Radiology Techniques Department

Special Radiological Procedures-1

lecture 1

Historical development of radiographic agent

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Historical development of radiographic agent

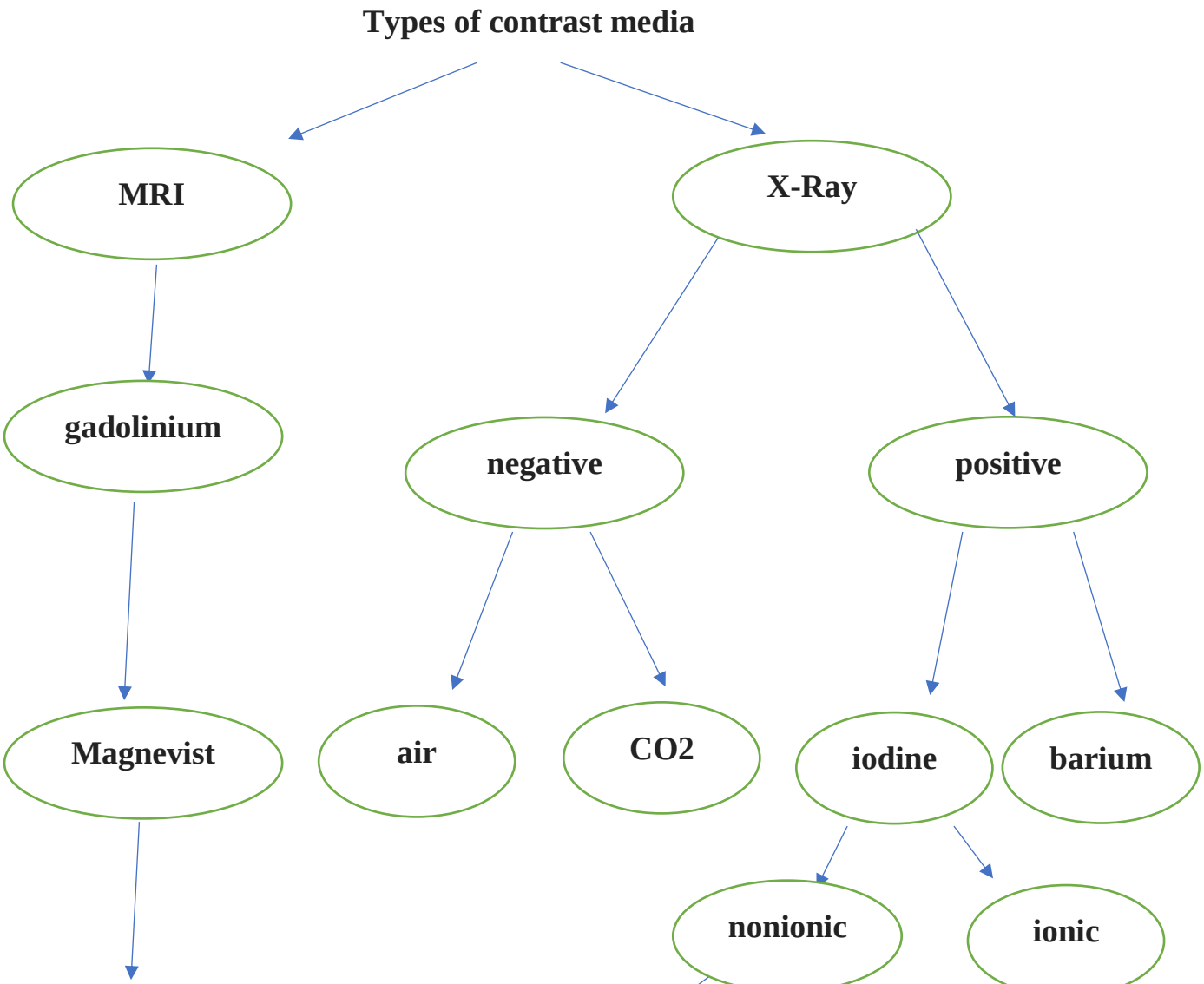
- Radiographic contrast has been used for over a century to enhance the contrast of radiographic images.
- In 1896, in the year after X-rays were discovered, inspired air became the first recognised contrast agent in radiographic examinations of the chest.
- The first report of opacification of urinary tract after I.V injection of contrast agent appeared in 1923 using an I.V injection of 10% of sodium iodide solution, which was at that time prescribed for of syphilis and was execrated in the Urine

contrast media are chemical substances used to enhance the visibility of internal structures in X-ray -based imaging techniques such as **computed tomography** (CT), Conventional radiography, and fluoroscopy also used in magnetic resonance imaging (MRI).

Contrast materials enter the body in three ways. They can be:

1. **Orally** such as (barium swallow, barium meal, and barium follow through)
2. **Rectally** such as (barium enema)
3. **Intravenous** in most radiological examination
4. **Intra-arterial** such as (coronary angiography)

Q/What are types of contrast media?



*Radiocontrast agents are typically **iodine**, or more rarely **barium-sulphate.**

They absorb external X-rays, resulting in decreased exposure on the X-ray detector.

*The two main types of iodine – based contrast media are **ionic** and **nonionic**.

*Magnetic resonance imaging (MRI) contrast media are most commonly **gadolinium** contrast agents such as **Magnevist**.

Ionic media

dissociate in water; their injection into the blood plasma results in a great increase in the number of particles present in the plasma. This has the effect of displacing water. Water moves from an area of greater concentration to an area of lesser concentration by the process of osmosis, the physical process that occurs whenever there is a concentration difference across a membrane and that membrane is permeable to the diffusing substance.

*Osmolality is defined as the number of solute particles, i.e. the contrast medium molecules dissolved in 1 L (1000 g) of water.

These media exert tremendous osmotic activity on the body. The osmolality of normal human blood is given as around **290–300 mOsm/kg** (milliosmoles per kilogram).

_Non-ionic low-osmolality contrast media became widely available between the 1970s and 1980s, with the first non-ionic contrast medium being introduced in 1974, representing a major advancement in diagnostic imaging. Most recently the non-ionic dimers have emerged. These media are highly hydrophilic, resulting in lower chemotoxicity, and they are iso-osmolar with the respective body fluids, meaning they can be used for examinations such as angiography and computed tomography (CT) arteriography, which require high doses of contrast media to be administered and where low toxicity is essential.

Low osmolality contrast media (LOCM): is non-ionic iodinated radiological contrast media such as **Omnipaque** and **Ultravist** used in most radiological examination.

- ❖ There is currently no contrast medium is considered to be ideal, but the ideal contrast medium should fulfil certain requirements for safe and effective application. **It should be:**

1. easy to administer
2. non-toxic
3. a stable compound
4. concentrated in the required area when injected
5. rapidly eliminated when necessary
6. non-carcinogenic
7. of appropriate viscosity for administration
8. tolerated by the patient
9. cost-effective.