## **Therapeutic areas – Part 2**



Module 4 Topic 4

# **Overview of Cancer**

- Cancer is the <u>out-of-control growth of cells</u> in the body
- Cancerous (malignant) cells are different from normal cells in many ways because they:
  - Multiply very quickly
  - Keep on multiplying even though the organ they're in doesn't need more cells
  - Look abnormal and usually don't function properly
  - Don't stay where they belong they invade nearby organs or spread to distant parts of the body (metastasize)



## What causes cancer?

### Genetic mutations

- Oncogenes These are abnormal forms of normal genes
- Tumor suppressor genes e.g. p53 gene become unable to function
- **Chromosomal abnormalities** can occur through deletion, translocation, or duplication
- Environmental factors Carcinogens include sunlight, tobacco, chemicals, certain viruses, radiation
- Drugs e.g. Estrogen & breast cancer, anabolic steroids & liver cancer

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**Dietary substances** e.g. alcohol & risk of head & neck and esophageal cancer; meats cooked at a high temperature & risk of developing stomach cancer

# Common types of cancers

(from most to least common)

- In men,
  - Prostate
  - Lung
  - Colon and rectum
  - Bladder
  - Kidney
- in women
  - Breast
  - Lung
  - Colon and rectum
  - Uterus
  - Thyroid

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# Warning Signs of Cancer

- Weight loss for no known reason
- Tiredness and fatigue
- Night sweats
- Fever that keeps coming back
- Cough that doesn't go away
- Changes in the size or color of a mole or spot on skin that doesn't heal
- Enlarged lymph nodes
- A lump in the breast

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Blood in urine or stool

# **Cancer Treatment Principles**

- Major modalities of therapy are
  - Surgery for local and local-regional disease
  - Radiation therapy for local and local-regional disease
  - Chemotherapy for systemic disease

### **Combination Cancer Therapy**

• A mix of surgery, radiation therapy, and chemotherapy



### Meningitis

- Inflammation of the membranes (meninges) surrounding the brain and spinal cord
- Causes
  - Viral infections
  - Bacterial infections
    - ear or sinus infection
    - a skull fracture
  - Fungal infections





### Meningitis (contd)

- Signs and symptoms
  - Headache with nausea or vomiting
  - Fever
  - Neck stiffness
  - Confusion or difficulty concentrating
  - Seizures ('fits' or 'convulsions')
  - Skin rash (in meningococcal meningitis)
- Treatment
  - Acute bacterial meningitis intravenous antibiotics and corticosteroids
  - Drain infected sinuses or mastoid bone behind ear

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# Encephalitis

- Inflammation of the brain
- **Primary encephalitis** occurs when a virus or other agent directly infects the brain
  - Herpes virus
  - Enteroviruses (Polio virus and Coxsackie virus)
  - Mosquito-borne viruses (Chikungunya, Dengue)
  - Rabies virus
- Secondary encephalitis due to a faulty immune system reaction to an infection elsewhere in the body, immune system also mistakenly attacks healthy cells in the brain



Common childhood infections, such as measles, mumps and German measles (rubella) - used to be fairly common causes of secondary encephalitis

# Encephalitis (contd)

#### • Treatment

- Treatment for mild encephalitis usually consists of:
  - Bed rest
  - Plenty of fluids
  - Anti-inflammatory drugs such as acetaminophen, ibuprofen, and naproxen sodium to relieve headaches and fever

#### • Antiviral drugs

- Antiviral medications commonly used to treat encephalitis include:
  - Acyclovir
  - Ganciclovir
  - Foscarnet
- Additional therapy, such as:
  - Physiotherapy to improve strength, flexibility, balance, motor coordination and mobility
  - **Occupational therapy** to develop everyday skills for everyday activities
  - Speech therapy to relearn muscle control and coordination to produce speech
  - Psychotherapy

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### **Brain abscess**

- Intracerebral collection of pus
- Causes
  - Direct extension of cranial infections e.g. osteomyelitis, mastoiditis, sinusitis, subdural empyema
  - Penetrating head wounds including neurosurgical procedures
  - Hematogenous spread e.g. in bacterial endocarditis
  - anaerobes, such as <u>Bacteroides</u>, anaerobic and microaerophilic <u>streptococci</u>, <u>Staphylococci</u> (common after cranial trauma, neurosurgery, or endocarditis); <u>Enterobacteriaceae</u> (in chronic ear infections)



### Brain abscess (contd)

- Treatment
  - Antibiotics (initially cefotaxime or ceftriaxone, plus metronidazole for *Bacteroides* sp or vancomycin for *Staphylococcus aureus* based on suspicion, then as guided by culture and susceptibility testing)
  - Usually CT-guided stereotactic aspiration or surgical drainage
  - Sometimes corticosteroids, anticonvulsants, or both



### Stroke

- When the blood supply to part of brain is interrupted or reduced, depriving brain tissue of oxygen and nutrients
- Within minutes, brain cells begin to die
- Causes
  - Blocked artery (ischemic stroke)
  - Leaking or bursting of a blood vessel (hemorrhagic stroke)



### Ischemic stroke

- Thrombotic stroke occurs when a blood clot (thrombus) forms in one of the arteries that supply blood to the brain
- Embolic stroke occurs when a blood clot forms away from the brain and is swept through the bloodstream to lodge in brain arteries. This type of blood clot is called an embolus

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- Group of symptoms affecting memory, thinking and social abilities severely enough to interfere with daily life
- Causes
  - Alzheimer's disease <u>Plaques</u> (clumps) of a protein called <u>beta-amyloid</u>, and fibrous tangles made up of tau protein deposited in brain
  - Vascular dementia
  - Lewy body dementia protein deposits in brain
  - Frontotemporal dementia degeneration of cells



# Dementia (contd)

- Cognitive changes
  - Memory loss, which is usually noticed by a spouse or someone else
  - Difficulty communicating or finding words
  - Difficulty reasoning or problem-solving
  - Difficulty handling complex tasks
  - Difficulty with planning and organizing
  - Difficulty with coordination and motor functions
  - Confusion and disorientation
- Psychological changes

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- Personality changes, Inappropriate behavior
- Depression, Anxiety, Paranoia, Agitation, Hallucinations

# Dementia (contd)

- **Prevention** There's no sure way to prevent dementia, but the following might be beneficial:
  - Keep your mind active Mentally stimulating activities, such as reading, solving puzzles and playing word games
  - Be physically and socially active Physical activity and social interaction might delay the onset of dementia
  - Quit smoking Smoking may increase risk of dementia and vascular conditions



# Parkinson's Disease (PD)

- A slowly progressive, degenerative disorder characterized by resting <u>tremor</u>, stiffness (<u>rigidity</u>), slow and decreased movement (<u>bradykinesia</u>), and gait and/or postural instability
- Dopaminergic cell groups in the brain degenerate, leading to depletion of dopamine and causes many of the motor manifestations of PD
- Treatment

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- Carbidopa/levodopa (mainstay of treatment)
- Dopamine agonists e.g. ropinirole
- Catechol O-methyltransferase (COMT) inhibitors, always used with levodopa, particularly when response to levodopa is wearing off
- Surgery if drugs do not sufficiently control symptoms or have intolerable adverse effects