MRI of Chronic Low Back Pain
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Summary: MRI is useful in diagnosing the etiology of both acute radicular low back pain and some causes of chronic low back pain. MRI is limited in predicting which patients with degenerative lumbar spine disease will benefit from spinal fusion. Imaging tools to identify non-radicular pain generators are needed. Advanced MR imaging may be helpful in identifying painful disks. In patients with multilevel degenerative changes, functional MRI of the spinal cord may have a role in identifying painful levels which might benefit from intervention. Functional brain imaging could help in recognizing chronic pain states or psychological conditions not amenable to surgical therapy.

Back pain is one of the most common causes of disability, and the incidence of back pain is increasing in the U.S.[1]. Treatment of back pain is one of the leading factors resulting in increasing medical expenditures in the U.S. Despite the extensive resources spent on diagnosis and treatment of back pain, there is great need for improvement. More precision is needed in identification of specific painful pathology. Additional insight is required into the contributions of psychological states and secondary gain. Advances in MR imaging could ensure that patients receive appropriate surgical procedures when indicated. Patients who would not benefit from surgery could be spared the cost and morbidity of unnecessary procedures.

Causes of low back pain are myriad, including disk degeneration and herniation, spinal stenosis, facet arthropathy, muscle strain and spasm, and vertebral fracture. Lumbar disk herniation is a common source of radicular low back pain. Initial management for lumbar disk herniation is conservative. Surgical diskectomy may be required for patients with intractable pain or neurological deficits. After lumbar diskectomy, a group of patients will have persistent or recurrent back pain which cannot currently be explained by imaging findings.

In some cases, back pain is thought to arise from the disk space itself. Additionally, many patients have psychological states exacerbated by chronic back pain. Secondary gain also becomes an issue in cases such as workers' compensation. These factors contribute to the high incidence of failed back surgery[2]. MR imaging techniques which reliably identify lumbar pain generators could reduce the incidence of failed back surgery.

Patients may have extensive degenerative disease with nerve compression at multiple levels. In these cases it is difficult to determine on imaging or clinical grounds which level is responsible for pain and therefore amenable to surgical therapy. Invasive nerve blocks may help to localize pain generators in selected cases. Imaging methods which could localize pain to specific spinal levels would greatly assist in diagnosis and treatment of lumbar pain. In particular, functional MRI of the spinal cord may be of use to identify specific painful levels[3].

Many patients complain of non-radicular axial back pain. MRI may show degenerative disk changes or annular tears which are associated with diskogenic pain[4]. MRI has poor specificity for predicting which abnormal appearing disks are a source of pain[5]. Invasive procedures including diskography also have poor specificity for determining which disk spaces are responsible for low back pain[6]. An imaging method which differentiates between painful disks and asymptomatic degenerated disks[7][8] would have great clinical utility.

In subjects with chronic lumbar pain, the contribution of psychological states and psychiatric disorders must also be considered. There is significant clinical overlap between depression and chronic back pain[9], with possible interaction between these processes. FMRI could be useful in identifying areas of brain activation common to depression and chronic pain[10].