

associated peripheral neuropathy in a patient who also has Babinski signs is a helpful diagnostic clue. Optic atrophy and irritability or other cognitive changes may be prominent in advanced cases and are occasionally the presenting symptoms. The myelopathy of subacute combined degeneration tends to be diffuse rather than focal; signs are generally symmetric and reflect predominant involvement of the posterior and lateral tracts, including Romberg sign. Causes include dietary deficiency, especially in vegans, and gastric malabsorption syndromes including pernicious anemia (**Chap. 99**). The diagnosis is confirmed by the finding of macrocytic red blood cells, a low serum B₁₂ concentration, and elevated serum levels of homocysteine and methylmalonic acid. Treatment is by replacement therapy, beginning with 1000 µg of intramuscular vitamin B₁₂ daily for 5 days and then continued as a once monthly maintenance dose; oral maintenance is also reasonable, except in cases of pernicious anemia.

Two closely related conditions deserve mention here. The first is **folate deficiency**—associated myelopathy, now only rarely seen since widespread programs of dietary fortification with folate have been implemented. A second is due to inhalation with **nitrous oxide** (laughing gas), an irreversible inhibitor of vitamin B₁₂, which also produces a myelopathy identical to subacute combined degeneration. Exposure to nitrous oxide may occur during dental or surgical procedures or from recreational inhalation (“doing whippets”).

■ HYPOCUPRIC MYELOPATHY

This myelopathy is similar to subacute combined degeneration (described above), except serum levels of B₁₂ are normal. Low levels of serum copper are found, and often there is also a low level of serum ceruloplasmin. Some cases follow gastrointestinal procedures, particularly bariatric surgery, that result in impaired copper absorption; others have been associated with excess zinc from health food supplements or in the past zinc-containing denture creams, all of which impair copper absorption via induction of metallothionein, a copper-binding protein. Many cases are idiopathic.