In accordance with current clinical practice guidelines, the vast majority of patients presenting to primary care with low back pain are classified as having “nonspecific” low back pain, by exclusion of serious spinal pathology or radiculopathy. Typical radiculopathy, with radiation of pain in a dermatomal distribution and clear neurological signs at a corresponding spinal level, commonly produces neuropathic pain. However, there is emerging evidence that features of neuropathic pain are not restricted to typical radiculopathy in patients with low back pain. In this seminar I will review this evidence and discuss the possible nociceptive, neuropathic and neuroplastic mechanisms that might underpin the development and maintenance of non-specific low back pain. Approaches to identify neuropathic, nociceptive and neuroplastic components to low back pain in the clinic will also be reviewed, and implications for clinical practice and research discussed.