Medical imaging allows for non-invasive visualization of functional and anatomical structures in the body. These images are routinely used for diagnosis, treatment planning, and tracking disease progression.

**Computed Tomography (CT):**
CT forms an image by applying complex mathematics to many X-ray images taken at different angles.

**History:**
The technique is based on the mathematical work of Johann Radon. Godfrey Hounsfield commercialized this reconstruction ability for studying brain tumors.

**Modern Techniques:**
CT has greatly increased in speed through the years. Modern computing allows for 3D visualization.

**Advantages of CT**
- Short Scan Time
- Great Bone Contrast
- Large Field of View
- Quantitative Measure of Density

**Drawbacks of CT**
- High Dosage of Ionizing Radiation
- Poor Soft Tissue Contrast
- Long Reconstruction Times
- Limited Patient Applicability

**Magnetic Resonance Imaging (MRI):**
MRI uses a strong magnetic field to excite water molecules. These molecules emit a radio-frequency signal as they return to a non-excited state.

**History:**
Lauterbur and Mansfield invented MRI by introducing spatially-varying magnetic fields to a common chemical analysis technique.

**Modern Techniques:**
MRI is extremely versatile. The same hemorrhage is nearly invisible in (a) and (b); however, (c) clearly shows the impacted region.

**Advantages of MRI**
- Great Soft Tissue Contrast
- Versatility of Contrast
- Non-ionizing Radiation
- Measures functional properties

**Drawbacks of MRI**
- Poor Contrast Otherwise
- Poor Resolution
- Long Scan Time and Noisy
- High Strength Magnet