LEARNING OBJECTIVES

This presentation will enable the learner to:
Discuss the costs and benefits of using CSF flow cytometry to diagnose CNS lymphoma

1. Identify appropriate clinical indications for using CSF flow cytometry as a first-line test
2. Apply a testing algorithm to increase the diagnostic yield of CSF flow cytometry

Session 2: Tumour Neuropathology

Abstract 4

Diagnostic and pathogenic features of calcifying pseudoneoplasm of the neuraxis

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doi: 10.1017/cjn.2021.90

Calcifying pseudoneoplasm of the neuraxis (CAPNON) is a rare tumefactive lesion with unclear pathogenesis. It is diagnosed by pathological findings of the typical histological features that include granular amorphous cores with palisading spindle to epithelioid cells, variable fibrous stroma, foreign-body reaction with giant cells, and calcification/ossification occasionally with psammoma bodies. However, its histopathology may be variable and currently immunohistochemistry plays a limited role in its diagnosis and understanding the pathogenesis. In this study, we examined 6 cases of CAPNONs including 3 intracranial and 3 spinal epidural lesions (age range: 59–69 years; 3 males and 3 females). Immunohistochemistry revealed that all CAPNON cores contain abundant positive deposits of neurofilament protein (NFP), which was supported by electron microscopy finding of filaments (8–13 nm in diameter). In comparison, no NFP positivity was found in 5 psammomatous/metaplastic meningiomas or 7 intervertebral tissue lesions with calcification/ossification. In addition, CAPNON cellular areas showed variable numbers of CD8+ cytotoxic T-cells with less CD4+ T-cells and a decreased ratio of CD4/CD8+ cells, versus the intervertebral tissue lesions without CD8+ or CD4+ cells. Our findings suggest that NFP may be a principal constituent of CAPNONs, and thus involved in the pathogenesis of CAPNON. Given the decreased CD4/CD8 ratio, the pathogenic process of CAPNON is possibly immune- mediated.

LEARNING OBJECTIVES

The presentation will enable the learner to:

1. Discuss histopathological features of calcifying pseudoneoplasm of the neuraxis (CAPNON) with variation of non-core components.
2. Explore diagnostic and pathogenic roles of immunohistochemical markers including neurofilament protein and CD4/CD8 in CAPNON.

Abstract 5

Synthesis of glioma histopathology images using generative adversarial networks

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doi: 10.1017/cjn.2021.91

Deep learning, a subset of artificial intelligence, has shown great potential in several recent applications to pathology. These have mainly involved the use of classifiers to diagnose disease, while generative modelling techniques have been less frequently used. Generative adversarial networks (GANs) are a type of deep learning model that has been used to synthesize realistic images in a range of domains, both general purpose and medical. In the GAN framework, a generator network is trained to synthesize fake images, while a dueling discriminator network aims to distinguish between the fake images and a set of real training images. As GAN training progresses, the generator network ideally learns the important features of a dataset, allowing it to create images that the discriminator cannot distinguish from the real ones. We report on our use of GANs to synthesize high resolution, realistic histopathology images of gliomas. The well- known Progressive GAN framework was trained on a set of image patches extracted from digital slides in the Cancer Genome Atlas repository, and was able to generate fake images that were visually indistinguishable from the real training images. Generative modelling in pathology has numerous potential applications, including dataset augmentation for training deep learning classifiers, image processing, and expanding educational material.

LEARNING OBJECTIVES

This presentation will enable the learner to:

1. Explain basic principles of generative modelling in deep learning.
2. Discuss applications of deep learning to neuropathology image synthesis.

Session 3: Pediatric, Neuromuscular, Infectious/Immune Mediated Neuropathology

Abstract 6

Familial juvenile onset Alexander Disease demonstrating germline mosaicism and presenting with a tumor-like mass of the medulla

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doi: 10.1017/cjn.2021.92

Alexander Disease (AD) is a rare and ultimately lethal leukodystrophy, typically presenting in infants who exhibit developmental delay, macrocephaly, seizures, spasticity and quadriparesis. Classic *infantile* forms are generally due to sporadic mutations in *GFAP* that result in the massive deposition of intra-astrocytic Rosenthal fibres, particularly in the frontal white