Canadian Association of Neuropathologists

Abstracts of papers presented at the 36th Annual Meeting

October 2nd - 5th, 1996
Halifax, Nova Scotia

The 36th annual meeting of the Canadian Association of Neuropathologists was held from October 2nd - 5th, at the Sheraton Halifax Hotel in Halifax, Nova Scotia. Local arrangements were made by Dr Virgilio Sangalang and Dr. Lothar Resch.

The scientific session consisted of 21 platform presentations and 13 cases for diagnosis. The Royal College of Physicians and Surgeons of Canada speaker was Dr John Q. Trojanowski, Professor of Pathology and Laboratory Medicine, University of Pennsylvania School of Medicine, Philadelphia, PA. His talk was entitled "Alterations in Tau and Neurofilament Proteins: Implications for Neurodegenerative Mechanisms". The Jerzy Olszewski lecturer was Dr Ivar Mendez, Director, Neural Transplantation Laboratory, Dalhousie University, and Staff Neurosurgeon, Queen Elizabeth II Health Sciences Centre, Halifax. His talk was entitled "Neural Transplantation for Parkinson's Disease: From Basic Research to Clinical Applications."

The winners of the Mary Thom Award were Dr. M. Kim (Neurosurgery Resident: University of Toronto) and Dr. D. Kydd (Neuropathology Resident: Queen's University). Dr. N. Duggal (Neurosurgery Resident: University of Ottawa, currently at University of Western Ontario) won the Morrison H. Findlayson Award.

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press

Abstracts of Papers Presented at the 36th Annual Meeting of the Canadian Association of Neuropathologists

PLATFORM PRESENTATIONS

1.

Neuropathology of NFLgp160Xba and NFHgp160 Transgenic Mice Expressing the HIV-1 env Proteins in Neurons.

J. MICHAUD, G. CHARRON, A. SAUVAGEAU, R. DOUTRE, D. RAMLA, Y. ROBITAILLE and A. KESSOUS (Université de Montréal and Hôpital Ste-Justine, Montréal)

The HIV-1 associated motor/cognitive complex underlines a direct or indirect neuronal involvement whose physiopathology remains obscure. We developed transgenic mice carrying a segment of the HIV-1 genome expressing the viral gp160 protein under the control of the human neurofilament light (NFLgp160Xba) and heavy (NFHgp160) gene promoters. The Env protein expression appears between day 6-8 after birth, is complete at day 12 and is found mainly in motor neurons of the brainstem and spinal cord. At 3-4 months, subtle dendritic and axonal changes associated with a reactive gliosis are found. At 12 months, neuronal degeneration and loss, reactive gliosis, dendritic and axonal swellings, and focal chronic inflammation were found and analysed by immunohistochemistry and ultrastructure, particularly in the NFHgp160 line 1932. To date, these transgenic mice remain the only one with neuronal expression of a segment of the HIV-1 genome. The morphological findings offer several avenues for subcellular and molecular exploration of the effects of HIV-1 Env proteins in neurons. (Supported by MRC Grant MA-11282.)

2.

Surveillance for Creutzfeldt-Jakob Disease in Canada.

M. N. RICKETTS[1], N. CASHMAN[2], C. BERGERON[3] and E. STRATTON ([1]Laboratory Centre for Disease Control - Health Canada,[2]Montreal Neurological Institute, [3]Toronto General Hospital)

Background: Recent findings of a new variant of CJD (nv-CJD) in populations of people exposed to Bovine Spongiform Encephalopathy (BSE) have raised concerns about the transmissibility of CJD. Evidence from animal studies, although contradictory, demonstrates potential for transmission in blood. Health Canada policy requires quarantine of blood donated by persons with CJD. Responding to the need for information, Health Canada (LCDC) has designed an active surveillance system and case-control study.

Methods: Surveillance involves the voluntary collaboration of all Canadian neurologists, neuropathologists and geriatricians. Case control design is needed to quantify the risk of CJD following a blood transfusion. Neuropathology and gene sequencing will be conducted. Immunohistochemistry services will be provided for diagnosis of nv-CJD. Canada is an arm of the international study, centred in Edinburgh Scotland.

Results: No results are available. The presentation will describe the surveillance system and role of clinicians in Canada in this study. Evidence regarding the hypothesis that CJD is blood-borne will be provided. Diagnostic confirmation of nv-CJD will be described.

3.

Adult Onset Metachromatic Leukodystrophy (MLD) with Normal Arylsulphatase Activity.

K.T. KOPROWICZ, V.J.A. MONTPETIT, R. SWENSON, R.F. NELSON and E. PRINGLE (University of Ottawa, Ottawa, Ontario)

One of the childhood neurodegenerative disorders presenting as dementia in adults is MLD. The clinical diagnosis in our case was confirmed by a sural nerve biopsy. A 29 year old woman presented to the Ottawa General Hospital with progressive personality changes since 1989, urinary and fecal incontinence, and loss of insight and judgment into most of her life's aspects. There was no family history of similar illness. On neurological examination she was oriented only to person and there was a decrease in vibration sense in all four limbs. Neuropsychological assessment demonstrated severe cognitive impairment. CT and MRI of the head showed changes of the entire cortical white matter in keeping with a leukoencephalopathy. Delayed sensory-motor conduction was noted on the nerve conduction study. The sural nerve revealed marked paucity of myelinated fibers with metachromatic inclusions within Schwann cell cytoplasm. The teased fiber preparation showed severe segmental demyelination and remyelination. At the ultrastructural level the storage granules were membrane bound and had variable appearance. Some consisted of stacks of lamellar discs while others looked like "tuffstones". There were also myelin figures and concentric lamellar osmiophilic inclusions. The diagnosis of metachromatic leukodystrophy was made. WBC enzymatic studies disclosed normal beta-galactosidase, arylsulfatase A and galactocerebrosidase levels. This case demonstrates that it is important to consider late onset inborn cerebral storage disease in demented adults.

4.

Pathology of Multiple Sulfatase Deficiency Reflects Pattern of Enzyme Deficiencies.

R.J.B. MACAULAY, N. LOWRY and R. CASEY (Department of Pathology, University of Saskatchewan, Saskatoon, SK)

Multiple sulfatase deficiency (MSD) is a rare metabolic disorder of childhood. It is a presumed autosomal recessive inherited condition, although this has not been proven. Symptoms include dysmorphic features similar to mucopolysaccharidosis, developmental delay, loss of milestones, seizures, progressive deterioration and death. Biochemical testing reveals accumula-

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press

tion of gangliosides, glycosaminoglycans (GAGs) and sulfatides in the brains and other tissues of affected patients. The variety of stored materials results from the multiple enzymes found to be deficient; all are sulfatases, hence the name of the disorder. The pathogenesis of the disease has not been elucidated. Only 2 accounts of autopsy findings are available in the English literature. White matter histological and biochemical pathology similar to metachromatic leukodystrophy (MLD) have been reported. Ganglioside accumulation may be pronounced, but is likely secondary to interference of degradative enzyme activity by the accumulating GAGs. The pathology of MSD therefore represents an overlap of the leukodystrophies and mucopolysaccharisoses. We report a case of MSD with only mild deficiencies of ASA and ASB, but severe deficiencies of dextran and heparin sulfatases. Pathologic changes were more in keeping with a mucopolysaccharidosis, with minimal white matter changes and deposition of metachromatic material. We postulate that the mild leukodystrophic changes but profound mucopolysaccharidosis features are reflections of the pattern of enzyme deficiency.

5.

Mitochondrial Neurogastrointestinal Encephalomyopathy (MNGIE): Pathology in One Family.

D.H. GEORGE[1], S. KRAFT[1] and E.S. JOHNSON[2] (Departments of Pathology and Neurology, U of S[1], Saskatoon, U of Alberta[2], Edmonton)

MNGIE is a recently described form of mitochondrial disorder characterized by ophthalmoparesis, peripheral neuropathy, leukoencephalopathy, intestinal dysmotility, and myopathy. This disorder is usually inherited as an autosome recessive trait, and is associated in about half of cases with multiple deletions of mitochondrial DNA. We report a family with no parental consanguinity in which 4 of 10 siblings (2 male, 2 female) were affected by this disorder. Two brothers came to autopsy at the ages of 28 and 40. Clinical and radiological features included: severe cachexia, malabsorption, dysphagia, gastrointestinal dysmotility, increased T2 signal of cerebral white matter ("demyelination"), wasting and weakness of skeletal muscle, and peripheral neuropathy. The pathology was characterized by diffuse spongiosis and myelin pallor of cerebral white matter, atrophy and gliosis of the hippocampal endfolium and dentate fascia, a combined demyelinating and axonal peripheral neuropathy, ragged red skeletal muscle fibres, and atrophy of intestinal smooth muscle with mitochondrial abnormalities. Genetic analysis of tissue from one brother (courtesy S. DiMauro) failed to reveal mitochondrial DNA deletions.

6.

Human Hair: A Genetic Marker.

V. JAY and A. MERCER-CONNOLLY (The Hospital for Sick Children, Toronto, Ontario, Canada)

Hereditary disorders of amino-acid metabolism, some CNS disorders, disorders of skeletal growth and ectodermal differentiation and chromosomal abnormalities are associated with abnormal hair development. Scanning electron microscopic examination of hair provides useful diagnostic information in these conditions. Examples of some hair abnormalities are presented including monilethrix, pili torti, trichorrhexis nodosa, trichorrhexis invaginata, longitudinal grooving and loss of scales. Hair changes are prominent in Menkes kinky hair disease and include pili torti (twists about the longitudinal axis of the hair), trichorrhexis nodosa (fractures at points along the hair shaft with fraying of hair filaments) and monilethrix (variations in diameter of hair). The characteristic abnormality in Netherton's syndrome is trichorrhexis invaginata (bamboo hair). Hair abnormalities may be found in other conditions such as Down syndrome, deLange syndrome, Trisomy E, Marinesco Sjögren syndrome and Apert's syndrome.

7.

Amniotic Rupture Sequence: Some Neuropathological Considerations.

E.S. JOHNSON, K.E. ARONYK and S. BAMFORTH (University of Alberta, Edmonton, Alberta)

The neuropathological findings in a boy who died at 34 months with the amniotic rupture sequence (ARS) are discussed in regard to the accepted pathogenesis of mechanical and vascular fetal developmental disruption. Characteristic stigmata were noted at birth: abnormal skull with cephalic meningocele tract, hydrocephalus, a right cleft lip and palate, a bifid left foot, a left elbow constriction band, and pseudosyndactyly of the left hand. At autopsy the scaphocephalic skull was asymmetrically bossed with a shallow posterior fossa associated with displacement of the hypoplastic falx cerebri and tentorium cerebelli. The 850 g brain showed marked hydrocephalus with formation of a unilateral right occipital colpocephalic cyst due to posterior fusion of the thalami and stenosis of the aqueduct of Sylvius. Other findings included glioependymal seams radiating from the temporal ventricular horns, meningeal neuroglial heteropias, and changes referable to ischemia and brainstem displacement. The dysgenesis of the aqueduct of Sylvius in this case and similar reported cases, in conjunction with other craniocerebral malformations suggest the added possibility of an intrinsic organizational defect as part of the ARS complex.

8.

Diencephalic Hamartoma Associated with Hydrocephalus and Craniofacial Defects.

J.P. ROSSITER[1], M. KHALIFA[2] and S. NAG[3] (Depts. Pathology[1-3] & Medical Genetics[2], Kingston General Hospital[1,2] & The Toronto Hospital[3])

This is the case of a boy who was born with severe hydrocephalus, bilateral cleft lip/palate, anophthalmia (L), microphthalmia (R), low-set ears and an equino-varus foot deformity.

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press

Imaging studies showed enlarged lateral ventricles, apparent absence of the corpus callosum and a midline density in the third ventricular region. He had a normal male karyotype. He was severely mentally retarded and died suddenly at 7 years of age. An autopsy was performed at another institution and the brain was referred to us for assessment. The cerebral hemispheres were enlarged and polygyric, with secondary thinning of the corpus callosum and occipital cortex (R). A large hamartoma filled the interpeduncular fossa and third ventricle and was continuous posteriorly with the left thalamus. The right optic nerve merged with the mass, while the left optic nerve was absent. Microscopically the mass consisted of grey matter containing mature neurons, interspersed with narrow bands of white matter. No immature or non-neural elements were present. To our knowledge, the complex of midline malformations found in this case has not previously been described.

9.

Neuropathologic and Ocular Abnormalities in Tuberous Sclerosis.

V. JAY (Hospital for Sick Children, Toronto, Ontario, Canada)

With a common embryologic derivation from the neuroectoderm, there are striking similarities in the retinal and brain lesions of tuberous sclerosis (TS). The CNS pathology in TS includes cortical tubers, white matter lesions with gliosis and a paucity of myelin, balloon cells, subependymal candle gutterings and the subependymal giant cell tumor (SEGT). Besides adenoma sebaceum of the lids, the notable retinal pathology in TS is the retinal astrocytic hamartoma, which is usually asymptomatic. Rare cases have presented as vitreous hemorrhage. Lesions are often bilateral. Unlike the SEGT which can grow and produce obstructive hydrocephalus, most retinal lesions remain stable, but may calcify over time. Retinal hamartomas show variable positivity for NSE, GFAP, S-100 and vimentin, but may also show pleomorphic giant cells, sometimes leading to a mistaken diagnosis of malignancy. Both brain and retinal lesions may be present even in late gestation and early infancy, and the latter may account for up to 3% of cases of leukocoria.

10.

Localization of TSC-2 mRNA and its Protein, Tuberin, in the Brains of Patients With and Without Tuberous Sclerosis.

C. KERFOOT[1], J. EMELIN[1], M. MENCHINE[1], C. WELSH[1], H.V. VINTERS[1], R. WJENECKE[2] and J. DECLUE[2] (UCLA Medical Center, Los Angeles, CA[1], National Cancer Institute, Bethesda, MD[2])

Tuberous sclerosis complex (TSC), an autosomal dominant disorder, is characterized by malformations, hamartomas and tumors in various organs including the brain. TSC is genetically linked to two loci: TSC1 on chromosome 9q34 and TSC2 on 16pl3.3. We have analyzed the distribution of TSC2 mRNA and its protein, tuberin, in the brains of TSC patients and non-affected individuals. There were high levels of transcript and protein expression in the choroid plexus epithelium, ependymal cells, most motor neurons, Purkinje cells and the external granule cell layer of the cerebellum. Neocortical and hippocampal neurons expressed high levels of TSC2 transcript, but only modest levels of tuberin, a finding also noted in the internal granule cell layer of cerebellum. In TSC patients, dysmorphic cytomegalic neurons expressed high levels of tuberin and transcript, particularly when in an 'ectopic' location within the cortex or deep white matter. Individual cells within subependymal giant cell astrocytomas and hamartomas from TSC patients expressed moderate to high levels of TSC2 transcript and tuberin. CNS expression of tuberin is unique in that primarily non-dividing cells express it, whereas extra-CNS expression of the protein is mainly in actively proliferating cells.

11.

Expression of NF2/Merlin in the Human CNS.

A.O. STEMMER-RACHAMIMOV, V. RAMESH and D.N. LOUIS (Massachusetts General Hospital, Boston, MA)

Merlin, the protein encoded by the NF2 (neurofibromatosis 2) gene, is a member of the protein 4.1 superfamily that links the cell membrane and underlying cytoskeleton. Because patients with NF2 develop glial lesions (gliomas and hamartomas), we examined the cellular and subcellular distribution of merlin in the human central nervous system using immunohistochemistry with anti-merlin antibodies. In the normal brain, merlin is expressed in astrocytes throughout the brain and spinal cord. Strong merlin expression in neurons, however, is restricted to some regions, such as the thalamus. Expression was weak in ependymal cells and not detectable in arachnoid and cranial nerve. In all positive normal cells, merlin is present as coarse cytoplasmic granules. In reactive astrocytes, however, merlin is present in cell processes, including the processes of astrocytes in the subependymal and subpial regions of the normal brain. Merlin is also expressed in cortical glial hamartomas in patients with NF2. These findings support the thesis that merlin may be involved in endocytic processes that regulate signal transduction. On the other hand, the location of merlin near the cell surface in reactive astrocytes and cultured cells suggests that merlin may also be involved in cell-cell interactions and cell motility.

12.

Merosin Immunoreactivity in Tumours of the Central Nervous System.

P.V. GOULD (Hôpital de l'Enfant-Jésus, Québec, PQ, Canada)

Merosin (alpha 2 laminin) is the heavy chain subunit of laminin-2, which belongs to the laminin family of heterotrimeric

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press

glycoproteins found in the basement membrane. Merosin has been studied in the basal lamina of striated muscle (where its absence is an important cause of congenital muscular dystrophy and associated brain abnormalities), Schwann cells and trophoblast. Since little is known about the distibution of merosin in the central nervous system (CNS), cryostat sections of 25 surgical neuropathology cases were stained with a monoclonal antibody to merosin (Chemicon). Merosin immunoreactivity was found in the endothelium of brain and peripheral nerve blood vessels as well as the pia limitans. Merosin expression in tumours was as follows: not expressed - neoplastic astrocytes, oligodendroglia and ependyma; weakly expressed - meningiomas; strongly expressed - acoustic Schwannomas. The observed distribution of merosin in the CNS is similar that of laminin (McComb & Bigner, 1985, J Neuropathol Exp Neurol 44:242-253). Merosin may thus be useful in surgical neuropathology as a marker of Schwannian differentiation and tumour spread.

13.

Illusions of Gross Total Resections: Growth and Diffusion Interactions in Gliomas.

P.K. BURGESS, P.M. KULESA, J.D. MURRAY and E.C. ALVORD (Applied Mathematics and Pathology, Univ. Wash., Seattle)

At least two illusions of "gross total resections" of gliomas have been explored using a 3-dimensional mathematical model to define the contributions of the tumor's growth rate and diffusion, the time of diagnosis and the extent of surgical resection to the prognosis of a patient with a glioma. The model considers the average diagnosis possible when the radius of tumor cells above a threshold concentration reaches 1.5 cm and death when the radius reaches 3 cm. Diffusion, practically ignored up to the present, is more important than growth rate and accounts for the recurrence of gliomas generally no matter how extensive the resection. Even with very early diagnosis, when the radius is only 0.5 cm, only those with a low diffusion and a rapid growth rate benefit from a very wide resection of at least 2.1 cm radius. Surgical resections generally fail because the action is on the far side, just as a forest fire spreading centrifugally from a burned out center cannot be controlled by dropping fire-fighters into the center. Furthermore, diffusion away from the margins of the resection results in decreased concentration of tumor cells, falling below the threshhold for detection by CT/MRI and contributing to the radiological illusion of a gross total resection.

14.

Protoplasmic Astrocytoma, a Rare, Resectable Glioma.

L.M. WELLS and B.H. LIWNICZ (Department of Pathology, Loma Linda University Loma Linda, California)

A 10 1/2 year old Caucasian female presented with severe complex partial seizures. MRI revealed a left medial temporal lobe cystic lesion.

The 6.5 x 4.7 x 1.8 cm portion of brain tissue microscopically showed uniform cells with bland, round to oval nuclei and scant cytoplasm against a homogeneous mucinous background of degenerative microcystic change. No mitoses were found. The edges of the tumor were completely within the resection. All of these characteristics were consistent with protoplasmic astrocytoma.

Diffuse astrocytomas are a common type of astrocytoma that are known to usually have a poor prognosis because they cannot be totally resected. The tumor grows along neuronal tracts without destroying the brain tissue and thus not giving symptoms. Once detected they are widespread. The protoplasmic astrocytoma is different because it grows superficially in the cortex with minimal invasion, thus it is resectable. In addition, the growth within the gray matter causes seizures leading to early detection. These tumors have a good prognosis due to their slow growth and total resectability.

WHO classifies the protoplasmic astrocytoma as a form of diffuse astrocytoma, however the behavior of this tumor justifies reclassifying it as a special variant of astrocytomas which have a better prognosis than the diffuse astrocytomas.

15.

Axonal βapp Expression in the Central Nervous System of Shaken Baby Syndrome.

P. SHANNON, J. DECK, C.R. SMITH, L.C. ANG and L. BECKER (Departments of Neuropathology and Anatomic Pathology, University of Toronto)

Diffuse axonal injury is often implicated in the pathogenesis of shaken baby syndrome (SBS) but has only been verified in infants with either skull fractures or white matter tears. Recent studies have shown that β-amyloid precursor protein (βAPP) is rapidly expressed by injured axons. In this study we demonstrate evidence for axonal injury in a series of 16 cases of SBS. Sections of corpus callosum and cervical spinal cord were examined using routine histological sections and with monoclonal antibodies to βAPP. Age matched normal controls (n=9) and brains from children dying with non-traumatic hypoxic ischemic encephalopathy (HIE, n=7) were similarly examined. βAPP positive axons were found in the corpus callosum of all 10 cases of SBS examined. Swollen axons were present in 8/10. Swollen, βAPP positive axons were present in 6/7 cases of HIE. One normal control contained occasional positive axons. In sections of cervical spinal cord, βAPP reactivity was absent in normal controls and was present in 2/6 HIE, where it was confined to neuronal cell processes of the central gray matter. However, among cases of SBS, 8/12 contained βAPP axons in the white matter and spinal nerve roots. In another 2/12 cases, reactivity was confined to the central gray matter. Although both SBS and HIE result in swollen βAPP positive axons, expression in the cervical spinal cord is more common in SBS.

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press

16.

Selective Vulnerability of Lumbo-sacral Neurons in Severe Anoxic-ischemic Encephalopathy Following Cardiac Arrest and/or Hypotension.

N. DUGGAL and B. LACH (Ottawa Civic Hospital and University of Ottawa, Ottawa)

Aim The assessment of spinal cord injury accompanying anoxic-ischemic encephalopathy.

Background It is generally recognized that the most sensitive to anoxia-ischemia in the spinal cord are neurons in the watershed area at the mid thoracic level.

Material and Method Files of all patients with neuropathologically confirmed anoxic-ischemic encephalopathy or/and myelopathy (AIE) diagnosed between 1985 and 1995 were reviewed. Subsequently, fetal cases and aortic aneurysm dissection/repair, and incompletely documented cases were excluded.

Results In 206 cases satisfying selection criteria, anoxic-ischemic myelopathy developed after cardiac arrest (35%), severe hypotension (31%) and other/multiple causes (34%). Predominant involvement of lumbo-sacral neurons and relative sparing of thoracic levels were found in 30% of cardiac arrest and 40% of hypotension patients. In some of these cases, neuronal necrosis appeared to be a delayed event.

Conclusion Our findings suggest greater vulnerability of neurons to anoxia-ischemia at the lumbo-sacral level than other levels of the spinal cord.

17.

Trigeminofacial Malignant Epithelioid Schwannoma.

J. WOULFE,[1,2] D. DERUBEIS,[2] M. STRONG,[1,2] D. ROSSO,[3,4] D. LEE,[3] L. PARNES,[4] S. LOWNIE[2] and R. HAMMOND[1,2] ([1]Departments of Pathology, [2]Clinical Neurological Sciences, [3]Diagnostic Radiology and [4]Otolaryngology, University of Western Ontario, London, Ontario)

A 42 yr old male presented with progressive left lower motor neuron facial weakness and subsequent sensory loss in the third division of the trigeminal nerve. MRI identified lesions affecting the distal facial nerve, Gasserian ganglion and V3. The facial nerve was biopsied and showed replacement by a malignant epithelioid schwannoma (MES). Subsequent resections have resulted in the gross total removal of intracranial tumour. The patient was otherwise healthy and had no stigmata or family history of neurofibromatosis. The tumour cells expressed S-100 protein and vimentin. Basement membrane material was prominent on ultrastructural examination. Luse bodies and mesaxons were also seen. This is one of very few examples of intracranial malignant peripheral nerve sheath tumours (MPNST) and the first example of MES at this site. It is noteworthy that there is not a strong association between neurofibromatosis type I (NF1) and MES. Likewise, cranial nerve MPNSTs do not show a strong association with NF1. Resection has been the mainstay of therapy but its location and centripetal growth have led to a high mortality in cases with intracranial disease. Prognosis is directly proportional to the completeness of resection and hematogenous metastasis is a common late complication. The role of radiation therapy is uncertain.

18.

The London Brain Tumour Tissue Bank (BTTB).

D.A. RAMSAY, J.G. CAIRNCROSS, R.F. DEL MAESTRO, J.J. GILBERT, D.R. MACDONALD and E. MOORE. London Health Sciences Centre and London Regional Cancer Clinic.

The BTTB prepares batches of frozen human brain tumours and matching normal tissue and clinical data for neuro-oncology research in Canada and internationally. Standardised tissue and blood collection methods allow excellent preservation of mRNA and enzymes. An average of 3 strips of freshly resected tissue/case (3 x 1 x 0.5 cm) are prepared. One third of each strip is cut into small fragments (2 mm x 4 mm), laid along the inside of a cryotube and frozen in liquid nitrogen. A second third is embedded in OCT and frozen. The central third is processed for light microscopy to determine the quality of banked tissue. Stored tissue is linked to basic demographic, clinical follow-up and treatment information. Two hundred and fifty-three cases (including 48 paediatric cases) have been banked since the Bank's inception (101 gliomas, 52 meningiomas, 50 metastases, 50 miscellaneous tumours). Research utilisation varies by tumour type from 0% (schwannomas) to 65% (glioblastomas). Tissue has been provided to 11 Canadian and American centres for 15 projects, which have used RNA, DNA and/or enzyme analysis, in situ hybridisation, and/or immunohistochemistry. [Funded by the National Cancer Institute of Canada and the Brain Tumour Foundation of Canada.]

19.

Diffuse Lewy Body Disease Associated with Pallido-Luyisial Degeneration.

D.A. GRIMES and B. LACH (Ottawa Civic Hospital)

We present a 76 year old male who died after a nine year history of parkinsonism and a three year history of gradually progressing, severe dementia.

At the autopsy the brain weighed 1310 g. Substantia nigra and locus coeruleus showed discolouration, severe loss of neurons, gliosis and frequent presence of typical and atypical Lewy-bodies. The limbic system and other cortical areas displayed ubiquitin-positive atypical Lewy body-like inclusions. Classical Lewy bodies were not seen in the cortex.

Pallidum and subthalamic nucleus showed severe neuronal drop-out, focal sponginess and gliosis. Caudate nucleus and putamen were perfectly preserved. In addition, the patient had moderate to severe classical senile changes of the Alzheimer's type.

This is the first case demonstrating a combination of diffuse Lewy body disease with pallido-Luyisial degeneration. Whether this is a new syndrome in spectrum of parkinson-plus pathology or fortuitous association of two independent clinico-pathological entities remains to be seen.

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press

20.

Pathology of Auerbach's Plexus in Achalasia.

L. RAYMOND, B. LACH and F.M. SHAMJI (Ottawa Civic Hospital & University of Ottawa, Ottawa. Ontario)

Aim Assessment of Auerbach's plexuses in idiopathic achalasia.

Background Idiopathic achalasia (IA) is a disease of the esophagus characterized by increased lower esophageal sphincter (LES) tone, absence of LES relaxation with swallowing and a peristalsis of the body of the esophagus. The etiology of pathogenesis of achalasia is still controversial.

Method We examined 15 esophagus biopsies from patients with idiopathic achalasia and 3 cases of diffuse esophageal spasm. The control was composed of autopsy cases with no history of esophageal disorder (5), gastroesophageal reflux disease (1), and esophageal carcinoma (1). Sections were immunostained for the follow markers; NF70, NF200, S100 protein, LCA, CD20, CD43 and CD45RO, and some for CD68. Light microscopic examination of plastic embedded material was carried out on all biopsies and electron microscopy (EM) was performed on 13 specimens containing autonomic plexus.

Results Inflammatory infiltrate of varying intensity was present around autonomic ganglia and along the nerve fascicles in 72% of cases. In a majority of biopsies the infiltrate was composed of T lymphocytes (64%). The ganglion cells and nerve fibers showed degenerative changes which were often discernable only by EM. The controls showed normal plexuses and no evidence of inflammation.

Conclusion Our results demonstrate degeneration of nerve fibers in autonomic plexuses accompanied by T-cell lymphocyte infiltrate. These findings support the concept of an autoimmune etiology for IA.

21.

Hereditary Myopathy with Vesicular, Hexagonally Cross-linked Crystalloid-like Inclusions.

B.LACH, P.BOURQUE, P. RIPPSTEIN and F. LEE (Ottawa Civic Hospital, University of Ottawa & Dept. of Heath and Welfare)

We report father and son with relatively indolent, slowly progressive proximal myopathy. Both patients complained of a mild weakness accompanied by exertional burning pain affecting predominantly hip girdle muscles since the teenage years. Both had tall and thin habitus and show truncal and proximal muscle group atrophy. Nerve conduction study showed no abnormalities. An EMG was "myopathic". There were no CNS abnormalities. Muscle biopsies revealed small, eosinophilic, purple in Gomori method cytoplasmic inclusions in approximately 1% of muscle fibers. They appear to be limited to type II fibers only. Immunohistochemically they were negative for markers of intermediate filaments and microtubules.

Electron microscopy showed crystalloid-like inclusions composed of a multitude of orderly organized round profiles (probably vesicles) measuring approximately 37.5nm in diameter and connected by six, radially arranged, double side arms 22.5 nm in length, arising from each vesicle at 600 angle. In longitudinal sections they appeared crystalloid and extended up to 10 sarcomeres. There was no discernable continuity of inclusions with any of the normal cellular organelles. Their chemical nature is not known. They were not found in long term tissue cultures of muscles.

In summary, clinical and pathological findings in this family suggest a new hereditary myopathy with unique inclusions in type II muscle fibers.

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press

Titles of Diagnostic Case Presentations

1. **Cerebral coenurosis.**
   V.E. SANGALANG (Halifax, NS).

2. **Falciparum malaria.**
   D. KYDD and S. LUDWIN (Kingston, ON).

3. **Ruptured Rathke's cleft cyst with (1) lymphocytic and granulomatous hypophysitis and (2) chronic bilateral inflammation of cavernous sinuses (consistent with Tolosa-Hunt syndrome).**
   R.J.B. MACAULAY (Saskatoon, SK).

4. **Candida albicans meningitis with endarteritis of basilar artery and brain stem infarction.**
   D.A. GRIMES, B. LACH and P.R. BOURQUE (Ottawa, ON).

5. **Myxopapillary ependymoma.**
   J.P. ROSSITER and D.W. KYDD (Kingston, ON).

6. **Clear cell meningioma.**
   T. E. HUANG (Royal Oak, MI).

7. **Pencil-shaped softening of the spinal cord.**
   A.H. KOEPPEN and K.D. BARRON (Albany, NY).

8. **Cardiac arrest encephalopathy.**
   D.H. GEORGE (Saskatoon, SK).

9. **Anaplastic neurocytic tumour.**
   M. KIM, S. NAG and I. MACKENZIE (Toronto, ON).

10. **Primary cerebral ganglioneuroblastoma.**
    K. BERRY and J.W.M. STEPHEN (Vancouver and Kamloops, BC).

11. **Malignant transformation in a plexiform neurofibroma.**
    W. HALLIDAY (Winnipeg, MAN).

12. **Autonomic Charcot-Marie-Tooth disease.**
    D. KYDD and S. LUDWIN (Kingston, ON).

13. **Chloroquine myopathy.**
    J.M. BILBAO, C. GEENEN and S.M. COHEN (Toronto, ON).

https://doi.org/10.1017/S031716710002117X Published online by Cambridge University Press