N

Narcolepsy, Narcoleptic Syndrome
- see HYPERSOMNOLENCE

Nasopalpebral Reflex
- see GLABELLAR TAP REFLEX

Negative Myoclonus
- see ASTERIXIS

Negative Tremor
- see ASTERIXIS

Negativism
Negativism may be used to describe a motor sign consisting of the patient doing the opposite of what is asked and actively resisting efforts to persuade compliance. For example, movement of a limb in response to application of pressure despite the patient having been told to resist (*mitgehen*) may be one element of negativism. This may be observed in mental disorder, usually schizophrenia, and may also be a feature of catatonia. The similarity of some of these features to *gegenhalten* suggests the possibility of frontal lobe dysfunction as the underlying cause.

Negativism has also been used by Bleuler to describe an inner sensation in which the effort to start one action elicits a counter impulse which blocks or hinders the execution of the action, also known as conflict of intentions. This may reflect a callosal lesion.

References

Moore DP. Conflict of intentions or inner negativism? *J Neurol Neurosurg Psychiatry*. 2002; **72**: 681.

Nishikawa T, Okuda J, Mizuta I, et al. Conflict of intentions due to callosal disconnection. *J Neurol Neurosurg Psychiatry*. 2001; **71**: 462–71.

Cross References

Catatonia; *Gegenhalten*

Neglect
Neglect is a failure to orient toward, respond to, or report novel or meaningful stimuli. If failure to respond can be attributed to concurrent sensory or motor deficits (*e.g.* hemiparesis, hemianopia, visuospatial deficits) neglect is not present.

Neglect can involve stimuli in the extrapersonal environment (*e.g.* visual neglect) or personal space (*e.g.* personal neglect or asomatognosia). This dichotomy may also be characterised as egocentric (neglecting hemispace defined by the midplane of the body) and allocentric (neglecting one side of individual stimuli). Neglect of contralateral hemispace may also be called unilateral spatial neglect, hemi-inattention, or hemineglect. Lesser degrees of neglect may be manifest as extinction (double simultaneous stimulation). Motor neglect may be evident as hemiakinesia, hypokinesia, or motor impersistence. Alexia may sometimes be a consequence of neglect (neglect alexia). Alloaesthesia and allokinesia may also be features of neglect.

A.J. Larner, *A Dictionary of Neurological Signs*,
DOI 10.1007/978-3-319-29821-4_14

Neglect may be obvious (*e.g.* patient not dressing one side of the body), but is sometimes more subtle, in which case it may be tested for using various simple tests:

- Cancellation tests, *e.g.* stars (unstructured array), letters (structured array).
- Line bisection (part of the Behavioural Inattention Test), numbering a clock face.
- Figure copying, *e.g.* Rey-Osterrieth figure.
- Drawing from memory.

Neglect is more common after right rather than left brain damage, usually of vascular origin. The angular gyrus and parahippocampal gyrus may be central to the development of visual neglect. Marked degrees of neglect may seriously hamper attempts at neurorehabilitation.

References

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Li K, Malhotra PA. Spatial neglect. *Pract Neurol*. 2015; **15**: 333–9.
Maravita A. Spatial disorders. In: Cappa SF, Abutalebi J, Démonet JF, Fletcher PC, Garrard P, editors. Cognitive neurology: a clinical textbook. Oxford: Oxford University Press; 2008. p. 89–118.
Maxton C, Dineen RA, Padamsey RC, Munshi SK. Don't neglect "neglect" – an update on post stroke neglect. *Int J Clin Pract*. 2013; **67**: 369–78.

Cross References

Alexia; Alloaesthesia; Allokinesia; Asomatognosia; Eastchester clapping test; Extinction; Hemiakinesia; Hypokinesia; Impersistence; Motor neglect

Negro's Sign

Negro has two eponymous signs:

- Cogwheel (jerky) type of rigidity in basal ganglia disorders.
- In both peripheral and central facial paralysis, the eyeball deviates outward and elevates more than normal when the patient attempts to look up due to overaction of the inferior oblique and superior rectus muscles, respectively.

Reference

Ghiglione P, Mutani R, Chiò A. Cogwheel rigidity. *Arch Neurol*. 2005; **62**: 828–30.

Cross References

Bell's palsy; Facial paresis, Facial weakness; Parkinsonism; Rigidity

Neologism

A neologism is a non-word approximating to a real word, produced in spontaneous speech; it is thought to result from an inability to organize phonemes appropriately in the process of speech production. Hence, this is a type of literal or phonemic paraphasia encountered in aphasic syndromes, most usually those resulting from left superior temporal-inferior parietal lobe damage (Wernicke type). A disconnection between stored lexical representations and language output pathways leading to aberrant phoneme activation is a postulated mechanism for neologistic aphasia

(The word "scientist" is said to be a neologism coined in the nineteenth century by William Whewell.)

Reference

Rohrer JD, Rossor MN, Warren JD. Neologistic jargon aphasia and agraphia in primary progressive aphasia. *J Neurol Sci*. 2009; **277**: 155–9.

Cross References

Aphasia; Jargon aphasia; Paraphasia; Schizophasia; Wernicke's aphasia

Neri's Test

- see LASÈGUE'S SIGN

Nerve Thickening

The characterization of a peripheral neuropathy should always include examination to feel if any nerves are thickened. Good places to palpate for nerve thickening include around the elbow (ulnar nerve), anatomical snuff box (superficial radial nerves), and head of the fibula (common peroneal nerve). Nerve thickening may be noted in a variety of conditions, in some by examination, in others using imaging techniques:

- Leprosy.
- Hereditary motor and sensory neuropathies (HMSN), especially types I, III, and IV (Refsum's disease).
- Hereditary neuropathy with liability to pressure palsies (HNLPP)/tomaculous neuropathy.
- Neurofibromatosis 1.
- Sarcoidosis.
- Chronic inflammatory demyelinating neuropathy/ophthalmoplegic migraine.
- Nerve tumours (localised).
- Amyloidosis (familial amyloid polyneuropathy, primary systemic amyloidosis): rare.

References

Donaghy M. Enlarged peripheral nerves. *Pract Neurol*. 2003; **3**: 40–5.
Duggins AJ, McLeod JG, Pollard JD, Davies L, Yang F, Thompson EO, Soper JR. Spinal root and plexus hypertrophy in chronic inflammatory demyelinating polyneuropathy. *Brain*. 1999; **122**: 1383–90.

Cross Reference

Neuropathy

Neuromyotonia

Neuromyotonia is neurogenic muscle stiffness (*cf*. myotonia, myogenic muscle stiffness) which reflects peripheral nerve hyperexcitability. Clinically this is manifest as muscle cramps and stiffness, particularly during and after muscle contraction, and as muscular activity at rest (myokymia, fasciculation). Tendon areflexia and abnormal postures of hands and feet may also be observed. Sensory features such as paraesthesia, and central nervous system features (Morvan's syndrome), can occur. A syndrome of ocular neuromyotonia has been described in which spasms of the extraocular muscles cause a transient heterophoria and diplopia; most cases follow months to years after cranial irradiation, but some are associated with multiple sclerosis.

Neuromyotonia is characterized physiologically by continuous motor unit and muscle fibre activity which is due to peripheral nerve hyperexcitability; it is abolished by curare (*cf*. myotonia). Spontaneous firing of single motor units as doublet, triplet, or multiplet discharges with high intraburst frequency (40–300/s) at irregular intervals is the hallmark finding.

Neuromyotonia may be associated with autoantibodies directed against presynaptic voltage-gated K^+ channels. Around 20% of patients have an underlying small-cell lung cancer or thymoma, suggesting a paraneoplastic aetiology in these patients. Neuromyotonia has also been associated with mutations within the voltage-gated K^+ ion channel gene.

Neuromyotonia usually improves with symptomatic treatments such as carbamazepine, phenytoin, lamotrigine, and sodium valproate, in combination if necessary. Paraneoplastic neuromyotonia often improves and may remit after treatment of the underlying tumour.

References
Dardiotis E, Ralli S. Images in clinical medicine. Paraneoplastic neuromyotonia. *N Engl J Med*. 2015; **372**: e24.
Isaacs H. A syndrome of continuous muscle-fibre activity. *J Neurol Neurosurg Psychiatry*. 1961; **24**: 319–25.
Maddison P. Neuromyotonia. *Clin Neurophysiol*. 2006; **117**: 2118–27.
Menon D, Sreedharan SE, Gupta M, Nair MD. A novel association of ocular neuromyotonia with brainstem demyelination: two case reports. *Mult Scler*. 2014; **20**: 1409–12.
Cross References
Fasciculation; Myokymia; Myotonia; Paramyotonia; Pseudomyotonia; Stiffness

Neuronopathy

Neuronopathies are disorders affecting neuronal cell bodies in the ventral (anterior) horns of the spinal cord or dorsal root ganglia, hence motor and sensory neuronopathies, respectively. Sensory neuronopathy (also known as ganglionopathy, or polyganglionopathy) has a more limited differential diagnosis than neuropathies, including:

- Paraneoplasia: anti-Hu antibody syndrome (although a similar syndrome, presumed paraneoplastic, may occur in the absence of these antibodies).
- Sjögren's syndrome.
- Associated with anti-GD1b ganglioside antibodies.
- Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP).
- HIV.

Anterior horn cell (motor neurone) disorders may be classified as motor neuronopathies, including motor neurone disease (amyotrophic lateral sclerosis), spinal muscular atrophies, and poliomyelitis.

References
Camdessanché JP, Jousserand G, Ferraud K, et al. The pattern of diagnostic criteria of sensory neuronopathy: a case-control study. *Brain*. 2009; **132**: 1723–33.
Ghadiri-Sani M, Larner AJ, Menon RK. Sensory neuronopathy as a possible paraneoplastic syndrome linked with pancreatic cancer. *Br J Hosp Med*. 2016; **77**: 48–9.
Cross Reference
Neuropathy

Neuropathy

Neuropathies are disorders of peripheral nerves. Various clinical patterns of peripheral nerve involvement may be seen:

- *Mononeuropathy*: sensory and/or motor involvement in the distribution of a single nerve.
- *Mononeuropathy multiplex*: simultaneous involvement of two or more nerves, usually in different parts of the body; if due to inflammatory disease, as is often the case, this may be described as mononeuritis multiplex.
- *Polyneuropathy*: a widespread process, predominantly affecting the distal parts of nerves; may be predominantly sensory ("glove and stocking" sensory loss) or motor, with or without concomitant autonomic involvement. It may be helpful to distinguish between polyneuropathies which are either predominantly axonal or demyelinating by means of neurophysiological (EMG/NCS) studies to aid with differential diagnosis.

These clinical patterns may need to be differentiated in practice from disorders affecting the neuronal cell bodies in the ventral (anterior) horns of the spinal cord or dorsal root ganglia (motor and sensory neuronopathies, respectively); and disorders of the nerve roots (radiculopathy) and plexuses (plexopathy). Clinical signs resulting from neuropathies are of lower motor neurone type (wasting, weakness, reflex diminution or loss).

The causes of neuropathy are many. Mononeuropathies often result from local compression (entrapment neuropathy), trauma, or diabetes. Mononeuropathy multiplex often reflects intrinsic inflammation (*e.g.* polyarteritis nodosa, Churg-Strauss syndrome, systemic lupus erythematosus, rheumatoid arthritis, Sjögren's syndrome, cryoglobulinaemia, isolated PNS vasculitis). Polyneuropathies may have genetic, infective, inflammatory, toxic, nutritional, and endocrine aetiologies. Many neuropathies, particularly polyneuropathies in the elderly, especially of sensory axonal type, may remain idiopathic or cryptogenic despite intensive investigation.

References

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Staal A, van Gijn J, Spaans F. Mononeuropathies: examination, diagnosis and treatment. London: WB Saunders; 1999.
Stewart JD. Focal peripheral neuropathies. 4th ed. Vancouver: JBJ Publishing; 2010.

Cross References

Amyotrophy; Foot drop; Lower motor neurone (LMN) syndrome; Neuronopathy; Plexopathy; Radiculopathy; Wasting; Weakness; Wrist drop

Newspaper Sign

- see FROMENT'S SIGN

Nominal Aphasia

- see ANOMIA

Nuchal Rigidity

Nuchal rigidity refers to neck stiffness, and this term is usually synonymous with meningism, in which case other signs of meningeal irritation are usually present (Kernig's sign, Brudzinski's neck sign). If these other signs are absent, then isolated nuchal rigidity may suggest a foraminal pressure cone. It may also occur in syndromes causing predominantly axial (as opposed to limb) rigidity (*e.g.* progressive supranuclear palsy). In intubated patients, there may be resistance to passive neck movements.

Nuchal rigidity may have better sensitivity (0.3) than either Kernig's or Brudzinski's signs (0.05) in adult patients with meningitis.

Reference

Thomas KE, Hasbun R, Jekel J, Quagliarello VJ. The diagnostic accuracy of Kernig's sign, Brudzinski's sign, and nuchal rigidity in adults with suspected meningitis. *Clin Infect Dis*. 2002; **35**: 46–52.

Cross References

Brudzinski's (neck) sign; Kernig's sign; Meningism; Parkinsonism

Nuchocephalic Reflex

In a standing subject, rapid turning of the shoulders to either left or right (eyes closed to avoid fixation) is associated with bilateral contraction of the cervical musculature so that the head is held in the original position. This nuchocephalic reflex is present in infants and children up to the age of about 4 years. Beyond this age the reflex is inhibited, such that the head is actively turned in the direction of shoulder movement after a time lag of about half a second. If the reflex is present in adults (*i.e.* disinhibited), this has been claimed to be a "regressive" (primitive) sign, indicative of diffuse cerebral dysfunction.

References

Jenkyn LR, Walsh DB, Walsh BT, Culver CM, Reeves AG. The nuchocephalic reflex. *J Neurol Neurosurg Psychiatry*. 1975; **38**: 561–6.
Schott JM, Rossor MN. The grasp and other primitive reflexes. *J Neurol Neurosurg Psychiatry*. 2003; **74**: 558–60.

Cross References

Age-related signs; Primitive reflexes

Numb Chin Syndrome, Numb Cheek Syndrome

- see ROGER'S SIGN

Nyctalopia

Nyctalopia, or night blindness, is an impairment of visual acuity specific to scotopic vision, implying a loss or impairment of rod photoreceptor function. Patients may spontaneously complain of a disparity between daytime and nocturnal vision, in which case acuity should be measured in different ambient illumination. Nyctalopia may be a feature of:

- Retinitis pigmentosa.
- Vitamin A deficiency.
- Cancer-associated retinopathy: most commonly associated with small-cell lung cancer (anti-recoverin antibodies may be detected), though gynaecological malignancy and melanoma have also been associated (with anti-bipolar retinal cell antibodies in the latter).

Since the words nyctalopia and hemeralopia have apparently been used in an opposite sense by many non-English-speaking doctors, the terms "night blindness" and "day blindness" may be preferred to avoid any ambiguity.

Reference

Ohba N, Ohba A. Nyctalopia and hemeralopia: the current usage trend in the literature. *Br J Ophthalmol*. 2006; **90**: 1548–9.

Cross References

Hemeralopia; Retinitis pigmentosa

Nylen-Bárány Manoeuvre

- see HALLPIKE MANOEUVRE, HALLPIKE TEST

Nystagmoid Jerks

- see NYSTAGMUS

Nystagmus

Nystagmus, or talantropia, is an involuntary to-and-fro oscillatory movement of the eyeballs, of which there are many varieties. It is usually bilateral, but occasionally may be unilateral, as in internuclear ophthalmoplegia (INO). The pathophysiological underpinnings are diverse, but all involve brainstem nuclei and tracts which control eye movements and gaze holding, especially the oculomotor (III), trochlear (IV) and abducnes (VI) cranial nerve nuclei, paramedian pontine reticular formation, vestibular nuclei, medial longitudinal fasciculus, central tegmental tract, cerebellar connections to these structures, interstitial nucleus of Cajal, and nucleus prepositus hypoglossi. It is important to distinguish nystagmus from other involuntary eye movements such as square-wave jerks, ocular flutter, and opsoclonus.

The nature of the nystagmus may permit inferences about the precise location of pathology. Observations should be made in the nine cardinal positions of gaze for direction, amplitude and beat frequency of nystagmus. Nystagmus may be abortive or sustained in duration.

Nystagmus may be classified in various ways:

Physiological:

Optokinetic nystagmus (OKN; *e.g.* looking out of a moving railway carriage).

Induced by vestibular stimuli (*e.g.* merry-go-round; caloric testing).

Nystagmoid jerks: in extremes of lateral or vertical gaze (end-point nystagmus, a form of gaze-evoked nystagmus).

Pathological:

Pathological nystagmus may be classified according to direction, waveform, anatomy/aetiology, or clinical frequency (common, rare).

- *Directional classification of nystagmus*:

Horizontal (common).
Vertical (rare):

Downbeat: seen with structural lesions of the cervico-medullary junction, midline cerebellum and floor of the fourth ventricle, but also with more diffuse cerebellar disease.
Upbeat: of less localising value than downbeat nystagmus, upbeat nystagmus may occur with pontomesencephalic, pontomedullary, and even caudal medullary lesions (infarct, inflammation); bow-tie nystagmus is probably a variant of upbeat nystagmus.

Torsional: usually accompanies horizontal nystagmus of peripheral vestibular (labyrinthine) origin.

- *Waveform classification of nystagmus*:

Jerk nystagmus:

At least one of the directions of eye movement is slow (slow phase; <40°/s) followed by a rapid, corrective, saccadic movement in the opposite direction (fast phase) for which direction the nystagmus is named. However, since it is the slow phase which is pathological, it is more eloquent concerning anatomical substrate. The intensity of jerk nystagmus may be classified by a scale of three degrees:

1st degree: present when looking in the direction of the fast phase;
2nd degree: present in the neutral position;
3rd degree: present when looking in the direction of the slow phase (*i.e.* present in all directions of gaze).

Pendular or undulatory nystagmus:

In which the movements of the eyes are more or less equal in amplitude and velocity (sinusoidal oscillations) about a central (null) point. This is often congenital, may be conjugate or disconjugate (sometimes monocular), but is not related to concurrent internuclear ophthalmoplegia or asymmetry of visual acuity. Acquired causes include multiple sclerosis and brainstem infarctions.

When studied using oculography, the slow phase of jerk nystagmus may show a uniform velocity ("saw-toothed"), indicative of imbalance in vestibulo-ocular reflex activity. A slow phase with exponentially decreasing velocity (negative exponential slow phase) is ascribed to "leakiness" of a hypothetical neural integrator, a structure which converts eye or head velocity signals into approximations of eye or head position signals (thought to lie in the interstitial nucleus of Cajal in the midbrain for vertical eye movements, and in the nucleus propositus hypoglossi for horizontal eye movements). A slow phase with exponentially increasing velocity (high-gain instability, runaway movements) may be seen in congenital or acquired pendular nystagmus. The pathophysiology of acquired pendular nystagmus is thought to be deafferentation of the inferior olive by lesions of the red nucleus, central tegmental tract, or medial vestibular nucleus.

- *Anatomical/aetiological classification of nystagmus*:

  Peripheral Vestibular:

  unidirectional (directed to side opposite lesion), and more pronounced when looking in direction of the fast phase (*i.e.* 1st degree), usually with a rotatory component and associated with vertigo. Tends to fatigue, and usually transient (*e.g.* in Hallpike manoeuvre). Nystagmus of peripheral vestibular origin is typically reduced by fixation (hence these patients hold their heads still) and enhanced by removal of visual fixation (in the dark, with Frenzel's lenses).

  Central Vestibular:

  unidirectional or multidirectional, 1st, 2nd or 3rd degree; typically sustained and persistent. There may be other signs of central pathology (*e.g.* cerebellar signs, upper motor neurone signs). Not affected by removal of visual fixation.

  Cerebellar/brainstem:

  commonly gaze-evoked due to a failure of gaze-holding mechanisms. It may be unidirectional with a unilateral cerebellar lesion (*e.g.* vascular disease) in which case it typically occurs when the eyes are looking in the direction of the lesion (*cf*. peripheral vestibular nystagmus); multidirectional nystagmus of cerebellar origin may occur in multiple sclerosis, drug/toxin exposure, cerebellar degenerations.

  Congenital:

  usually horizontal, pendular type nystagmus; worse with fixation, attention, anxiety. It may appear with blindness of childhood onset, or be acquired with neurological disease (multiple sclerosis, mitochondrial disease, Whipple's disease, Pelizaeus-Merzbacher disease).

Other forms of nystagmus include:

- *Ataxic/Dissociated*:

  in abducting > > adducting eye, as in internuclear ophthalmoplegia and pseudo-internuclear ophthalmoplegia.

- *Periodic Alternating*:

  primary position nystagmus, almost always in the horizontal plane, which stops and then reverses direction every minute or so; 4–5 min of observation may be required to see the whole cycle; its localising value is similar to that of downbeat nystagmus.

- *Convergence-retraction* (Körber-Salus-Elschnig syndrome):

  adducting saccades (medial rectus contraction), occurring spontaneously or on attempted upgaze, often accompanied by retraction of the eyes into the orbits, associated with mesencephalic lesions of the pretectal region (*e.g.* pinealoma).

- *See-saw*:

  a disconjugate cyclic movement of the eyes, comprising elevation and intorsion of one eye while the other eye falls and extorts, followed by reversal of these movements; may be congenital (*e.g.* with albinism, retinitis pigmentosa) or acquired (mesodiencephalic or lateral medullary lesions, *e.g.* brainstem stroke, head trauma, syringobulbia).

Many types of pathology may cause nystagmus, the most common being demyelination, vascular disease, tumour, neurodegenerative disorders of cerebellum and/or brainstem, metabolic causes (*e.g.* Wernicke-Korsakoff's syndrome), paraneoplasia, drugs (alcohol, phenytoin, barbiturates, sedative-hypnotic drugs), toxins, and epilepsy.

Treatment of nystagmus is usually that of the underlying cause, where possible. Pendular nystagmus may respond to anticholinesterases, consistent with its being a result of cholinergic dysfunction. Periodic alternating nystagmus responds to baclofen, hence the importance of making this diagnosis. See-saw nystagmus may respond to baclofen, clonazepam, or alcohol.

References

Leigh RJ, Zee DS. The neurology of eye movements. 4th ed. New York: Oxford University Press; 2006.

Straube A, Bronstein A, Straumann D; European Federation of Neurologic Societies. Nystagmus and oscillopsia. *Eur J Neurol*. 2012; **19**: 6–14.

Cross References

Caloric testing; Congenital nystagmus; Hallpike manoeuvre, Hallpike test; Internuclear ophthalmoplegia (INO); Myorhythmia; Optokinetic nystagmus (OKN), Optokinetic response; Opsoclonus; Oscillopsia; Palatal myoclonus; Pendular nystagmus; Pseudo-internuclear ophthalmoplegia; Spasmus nutans; Square-wave jerks; Vertigo