referred for contrast enhanced scans, patients who require repeated scans, e.g. to aid therapeutic monitoring or disease management, or patients with risk factors e.g. due to radiation exposure or patient risk factors. With the composition and method of the invention an optimum balance regarding image quality, radiation and iodine concentration per individual patient can be achieved by either lowering iodine concentration and/or by lowering radiation dose.

Hence, the present disclosure~~in a first aspect the invention~~ provides an X-ray diagnostic composition comprising an iodinated X-ray contrast agent together with a pharmaceutically acceptable carrier or excipient, wherein the composition has an ultra-low concentration of iodine. In one embodiment, the composition comprises a mixture of two or more iodinated X-ray contrast agents.

In a first aspect, there is provided a composition comprising an iodinated X-ray contrast agent and a pharmaceutically acceptable carrier or excipient, wherein the composition has a concentration of iodine of less than 100 mg I/ml.

In a second aspect, there is provided a composition comprising an iodinated X-ray contrast agent and a pharmaceutically acceptable carrier or excipient, wherein the composition has a concentration of iodine of 10-170 mg I/ml for use in a method of x-ray examination comprising

administering the composition to a body,

applying an X-ray radiation dose to the body provided by a tube voltage energy in the range of 70-140 kVp,

examining the body with a diagnostic device and

compiling data from the examination.

In a third aspect, there is provided a method of X-ray examination comprising

applying an X-ray radiation dose provided by a tube voltage energy in the range of 70-140 kVp to a body that had been administered a composition comprising an X-ray contrast agent wherein the composition has a concentration of iodine of 10-170 mg I/ml,

examining the body with a diagnostic device and

compiling data from the examination.

"Contrast agents", are agents that comprise a material that can significantly attenuate incident X-ray radiation causing a reduction of the radiation transmitted through the volume of interest. After undergoing CT image reconstruction and typical post-processing, this increased X-ray attenuation is interpreted as an increase in the density of the volume or region of interest, which creates a contrast enhancement or improved definition in the volume comprising the contrast agent relative to the background tissue in the image.

The terms composition, X-ray diagnostic composition and contrast media will be used interchangeably in this document and have the same meaning.

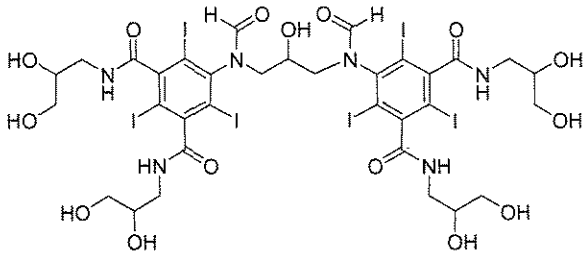
By the term "ultra-low concentration" (ULC) of iodine we define the concentration to be 10-170 mgI/ml, or more preferably 10-150 mgI/ml, even more preferably 10-100 mgI/ml, and most preferably 10-75 mgI/ml. In a particularly preferred embodiment the iodine concentration is less than 100 mgI/ml. The concentration of the X-ray composition has been found to be important as the composition, when administered to a body, replaces blood. By lowering the radiation dose of the X-ray tube i.e by lowering tube voltage (kilo volt peak or kVp), i.e.the difference in potential between the cathode and anode, and administering ultra-low concentrations of iodine, the image quality, i.e. the contrast effect, is actually maintained or improved. This is because the attenuation value of iodinated enhancements is increased at a lower

Claims:

1. A composition comprising an iodinated X-ray contrast agent and a pharmaceutically acceptable carrier or excipient, wherein the composition has a concentration of iodine of less than 100 mg I/ml.

2. A composition as claimed in claim 1 wherein the X-ray contrast agent is a non-ionic iodinated monomeric, dimeric, trimeric, tetrameric or pentameric compound.

3. A composition as claimed in claim 1 or 2 wherein the X-ray contrast agent is iodixanol or the compound of formula II



Formula II

4. Composition comprising an iodinated X-ray contrast agent and a pharmaceutically acceptable carrier or excipient, wherein the composition has a concentration of iodine of 10-170 mg I/ml for use in a method of x-ray examination comprising

administering the composition to a body,

applying an X-ray radiation dose to the body provided by a tube voltage energy in the range of 70-140 kVp,

examining the body with a diagnostic device and

compiling data from the examination.

5. A method of X-ray examination comprising

applying an X-ray radiation dose provided by a tube voltage energy in the range of 70-140 kVp to a body that had been administered a composition comprising an X-ray contrast agent wherein the composition has a concentration of iodine of 10-170 mg I/ml,