

## **MRI Data Acquisition and Analysis Hardware.**

### **MRI Acquisition**

The spine generic protocol for T2-weighted (T2w), T2\*-weighted (T2star), and Magnetization Transfer (MT) imaging on the GE MR750 3T MRI scanner (GE healthcare Inc, USA) was used and it involves specific acquisition parameters as described below<sup>1</sup>.

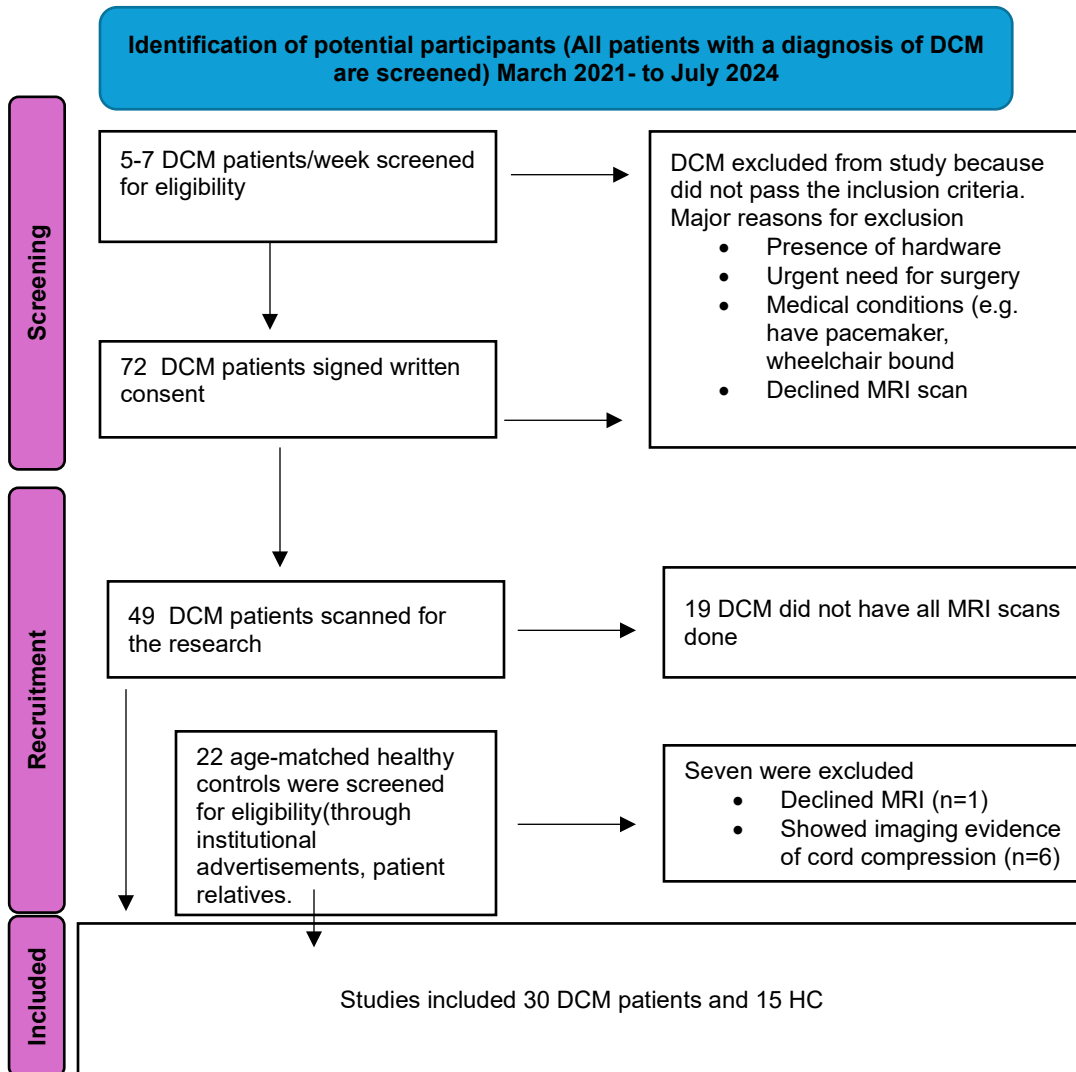
For T2w imaging, the protocol uses a sagittal plane with a 3D Cube pulse sequence. Key parameters include a repetition time (TR) of 2500 ms, echo time (TE) of 120 ms, and an echo train length of 78. The field of view (FOV) is set at 25.6 cm with a slice thickness of 0.8 mm and an acquisition matrix of 320x320. The scan utilizes frequency encoding in the superior/inferior direction, with an auto shim feature enabled and no phase correction applied.

For T2star imaging, the protocol is based on a gradient echo (GRE-ME) pulse sequence in an oblique plane. The TR is 600 ms, with a flip angle of 30 degrees, and a receiver bandwidth of 62.50 kHz. The FOV is set to 22.4 cm, with a slice thickness of 5.0 mm and a matrix resolution of 448x224. Auto shim is enabled, with no phase correction applied.

For MT imaging, the protocol includes two sequences: GRE-MT1 and GRE-MT0, both acquired in the oblique plane with a spoiled gradient echo (SPGR) sequence. The TR is 35 ms, TE is 4.0 ms, and the flip angle is set to 9 degrees. The FOV is 17.2 cm, and the slice thickness is 5.0 mm with a matrix resolution of 256x256.

### **Hardware used in analysis**

Our analysis was conducted on a MacOS Catalina system equipped with a 3.8 GHz 8-core Intel i7 processor and 64 GB of RAM. The Spinal Cord Toolbox (SCT) was installed following the user-friendly instructions available on the [Spinal Cord Toolbox website](#). The SCT-batch pipeline is optimized for efficiency and can be executed on standard consumer-grade hardware systems.



**Supplementary Figure 1:** Flowchart outlining the patient recruitment process from initial identification through screening and enrollment.

#### Reference:

1. Cohen-Adad J, Alonso-Ortiz E, Abramovic M, et al. Generic acquisition protocol for quantitative MRI of the spinal cord. *Nat Protoc.* Oct 2021;16(10):4611-4632. doi:10.1038/s41596-021-00588-0