

Structural damage in the brain is typically identified using two primary types of imaging: **CT (Computed Tomography)** and **MRI (Magnetic Resonance Imaging)**.<sup>1</sup> The choice between them depends on how quickly the information is needed and exactly what kind of damage is suspected.

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## 1. CT Scan (Computed Tomography)<sup>2</sup>

A CT scan is almost always the **first step** in an emergency room or acute setting.<sup>3</sup> It uses X-rays to create a 3D picture of the brain.

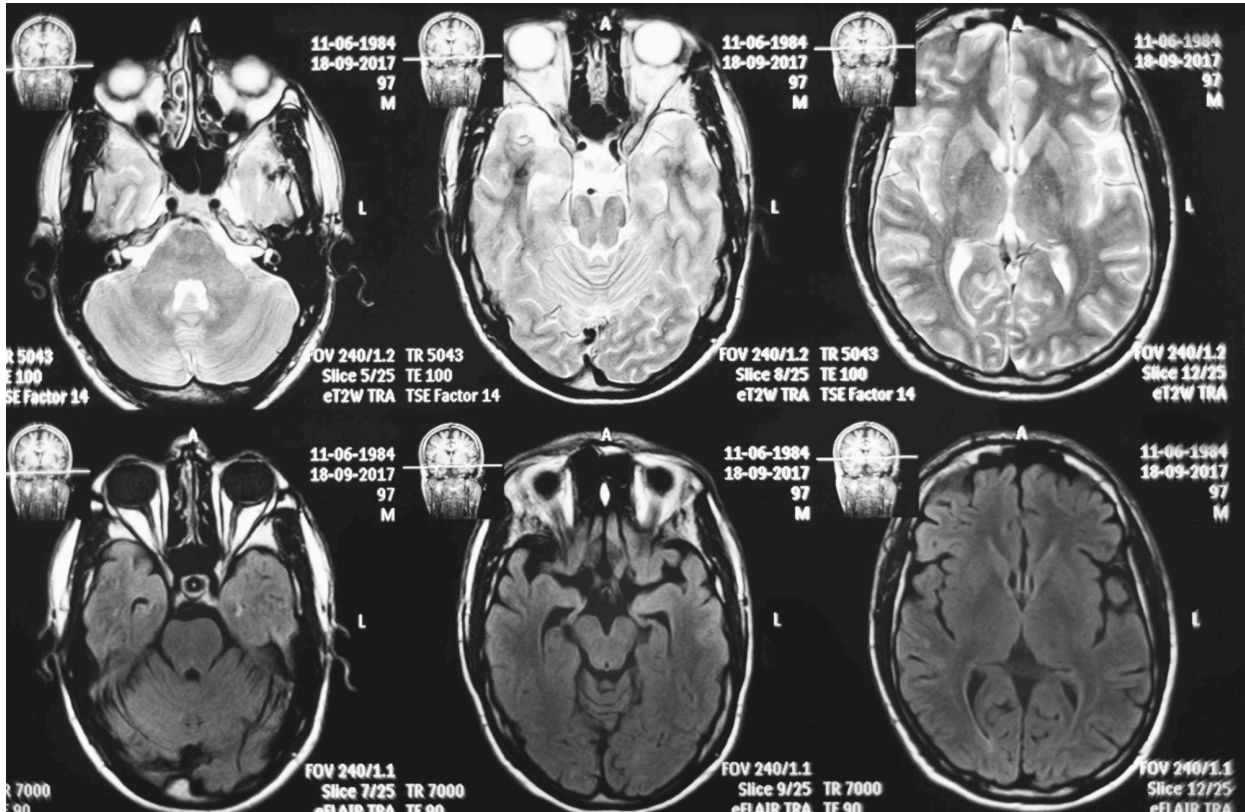
- **Best for:** Detecting life-threatening structural issues that require immediate action.<sup>4</sup>
- **What it shows:**
  - **Acute Bleeding:** Hemorrhages or "bleeds" show up clearly (usually as bright white areas).<sup>5</sup>
  - **Bone Fractures:** It is the gold standard for seeing cracks in the skull.<sup>6</sup>
  - **Large Tumors:** Major masses that are shifting brain tissue.<sup>7</sup>
  - **Swelling (Edema):** Areas where the brain is under pressure or compressed.
- **Pros:** Extremely fast (takes minutes) and widely available.<sup>8</sup>

## 2. MRI Scan (Magnetic Resonance Imaging)

An MRI uses powerful magnets and radio waves to create much more detailed images of the brain's soft tissues.<sup>9</sup> It is often used as a **follow-up** if a CT scan is "clear" but the patient is still experiencing symptoms.

- **Best for:** Seeing subtle, microscopic, or chronic structural changes.<sup>10</sup>
- **What it shows:**
  - **Diffuse Axonal Injury (DAI):** Small tears in the brain's long connecting fibers (white matter) that a CT often misses.<sup>11</sup>
  - **Ischemic Strokes:** Can detect a stroke much earlier than a CT (within minutes of onset).
  - **Inflammation/MS:** Lesions caused by diseases like Multiple Sclerosis.<sup>12</sup>

- **Old Bleeding:** Detecting tiny "microbleeds" from previous injuries.<sup>13</sup>
- **Pros:** High resolution and no radiation.<sup>14</sup>



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## Comparison at a Glance

Feature	CT Scan	MRI Scan
Speed	5–10 minutes	30–60 minutes
Detail	Good (Bones & Blood)	Superior (Soft Tissue & Nerves)
Primary Use	Emergencies (Trauma, Stroke)	Diagnostics (Tumors, Chronic Issues)

Risk	Uses Ionizing Radiation	No Radiation (Strong Magnets)
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## Specialized "Structural" Scans

In some cases, standard scans aren't enough to see the damage. Doctors may then use:

- **DTI (Diffusion Tensor Imaging): A type of MRI that maps the water flow in the brain to see if the white matter tracts (the brain's "wiring") are physically broken.**<sup>15</sup>
- **PET-CT: Combines a CT with a PET scan to show where the brain's structure is intact but the cells aren't using energy correctly, often used in cases of dementia or cancer.**<sup>16</sup>

**Note:** If you are asking because of a recent concussion, it is common for both CT and MRI scans to come back "normal" because concussions are often functional injuries (how the brain works) rather than large-scale structural ones.