cause [for the deceased’s isolated first rib fracture] is an indirect injury such as falling on an outstretched arm or a blow to or fall onto the shoulder away from the bone”.

In my opinion, the importance of this detailed consideration of the deceased’s isolated first rib fracture is because I think it very unlikely to be relevant when considering the direct forces applied by one or more of the police officers to the upper part of the back of the deceased’s chest during his restraint.

18. If I were to have to offer a formal cause of death in this case, it would be a ‘narrative’ one, and I would wish very strongly to support (and, hence, to borrow) Dr. Cary’s modification of that initially provided by Drs. Shearer and BouHaidar.

My opinion as to the cause of death, therefore, would be:-

“Sudden death in a man intoxicated by MDMA (ecstasy) and alpha-PVP in association with struggling and restraint”.

Yours sincerely,

WILLIAM LAWLER O.B.E., M.D., F.R.C.Path., M.F.F.L.M.
Consultant Forensic Pathologist
Formerly Home Office Pathologist.

DISCLOSURES

DECLARATION

I am an expert in forensic pathology, and I have been requested to provide a report. I confirm that I have read guidance contained in a booklet entitled “*Disclosure: Experts’ Evidence and Unused Material*”, which details my role and documents my responsibilities in relation to revelation as an expert witness. I have followed the

guidance and recognise the continuing nature of my responsibilities of revelation. In accordance with my duties of revelation, as documented in the guidance booklet, I

(a) confirm that I have complied with my duties to record, retain and reveal material in accordance with the Criminal Procedure and Investigations Act, 1996, as amended;

(b) have compiled an Index of all material. I will ensure that the Index is updated in the event I am provided with or generate additional material;

(c) that in the event of my opinion changing on any material issue, I will inform those instructing me as soon as reasonably practicable and give reasons.

EXPERT WITNESS SELF CERTIFICATION

I am aware of my responsibilities as an expert witness to reveal to the Court any information that might undermine my evidence.

I hereby declare that:-

1. I have never been convicted of, cautioned for, or received a penalty notice for any criminal offence other than minor traffic offences.
2. there are no proceedings pending against me in any criminal or civil court.
3. I am not aware of any adverse finding by a judge, magistrate or coroner about my professional competence or credibility as a witness.
4. I have never been the subject of any adverse findings by a professional or regulatory body.
5. there are no proceedings, referrals or investigations pending against me that have been brought by a professional or regulatory body.
6. I am not aware of any other information that I think may adversely affect my professional competence and credibility as an expert witness.