

## **Biology in Human Welfare – II**

**(Ascaris, Wuchereria, TDA abuse)**

### **Very Short Answer Questions:**

**1. The eggs of Ascaris are called ‘Mammilated eggs’. Justify?**

- Each egg in Ascaris is surrounded by a protein coat with rippled surface. So they are considered as Mammilated eggs.

**2. What is meant by nocturnal periodicity with reference in the life history of a nematode parasite you have studied?**

- Sheathed microfilaria larvae of Wuchereria bancrofti show nocturnal periodicity. They become active during night time between 10 pm and 4 am.
- These larvae reside in the deeper blood vessels during the day time but migrate to peripheral blood circulation during night time which coincides with nocturnal behavior of female Culex, the secondary host for filarial worm.

**3. Distinguish between Lymphadentia and Lymphangitis?**

- Both occur by the effect of Wuchereria bancrofti.
- Lymphadentia is inflammation of lymph glands.
- Lymphangitis is inflammation of the lymph vessels.

**4. ‘Elephantiasis is the terminal condition of filariasis’. Justify?**

- In severe cases of filariasis, sweat glands of the skin in the affected regions disintegrate and the skin becomes rough. It is known as terminal stage of filariasis i.e., elephantiasis.

**5. In which way does tobacco affect the respiration? Name the alkaloid present in tobacco? (May 2013)**

- Nicotine is the alkaloid present in the tobacco.
- Smoking increases the carbon monoxide (CO) level in the body. It reduces the Oxygen transportation capacity by haemoglobin of blood.

**6. Many secondary metabolites of plants have medicinal properties. It is their misuse that creates problems. Justify the statement with an example?**

- Several plants, fruits and seeds with hallucinogenic properties have been used in folk-medicine, religious ceremonies and rituals for hundreds of years.
- But when these are taken for a purpose other than the medicinal use or in excess amounts that impair one's physical or psychological functions, it constitutes 'drug abuse'.

**7. Why are cannabinoids and anabolic steroids banned in sports and games?**

- Cannabinoids are being abused by sports persons as doping.
- But they show effects on cardiovascular system of the body. So they are banned.

**8. Mention the names of any four drugs which are used as medicines to treat patients with mental illness like depression, insomnia etc?**

- Four types of drugs which are used as medicines to treat patients with mental illness like depression, insomnia etc., are
  - a) Barbiturates in sleeping pills      b) Amphetamines (cause sleeplessness)
  - c) Benzodiazepines as tranquilizers      d) Lysergic acid diethyl amides (LSD)

**9. From which substances, Smack and Coke are obtained?**

- A) Smack is heroin is formed by acetylation of morphine.
- B) Coke or crack is cocaine or coca alkaloid is obtained from the leaves of coca plant *Erythroxylum coca*.

**10. Write the scientific names of any two plants with hallucinogenic properties.**

- Plants with hallucinogenic properties are (1) *Atropa belladonna*, (2) *Datura*

**Short Answer Type Questions**

**1. What are the adverse effects of Tobacco?**

- **Effects of Tobacco:** Smoking increases the carbon monoxide (CO) level and reduces the oxygen level in the blood.
- Nicotine, an alkaloid present in tobacco stimulates the adrenal gland to release adrenaline and nor – adrenaline into blood. These hormones raise the blood pressure and increase the heart rate.
- Smoking is associated with bronchitis, emphysema, coronary heart disease, gastric ulcer and increases the incidence of cancers of throat, lungs, urinary bladder, etc. Smoking also paves the way to hard drugs. Yet smoking is very prevalent in society, both among young and old.
- Tobacco chewing is associated with increased risk of cancer of the oral cavity.

**2. Write short notes on Opioids?**

- **1) Opioids:** These are the drugs obtained from opium poppy plant *Papaver somniferum* (vernacular name: Nallamandu mokka). They bind to specific opioid receptors present in our central nervous system and gastro intestinal tract. Some of them are morphine, heroin, etc.
- **2) Morphine:** It is extracted from the dried latex of the unripe seed capsule (Pod) of poppy plant. It occurs as colourless crystals or a white crystalline powder.

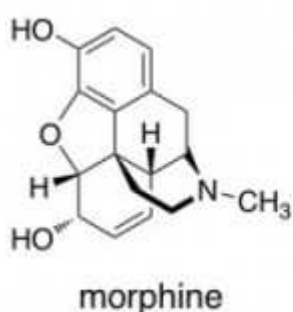
**Mode of Abuse:** Generally it is taken orally or by injection

**Effect:** It is effective as sedative and pain killer. It is very useful in patients who have undergone surgery.

**3) Heroin:** It is a white, bitter, odourless and crystalline compound, obtained by the acetylation of morphine. Chemically it is diacetyl morphine. It is commonly called snack.

**Mode of Abuse:** Generally it is taken by snorting and injection

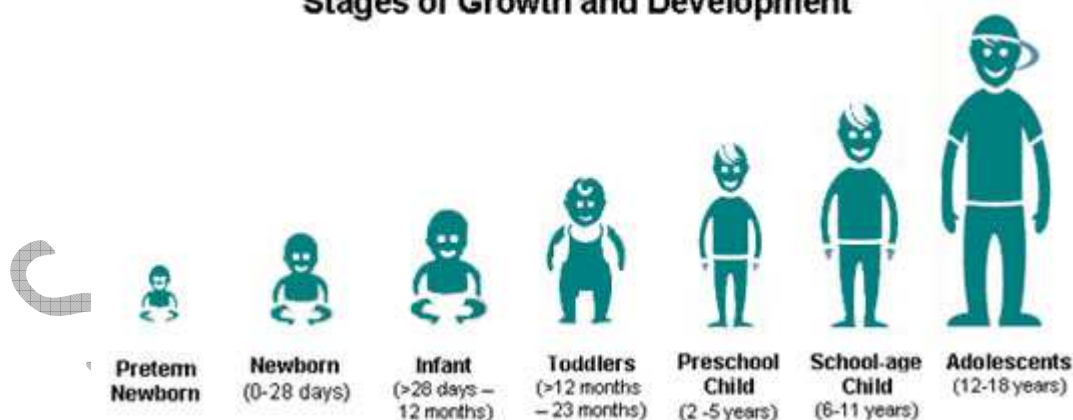
**Effect:** Heroin is a depressant and slows down the body functions



### 3. Why the adolescence is considered vulnerable phase?

**Adolescence:** It is the time period between the beginning of puberty and the beginning of adulthood. In other words, it is the bridge linking childhood and adulthood. The age between 12 – 18 years is considered adolescence period. It is both ‘a period and process’ during which a child becomes mature. It is accompanied by several biological and behavioral changes. Thus, adolescence is a very vulnerable phase of mental and psychological development of an individual.

#### Stages of Growth and Development



#### 4. 'Prevention is better than cure'. Justify with regard to TDA abuse?

A. prevention is better than cure holds true here also. Some of the measure successful for prevention and control of TDA abuse among the adolescents are:

i) **Avoid undue parental pressure:** Every child has his/her own choice. Capacity and personality. The parents should not force their children to perform beyond their capacity by comparing them with others in studies, games, etc.,

ii) **Responsibility of parents and teachers:** They should look for the danger signs and counsel such students who are likely to get into the 'trap'.

iii) **Seeking help from peers:** If peers find someone abusing drugs or alcohol immediately it should be brought to the notice of their parents so that they can guide them appropriately.

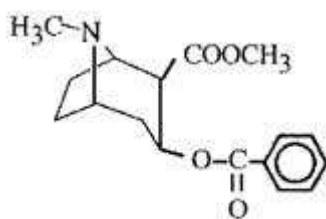
4) **Education and counselling:** Educating and counselling the children to face problems, stress and failures as a part of life.

5) **Seeking professional and medical help:** A lot of help is available in the form of highly qualified psychologists, psychiatrists and de – addiction and rehabilitation programme.

#### 5. Distinguish between addiction and dependence?

- Tobacco, drug and alcohol abuse leads to addiction and dependence.
- Addiction is a psychological attachment to certain effects like euphoria.
- Inherent addictive nature will increase.
- With the repeated use of TDA, the tolerance level of the receptors present in our body increases. It results that the receptors respond only to higher doses which lead to greater intake and addiction.
- Use of TDA even once, can be a fore runner to addiction.
- In the absence of any guidance or counseling, people get addicted and become dependent on them.

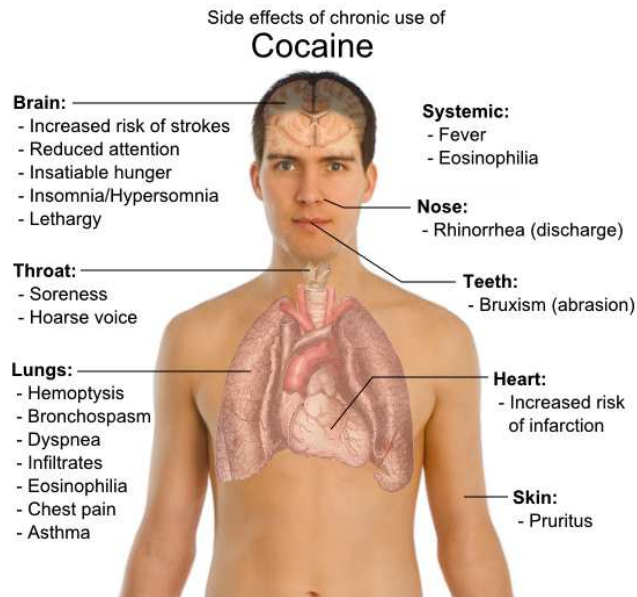
- Dependence is the tendency of the body to manifest a characteristic and unpleasant condition if the regular dose of alcohol or drugs is abruptly discontinued.
- The withdrawal syndrome is characterized by anxiety, shakiness/tremors, nausea and sweating.
- It leads the persons to ignore all social norms.



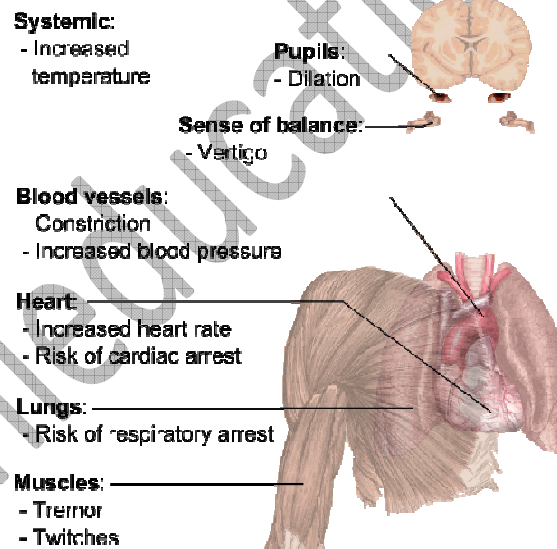
Structure 1. Cocaine

#### 6. Describe the effects of Cocaine?

- Coca alkaloid or Cocaine is a white crystalline alkaloid obtained from the leaves of Coca plant, *Erythroxylum coca*.
- It is commonly called as coke or crack.
- It is usually snorted.
- It has a potent stimulating action on the CNS as it interferes with the transport of the neurotransmitter 'Dopamine'.
- It produces a sense of euphoria and increased energy.
- It causes hallucinations in overuse condition.



### Main physiological effects of Crack cocaine



## 7. Write short notes on typhoid fever and its prophylaxis?

**A. Typhoid Fever:** It is caused by salmonella typhi which is a gram negative bacterium. It mainly lives in the small intestine of man and then migrates to other organs through blood. It can be confirmed by widal test.

**Mode of infection:** Contamination through food and water



**Symptoms:** Sustained fever with high temperature up to 104°F, weakness, stomach pain, constipation, headache and loss of appetite, intestinal perforation and death may also occur in severe cases.

**Prophylaxis:** Advancements made in biological sciences have armed to deal with many infectious effectively. The immunization programmes by the use of vaccines have enabled us to completely eradicate like typhoid. Biotechnology is making available never cheaper vaccines, discovery of antibiotics and various other drugs also enabled us to treat typhoid.

## 8. Write short notes on Pneumonia and its prophylaxis?

**A. Pneumonia:** It is caused by gram positive bacteria such as Streptococcus pneumonia and Haemophilus influenzae. They infect the alveoli of lungs in human beings.

**Mode of Infection:** Contamination by inhaling the droplets/aerosols released by an infected person or even by sharing the utensils with an infected person.

**Symptoms:** The alveoli get filled with fluid leading to severe problems in respiration. In severe cases, the lips and finger nails may turn gray to bluish in colour.

**Prophylaxis:** Advancements made in biological science have armed to deal with many infections effectively. The immunization programme by the use of vaccines has enabled us to completely eradicate pneumonia. Biotechnology is making available newer, cheaper vaccines, discovery of antibiotics and various other drugs also enabled us to treat pneumonia.



## **8. Why do some adolescents start taking drugs? How can this be avoided?**

**A.** Curiosity, desire for adventure and excitement, experimentation are the common causes for the motivation of youngsters towards the use of tobacco, drugs and alcohol.

The first use of drugs or alcohol may be out of curiosity or experimentation, but later the person starts using them to escape facing problems.

Recently stress from the pressure to excel in academics or examinations has played a significant role in allowing the youngsters to try certain drugs. Television, movies, newspapers and internet help promoting this wrong perception.

Other factors that are associated with tobacco, drug and alcohol abuse among adolescents are unstable or unsupportive family structures and peer pressure.

## **9. Explain the Pathogenicity of *Wucherera bancrofti* in man?**

**A).** i) Light infection causes filarial fever with the symptoms like headache, mental depression and increase in body temperature.

- Inflammation of the lymph vessels is known as lymphangitis.
- Inflammation of the lymph glands is known as lymphadenitis.

ii) Heavy infection causes the accumulation of dead worms which blocks the lymph vessels and lymph glands resulting in immense swelling. It is known as lymphoedema. It is visible in the extremities of limbs, scrotum of males and mammary glands in females.

iii) Accumulation of fibroblasts in tissues forms fibrous tissue.

iv) In severe cases the skin becomes rough in affected regions due to disintegration of sweat glands. This terminal condition is considered as Elephantiasis..

## Long Answer Questions

### 1. Describe the life cycle of *Wuchereria bancrofti*?

- ❖ *Wuchereria bancrofti*, filarial worm is a digenetic parasite as it completes its life cycle in two hosts namely Man (primary host) and female *Culex* (secondary host).

#### Life cycle in Man:

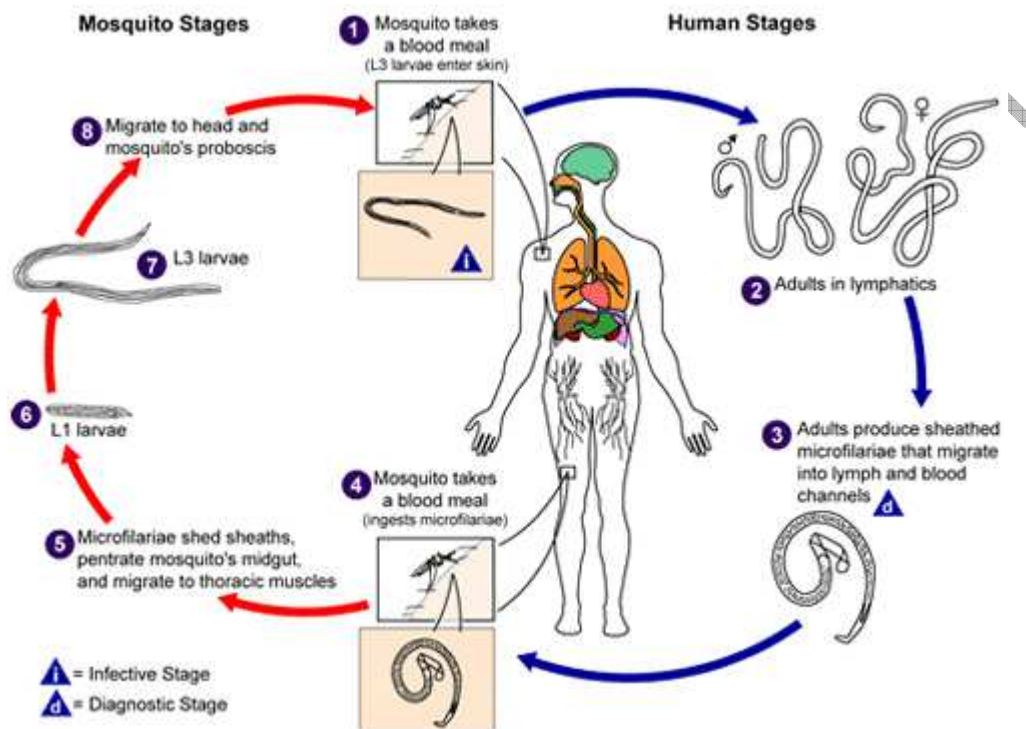
- ❖ After copulation between male and female worms in lymphatic vessels of man, the female releases the sheathed microfilaria larvae into lymph of man.
- ❖ The larva measures 0.2 to 0.3 mm in length and surrounded by a loose cuticular sheath which is modified shell.
- ❖ Microfilariae migrate to blood circulation and reside in the deep blood vessels during the day time.
- ❖ They show nocturnal periodicity and move to the peripheral blood circulation during the night time between 10 pm to 4 am. It coincides with the nocturnal behavior of mosquitoes.
- ❖ When a female *Culex* sucks the blood of an infected person, the larvae enter the gut of mosquito.
- ❖ Life span of larvae in man is 70 days.

#### Life cycle in female *Culex*:

- ❖ The sheath of larva is dissolved within 2-6 hrs. In mid gut of mosquito.
- ❖ Ex-sheathed microfilaria penetrates the mid gut wall reaches the haemocoel.
- ❖ It reaches the thoracic muscles and transform into a Sausage shaped larva within 2 days. It is known as 'first stage larva' or 'first stage microfilaria'.
- ❖ It undergoes two moultings within 10-20 days and transform into a long, infective '3<sup>rd</sup> stage microfilaria'.
- ❖ It reaches the labium of *Culex* and ready to enter into another man.

### Life Cycle in Man after Infection:

- ❖ 3rd stage microfilaria larvae enter the blood circulation of man during the mosquito's bite and reach the lymphatic vessels.
- ❖ They undergo the 3<sup>rd</sup> and 4<sup>th</sup> moultings and produce young worms which attain sexual maturity within 5 to 18 months.



## 2. Describe the structure and life cycle of *Ascaris lumbricoides* with the help of a neat labeled diagram?

### Structure of *Ascaris lumbricoides*:

- *Ascaris lumbricoides* is common roundworm. It is a monogenetic, dimorphic pseudocoelomate parasite lives in the small intestine of man.
- Body is elongated and cylindrical. Three chitinous lips surround the mouth present at extreme anterior end. Excretory pore is present near the mouth mid ventrally.
- Male has curved posterior end with cloacal aperture and a pair of equal sized chitinous pineal spicules or pineal setae to transfer the sperms to female.

- Female has a straight posterior tail. Female genital pore or vulva is located mid ventrally at about  $\frac{1}{3}$  length from the mouth. Anus is located at posterior end.

### **Life Cycle of *Ascaris lumbricoides***

- *Ascaris lumbricoides* is a monogenetic parasite.
- After copulation between male and female worms in lymph vessels of man, female releases two lakh eggs per day.
- Each egg is surrounded by three layers...
  - a) Outer protein coat with rippled surface... mammilated eggs.
  - b) Middle chitinous shell
  - c) Inner lipid layer.
- Eggs are passed out along with faecal matter into moist soil.
- In soil, development occurs in egg which results the formation of '1<sup>st</sup> stage Rhabditiform larva'.
- It undergoes the 1<sup>st</sup> moulting and becomes the 2<sup>nd</sup> stage Rhabditiform larva. It is the infective stage to man.
- 2<sup>nd</sup> stage larvae enter into new man through contaminated food and water.
- In small intestine, the shell gets dissolved and 2<sup>nd</sup> stage larva is released. It shows extra-intestinal migration in following manner.  
Small intestine → hepatic portal vein → liver → hepatic veins and post caval vein → Heart → pulmonary arteries → alveoli of lungs → bronchi → trachea → larynx → pharynx → oesophagus → stomach → Small intestine..
- In alveoli of lungs, 2<sup>nd</sup> stage larva undergoes two moultings and transform into 4<sup>th</sup> stage larva the following manner .  
2<sup>nd</sup> state Rhabditiform larva → 2<sup>nd</sup> moulting → 3<sup>rd</sup> stage larva → 3<sup>rd</sup> moulting → 4<sup>th</sup> stage larva.
- 4<sup>th</sup> stage larva reaches small intestine and undergoes 4<sup>th</sup> moulting or final moulting and become a young one which attains sexual maturity within 8 to 10 weeks.

