the small optic disc gives rise to the "double ring sign". Failure of differentiation of the retinal ganglion cell layer between the 12 and 17 mm stages of embryonal development has been suggested as a cause of optic nerve hypoplasia (ONH). Other theories include axonal degeneration within the optic nerve or stretching of the optic nerve during the development of abnormal cerebral hemispheres. Factors predisposing to ONH include maternal diabetes mellitus, postmaturity, young maternal age, alcohol abuse during pregnancy, and maternal use of anticonvulsants, quinine, LSD, and phencyclidine. Three clinical varieties are described: 1) Isolated abnormality in an otherwise normal eye; 2) In malformed eyes; 3) With other disorders involving the midline structures of the brain. Nystagmus, poor vision, and visual field defects occur. The differentiation from optic atrophy is important and may require examination with sedation and fundus photography. The electroretinogram is normal but the amplitude of the visual evoked response is reduced. ONH occurs with 25% of cases of agenesis of the septum pellucidum and 27% of patients with ONH have partial or complete absence of the septum pellucidum. The neurological features of this condition, known as septo-optic dysplasia, include mental retardation, spasticity, abnormalities of taste and impaired smell. The ability to learn tasks requiring spatial orientation may be impaired. A number of neurological conditions may be associated with ONH and these include porencephaly, cerebral atrophy, anencephaly, hydrocephaly, congenital suprasellar tumors, and Aicardi syndrome. The frequent association of endocrine problems with ONH should alert the physician to test for pituitary dysfunction early in infancy so that optimal replacement therapy can be given. Children with septo-optic dysplasia and a deficiency of growth hormone frequently have normal growth until their third or fourth year of life. Pituitary dysfunction with ONH may be manifested as diabetes insipidus, prolonged neonatal hyperbilirubinemia, hypotonia, infantile hypoglycemia, hypothyroidism, and growth retardation. All children with ONH should have a careful neuroendocrinology exam including a CT scan. (Zeki SM, Dutton GN. Optic nerve hypoplasia in children. Br J Ophthalmol May 1990, 74:300-304).

COMMENT. The early recognition of optic nerve hypoplasia and its differentiation from optic atrophy are important because of the frequent association with neurological and systemic abnormalities and particularly neuroendocrine disorders which may require early treatment.

NEUROMUSCULAR DISORDERS

JUVENILE AMYOTROPHIC LATERAL SCLEROSIS

Forty-three patients with hereditary motor system diseases belonging to 17 families were studied at the Institut National de Neurologie, La Rabta, Tunis, Tunisia. The mean age of onset was 12 years and the range was three to 25 years. Progression was very slow. Inheritance was autosomal recessive. Patients were subdivided into three groups: 1) Upper limb amyotrophy and pyramidal syndrome (17 patients); 2) spastic paraplegia and peroneal muscular atrophy (14);

and 3) spastic pseudobulbar form (12). Nerve and muscle biopsies showed neurogenic atrophy in the peroneus brevis muscle and minor changes in the superficial peroneal nerve. Infantile and juvenile ALS is usually rare and the frequency in Tunisia may be explained by the high incidence of consanguinity. (Ben Hamida M et al. Hereditary motor system diseases (chronic juvenile amyotrophic lateral sclerosis). Conditions combining a bilateral pyramidal syndrome with limb and bulbar amyotrophy. Brain April 1990; 113:347-363).

COMMENT. Ford FR, in his Diseases of the Nervous System in Infancy, Childhood, and Adolescence, refers to his own experience with hereditary amyotrophic lateral sclerosis as small, but unlike the cases described in the present study, Ford's cases showed a more rapid progression. The hereditary factor in juvenile ALS distinguishes this type from classical ALS or Charcot's disease, which develops in late middle age and which is usually neither hereditary nor familial. Both Ford and the present authors refer to articles by Holmes in 1905 and an autopsy report by Mass in 1911 on a child who had nystagmus in addition to the characteristic features, including degeneration of the pyramidal tracts and the motor cells of the anterior horns. The earliest report of an infantile amyotrophic lateral sclerosis of the familial type was by Brown CH (J Nerv and Ment Dis 1894; 21:707).

ACUTE INFANTILE SPINAL MUSCULAR ATROPHY

Massive muscle cell elimination by apoptosis in an infant who died eight weeks after birth from acute infantile spinal muscular atrophy is described from the Department of Neurology, Medical Academy, Warsaw, Poland, and the Division of Neuropathology, University of Mainz, Mainz, FRG. The classical morphological changes of ISMA included degeneration and loss of motor neurons in the spinal cord, loss of large myelinated fibers in anterior roots, and neurogenic atrophy in muscle. Ultrastructural findings in the muscle showed membrane bound muscle cell fragments or apoptotic bodies. Numerous immature muscle fibers were also observed suggesting a failure in muscle maturation. The authors speculate that in growth retarded muscle the process of muscle apoptosis may also be prolonged or repeated. The resulting protracted muscle cell death may lead to a greater reduction in the number and size of muscle fibers. The removal of the peripheral target of anterior horn cells then results in secondary death of motor neurons. (Fidzianska A et al. Acute infantile spinal muscular atrophy. Muscle apoptosis as a proposed pathogenetic mechanism. Brain April 1990; 113:433-445).

COMMENT. Death of muscle cells by apoptosis has not been demonstrated in infants with SMA previously. The term "apoptosis" was proposed by Kerr et al (1972) for cell death which plays a role in the regulation of animal cell populations. This form of cell death differs from that caused by coagulative necrosis. Apoptosis is responsible for the focal elimination of cells during embryonic development and metamorphosis. The final number of motor neurons in the spinal cord following fetal