LESSON PLAN: The Bombarded Brain

Topic: Brain tumour types

Subjects| Stream:
Biology
Science

Grade Level:
Senior (Grades 11 to 12)

Objective(s):

- To familiarize participants with some of the most common primary brain tumour types among the 120-different varieties.
- For participants to explore the different types of brain tumours by their characterizations of where they occur, and which specific types of cells are actively proliferating.

Brief Summary:

This activity aims to teach participants about the characteristic features of the various brain tumour types, where they occur, their constituent cells, and the World Health Organization classification of how cells behave from least aggressive (non-malignant) to most aggressive (malignant).

Background Information:

There are more than 120-types of primary brain tumours. A brain tumour is a mass of abnormal cells in the brain that can impair function if large enough to press on surrounding nerves, blood vessels, and tissue.

Resources | Materials required per pair:

- *X* sets of 17-index cards (depending on the number of groups that the class is split into).
- Enough space for participants to form groups of 3-4 and match all 17-words with their associated definitions.
- One marker (for preparation of the index cards)

Activity Instructions:

Step 1: Divide the total number of participants into groups of 3-4.

Step 2: Fold 17-index cards in half lengthwise and write the names of the brain tumour types (listed below) on the top half of the cards (these are your *word* cards) and a brief account of their characteristics (see below) in the bottom half (these are your *definition* cards).

Each group of 3-4 participants will receive an envelope of the 17-index cards; the Facilitator must prepare *X* sets of the *word* and *definition* cards (depending on the number of groups)

Step 3: Cut the index cards in half, using a marker to place a dot on the back of the *word* cards; place the cards face down and spread out

Step 4: Participants may only turn one dot (*word*) card and one plain (*definition*) card for each turn that they must match a word with its association definition

Step 5: When cards do not match, participants must turn them both face down again; when they do match, cards may remain face up.

Repeat until all are face up and correctly matched.

Step 6: Once the activity is complete, instruct the winning team to read aloud all vocab words and associated job descriptions.

Meningioma	• Grows from the meninges (layers of tissue covering the brain and spinal cord) • The most common type of primary brain tumour • Typically diagnosed as a low-grade
Glioblastoma	• Most aggressive malignant primary brain tumour • Most of these tumours occur in the cerebral hemispheres as high-grade tumours • The cells of these tumours grow quickly, are not well defined, and can spread throughout the brain.
Astrocytoma	• Glial cells, which are supportive cells that help brain cells (neurons) function, are the most common cellular component of the brain. • The most common type of glial cell is an astrocyte and a(n) _____ is a type of glial tumour
Diffuse midline glioma	• Brainstem gliomas that start in the brain or spinal cord tissue and are very unlikely to spread throughout the nervous system. • The tumour type is named for its location at the base of the brain. • These tumours are generally high-grade tumours that infiltrate the entire substance of the brain stem.
Oligodendrogliomas	• Come from oligodendrocytes which are one of the types of cells that make up the supportive, or glial, tissue of the brain. • May be associated with 1p or 19q chromosomal losses
Ependymoma	• Arise from the ependymal cells that line the ventricles of the brain and the center of the spinal cord. • They are soft, grayish, or red tumours which may contain cysts or mineral calcifications. • As these tumours grow and fill the ventricle, they obstruct the flow of cerebrospinal fluid (CSF) through the brain

Optic Pathway Glioma	• This tumour type is named for its location on or near the optic nerve pathways between the eyes and the brain. • These tumours may involve any part of the optic pathway and have the potential to spread along these pathways.
Atypical Teratoid/ Rhaboid Tumour (AT/RT)	• The tumour is characterized through a mutation of the tumour suppressor gene, INI1. • Genetic predisposition (germline mutation) can be found in up to 35% of patients • Very aggressive embryonal brain tumour seen in infants and young children
Medulloblastoma	• A malignant pediatric brain tumour that arises in the cerebellum or spinal cord • Changes have been identified in genes and chromosomes (the cell's DNA blueprints) that may play a role in the development of this tumour.
Acoustic neuroma	• Also known as a vestibular schwannoma, schwannoma, or neurilemmoma • This type of non-malignant brain tumour grows from the sheath surrounding the eighth cranial nerve and as a result can cause such symptoms as hearing loss, balance difficulty and tinnitus.
Craniopharyngioma	• A tumour that usually develops near the pituitary gland (a small endocrine gland at the base of the brain). • Intracranial tumours that are typically both cystic and solid in structure.
Pituitary Adenomas	• Occurs in the pituitary gland, which secretes several crucial hormones including corticotropin, thyroid-stimulating hormone, growth hormone, prolactin, gonadotropins, and antidiuretic hormone. • Grows in the front two-thirds of the pituitary gland.

Dysembryoplastic neuroepithelial tumour (DNET)	• Usually located in the temporal lobe • This tumour is often associated with a seizure disorder.
Chordoma	• Usually slow growing, locally invasive tumours that occur at the base of the skull or at the end of the spine. • Originates from cells left over from early fetal development • Invades the bone and soft tissues, and sometimes involves the brain and cranial nerves
Neurofibroma	• Non-malignant, soft, fleshy tumors that can grow on nerves anywhere in the body, and in some cases, on the spinal cord or cranial nerves
Nasopharyngeal Angiofibroma	• Non-malignant skull-base tumour of the nasopharynx (which is the space at the back of the nose that connects it with the mouth) • Usually diagnosed in adolescent boys • Usually causes congestion and nose bleeds
Osteoma	• Non-malignant slow-growing bone tumours that usually develop on skull and facial bones • Can cause problems in breathing, vision, hearing