

## Further Report on the Imaging of Adam Strain Date of Birth 4<sup>th</sup> August 1991

I have been provided with a further supplemental brief dated 7<sup>th</sup> December 2011, on Adam Strain date of birth 4<sup>th</sup> August 1991.

I have been asked to comment on the following:

### 1. Pre-treatment chest x-ray

- a) Please comment generally on the response of the RBHSC dated 28<sup>th</sup> October 2011
- b) In particular, please comment as to whether or not, in your opinion, a pre-treatment x-ray may have been carried out, and explain whether you agree with their assessment of the papers.

I have not been provided with a pre treatment chest x-ray.  
The RBHSC has indicated that although a form was completed it remains in the medical notes and is incomplete on the reverse.  
The RBHSC also indicates that there is no record of the KV and mas used and no radiographer initials.  
Based on the standard processes in most Radiology Departments I agree that the presence of the request form in the notes and the absence of lack of technical records of the x-ray makes it most likely that an x-ray was not performed prior to treatment.

### 2. Chest x-ray performed at 1.20pm

- a) Please comment on Dr Savage's assessment that the "chest xray showed pulmonary oedema"

Interpretation of radiological imaging by Radiologists is based on many years of specialist training, but is dependent on the clinical information provided by the doctors caring for the patient.

The interpretation of imaging by non radiologists is based on limited knowledge of image interpretation, but has the benefit of direct knowledge of the patient's clinical condition.

Pulmonary oedema is seen on a chest x-ray as increased vascular markings (increased prominence of the vessels) around the hilar of both lungs (the cluster of vessels and airways at the mid point of each lung) with increased air space shadowing in a classically perihilar distribution.

Pulmonary oedema may also be accompanied by fluid in the pleural space (the space between the lungs and the chest wall). This is typically seen on a chest x-ray as blunting of the normally acute costophrenic angle (the junction between the diaphragm and the chest wall), but is not seen on this chest x-ray in this case.

The chest x-ray performed at 1.20pm is taken in expiration, with poor expansion of the lungs. This causes crowding of the perihilar vessels, and to a non-radiologist may simulate the appearances of pulmonary oedema.

In my opinion, as a Radiologist, the chest x-ray does not show pulmonary oedema.

It should also be noted that if the patient was showing clinical signs of pulmonary oedema this may have influenced the clinician's interpretation of the chest x-ray.

**3. Chest x-ray performed at 9.30pm**

- a) **Please comment on Dr McKnight's assessment that the repeat chest x-ray showed "still quite marked pulmonary oedema"**

Please see response to Question 2a

- b) **Please comment on whether this chest x-ray showed "fluid in [the] horizontal fissure".**

An x-ray image is formed because the x-ray beam is attenuated differently by structures of different densities, ie the extent to which the intensity of the x-ray beam is reduced is determined by the density of the tissue that the beam is passing through.

Structures of high density, appear as white on an x-ray film eg. bone and structures of low density appear as black on an x-ray film eg. air.

The horizontal fissure is the interface between the inferior aspect of the right upper lobe and the superior aspect of the right lower lobe.

If the x-ray beam passes through the fissure at an angle whereby the beam is attenuated by the fissure differently to the adjacent lungs, the fissure will appear on the x-ray film as a structure of a different density to the adjacent lung – a white line between the black upper and lower lobes of the lung.

The presence of fluid in the fissure will cause a difference in the attenuation of the x-ray beam and the appearances will be the similar.

Radiological interpretation of these appearances is mostly based on the other supporting/refuting features on the film but is partly dependent on the clinical information provided.

If the horizontal fissure is seen on a chest x-ray, many non-radiologists will interpret this as indicating fluid in the fissure.

In my opinion, the horizontal fissure is not visible on either the chest x-ray dated 27<sup>th</sup> November 1995 at 9.50am or on the chest x-ray dated 27<sup>th</sup> November 1995 at 1.20pm

- c) **Please explain the significance of the presence of "fluid in the horizontal fissure" on a chest x-ray to show pulmonary oedema.**

If there is fluid in the pleural space between the lungs and the chest wall this can track between the lobes of the lungs and into the fissures.

In the presence of pulmonary oedema, whereby fluid fills the airspaces of the lung, fluid can also "leak" into the pleural space and may be seen on a chest x-ray at the costophrenic angles and within the horizontal fissure.

It should be noted, however, that the horizontal fissure may be seen on a normal chest x-ray, in the absence of pulmonary oedema, and is not an absolute indication of fluid within the pleural space. (See Question 3b)

- d) Please comment on Dr Taylor's assessment that the repeat chest x-ray showed "[d]iffuse oedema on CXR".

Please see response to Question 2a.



CAREN LANDES  
**Consultant Paediatric Radiologist**  
05.01.12

I, Dr Caren Landes, MBChB MRCPC FRCR, hold the post of Consultant Paediatric Radiologist at the Alder Hey Children's NHS Foundation Trust. I have been in this post for 4 years. I make this statement, the contents of which are true to the best of my knowledge, and I understand it may be placed before a Court.