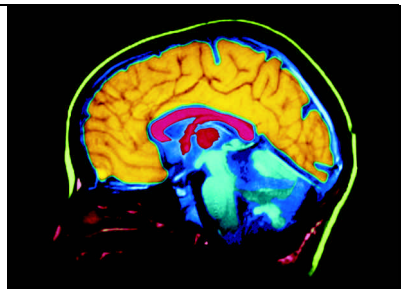
Neurology and neurosurgery



SEVERAL RECENT DEVELOPMENTS in the basic and applied sciences have been incorporated into neurological and neurosurgical practice.

Diagnosis. New magnetic resonance imaging (MRI) and molecular technologies have facilitated neurological diagnoses. Diffusion-weighted MRI (DWI) is the most sensitive imaging technique for acute brain lesions (eg, infarction), and distinguishes acute from chronic lesions. Coupling DWI with perfusion-weighted MRI (PWI) promises to identify which ischaemic stroke patients benefit from thrombolysis. Magnetic resonance spectroscopy, which detects metabolites (eg, lactate, choline) and *N*-acetyl-aspartate (NAA), can distinguish tumours (high in choline) from infarcts (low NAA and normal or low choline levels). Functional MRI (fMRI), which combines anatomical with physiological imaging, allows preoperative planning for resecting lesions in functionally important brain regions. Anatomical imaging by MRI, combined with functional imaging by ictal single- photon-emission computed tomography (SPECT) and interictal positron-emission tomography (PET), aids video-electroencephalogram monitoring and clinical assessment in localising seizure foci.

The chromosomal position of many genes which, when mutated, cause neurological disorders is now known. In some (eg, Huntington's disease, muscular dystrophy, childhood-onset generalised primary dystonia), the genes, their disease-causing mutations, and gene products have been characterised. This has facilitated the development of new diagnostic techniques, implementation of predictive testing and genetic counselling services, and promise of novel approaches to treatment and prevention.[1]

Treatment. For patients with chronic tension-type headaches, the combination of antidepressant medication and stress management therapy is more effective than monotherapy.[2] Among the newer specific acute migraine therapies, the triptans are of comparable efficacy, but differ in their onset and duration of action and adverse effect profile. Sodium valproate is an effective prophylactic for migraine.

Ischaemic stroke patients benefit from 300 mg aspirin immediately or intravenous thrombolysis within three hours of onset. Anticoagulation with heparins causes 20 more deaths per 1000 patients treated (mainly intracranial haemorrhage) than aspirin, despite preventing 10 more symptomatic deep venous thromboses per 1000 patients treated. Stroke care by a multidisciplinary team in a stroke unit maximises survival free of handicap.

The treatment of focal spasticity and dystonias has been revolutionised by botulinum toxin injections into affected muscle groups. The benefit lasts about 3–5 months, after which the injections can be repeated.

In early Parkinson's disease, dopamine agonist monotherapy controls symptoms in a third of patients for up to five years, with fewer motor complications than with levodopa therapy. For other patients, levodopa remains the most effective symptomatic treatment. In patients with motor fluctuations due to "wearing off" of pharmacotherapy, "on" time may be increased by 10%–25% with slow-release levodopa, dopamine agonists, and catechol-*O*-methlytransferase inhibitors. Amantadine is an effective form of chemical pallidotomy for dopa-induced dyskinesia. In some patients, neurosurgical interventions may alleviate drug-resistant tremor and control parkinsonian symptoms.

Frameless stereotaxy enables neurosurgeons to navigate and operate safely in high-risk areas of the brain. Neuroendoscopy is used in the ventricular system (eg, to remove dislodged shunt tubes, intraventricular blood, and colloid cysts, and to treat obstructive hydrocephalus by ventriculostomy) and assist trans-sphenoidal pituitary surgery.

Prevention. For patients with a history of transient ischaemic attack or stroke of any type (and no contraindication to blood-pressure-lowering therapy), gradually introducing antihypertensive medication, to slowly lower blood pressure by at least 9/4 mmHg, reduces the risk of recurrent serious vascular events by at least a quarter.[3]

Interventional neuroradiology offers potential strategies for stroke prevention with techniques such as coiling of intracranial aneurysms and carotid angioplasty and stenting for patients with symptomatic severe carotid stenosis.[4]

Several newer anti-epileptic drugs (lamotrigine, topiramate, vigabatrin, gabapentin, tiagabine) have been approved as "add-on" agents in patients who have seizures despite conventional first-line treatment. For patients with temporal lobe epilepsy refractory to anti-epileptic medication, surgical resection of a part of the temporal lobe improves the proportion of patients seizure-free at one year from 8% to 58% ($P < 0.001$), and improves quality of life.[5]

For patients with multiple sclerosis who have at least two disabling relapses every two years, interferon betas reduce the relapse rate by a third, and may delay the progression of disability. Glatiramer acetate and mitoxantrone, a new immunomodulatory drug, also reduce relapses and possibly delay the progression of disability.

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