



Modic Endplate Changes on MRI Spine



Modic changes are end-plate marrow changes of degenerative disease with different patterns depending on the type of marrow change (Fig. 1)

These different patterns have different correlates and most importantly need to be differentiated from infection. The best way to do that is to look at the disc. If the disc is T2 bright then there is likely infection, but if the disc is T2 dark, then these are just Modic changes.

Type 1 Modic changes (T1 low, T2 high) (Fig. 2) are the ones most likely to simulate infection, as compared to type 2 (T1 high, T2 high) (Fig. 3) and type 3 (T1 low, T2 low). On diffusion and non-diffusion images, the claw sign also helps confirm Modic changes.

Fig. 1: Table of the MRI appearances in different Modic types.

Modic Type	Pathology	T1 signal	T2 signal
Type 1	Edema / inflammation	Low	High
Type 2	Fatty marrow replacement	High	High
Type 3	Sclerosis	Low	Low

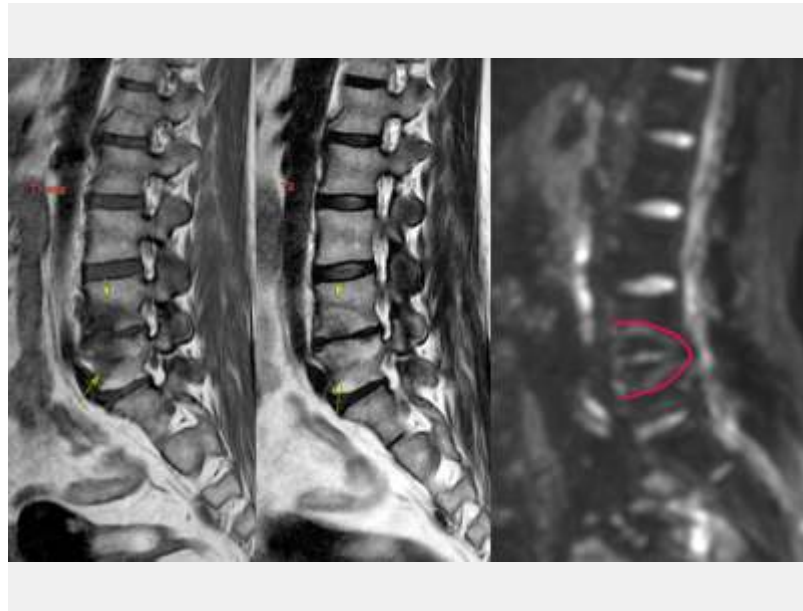


Fig. 2: Type 1 Modic changes. The sagittal T1 image (left) shows T1 dark marrow changes, while the sagittal T2 images (middle) shows T1 bright marrow changes, while the disc is T2 dark, suggesting degenerative disease and not infection. The diffusion image (right) shows the typical claw sign of degenerative disease.



At a glance

- ◆ Modic endplate changes are of 3 types.
- ◆ Type 1 is the one most likely to be mistaken for infection
- ◆ The different Modic types have different clinical implications as far as symptomatology is concerned.

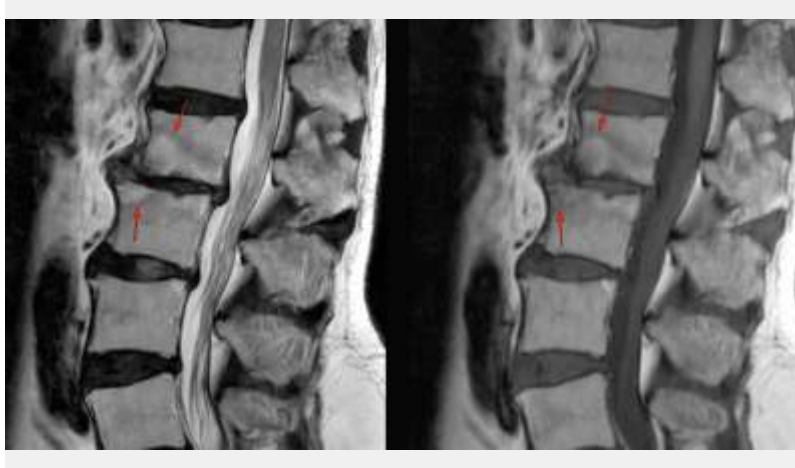


Fig. 3: Type 2 Modic changes. The sagittal T2 (left) and sagittal T1 (right) images show bright endplate marrow changes on both sequences, typical of type 2 Modic changes, reflecting a combination of fatty replacement and sclerosis.

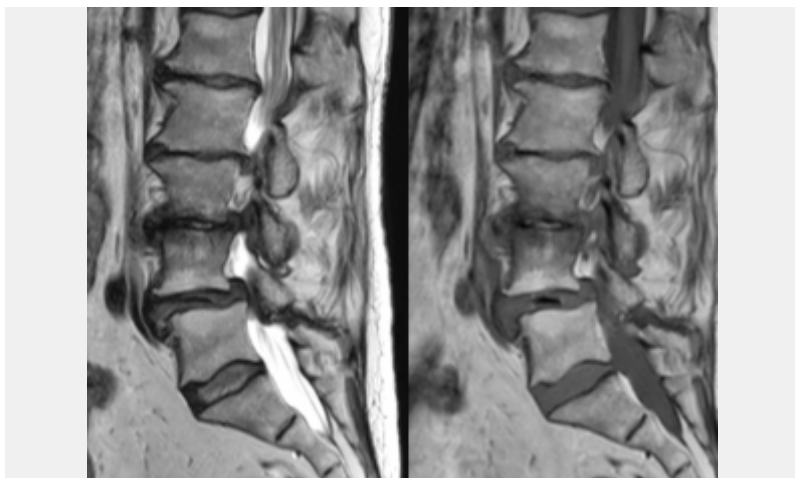


Fig. 4: Type 3 Modic changes. The sagittal T2 (left) and sagittal T2 (right) images show dark endplate marrow changes typical of type 3 Modic changes, reflecting fibrosis. The disk is minimally T2 dark, but in the absence of marrow edema, this is not significant.

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Printed, Published & Owned by Dr Bhavin Jankharia,

Printed at : India Printing House, First Floor, 42, G D Ambedkar Marg, Opp. Wadala Post Office, Wadala, Mumbai 400 031

Published from: Dr Jankharia's Imaging Centre, Bhaveshwar Vihar, 383, Sardar V P Road, Prarthana Samaj, Mumbai 400 004, M.S.,

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