**Smoking and Disease Study Sheet**

**Ingredients of tobacco smoke and their effects:**

* Tar: aromatic compounds that settle in and gunk up the lungs
* Carbon Monoxide: Affects haemoglobin association with oxygen negatively, decreases efficiency of gas exchange
* Nicotine: addictive and poisonous
  + Nervous stimulant to contract arterioles and release adrenaline
  + Heart rate and blood pressure increase
  + Decreases blood flow to extremities
  + Increases the likelihood of blood clotting (stroke, heart attack, embolism)

**Causes of Lung Disease:** Particulate matter, Allergens, Mutagens and carcinogens

**Lung Diseases**

* Obstructive diseases: general class of lung diseases caused by inhaling particulate matter
* Chronic Bronchitis
  + Causes: Tar from cigarette smoke builds up in trachea, bronchi, and bronchioles
  + Symptoms: Ultimately all symptoms are caused by an overproduction of mucus by overstimulated goblet cells
    - Damages cilia in airways—mucus cannot be swept away efficiently
    - Damaged cilia leads to scar tissue in bronchi and bronchioles—constricted pathways means less gas exchange
    - Mucus accumulates pathogens which can cause infections like pneumonia
    - “Smoker’s cough” from scar tissue
    - Coughing and mucus production further inflames and constricts airways.
* Emphysema
  + Causes: Constant inflammation from smoking or other debris in lungs leads to break down of tissues and decreased gas exchange.
  + Symptoms: Inflamed bronchi and bronchioles leads to a slew of symptoms:
    - Buildup of mucus and inflammation releases phagocytes to fight trapped pathogens
    - Enzymes exit capillaries by releasing elastase, an enzyme that breaks down the protein elastin (responsible for the stretchiness of the lung tissue and alveoli)
    - Less elastin means less stretchiness, so alveoli pop and leave spaces in the lungs
    - Fewer alveoli = less air exchanged
    - Shortness of breath, rapid breathing
    - Poorly oxygenated blood 🡪 may need oxygen breathing tube
    - Resistance in pulmonary artery builds up because blood doesn’t flow through the longs well, so the right side of the heart enlarges.
    - In serious cases, person is incapacitated
* Chronic Obstructive Pulmonary Disease
  + Causes: Emphysema and Chronic Bronchitis after many years.
  + Symptoms: Serious emphysema and chronic bronchitis, deteriorated lung tissue and decreased lung function.
    - Death: 30,000/year in the UK alone
  + Treatment: STOP SMOKING AS YOUNG AS POSSIBLE. Often times no cure, will be fatal eventually.
* Lung Cancer
  + Causes: Carcinogens in tobacco tar build-up and cause unregulated cell division (cancer)
  + Symptoms: Tumors cause secondary symptoms as well as a primary obstruction.
    - Malignant tumor: growing and spreading throughout the bronchioles, can break apart and enter lymph system. This can then spread to other parts of body (metastasis).
    - Bloody cough from deteriorated tissues
  + Tumor locating: Several technologies you should be familiar with—
    - Bronchoscopy: endoscopy of the bronchi (sticking a camera in there)
    - Chest X-ray
    - CT scan—a type of digital imaging that provides more detail.
  + Treatment: Cancer drugs with chemotherapy and radiation in an attempt to kill off the metastasizing cells of the tumor.
  + Evidence linking it to smoking:
    - Epidemiological: Smokers die younger and are more likely to die from smoking-related diseases like COPD. Vast majority of deaths from these disease are smokers, and smokers are much more likely to develop these diseases.
    - Experimental: Animals exposed to cigarette smoke develop smoking-related diseases and tumors.

**Cardiovascular Diseases**

* Have many factors and are a leading cause of death world-wide, especially in more economically developed counries.
* Atherosclerosis
  + Causes: Accumulation of fatty material in the walls of the arteries.
  + Symptoms: Reduced blood flow and increased risk of blood clots leads to build-up of nutrient and oxygen deprived cells, tissue, platelets, and cholesterol (atheroma)
    - Obstructed blood flow deprives tissues of nutrients and oxygen
    - Cholesterol deposits in the blood to repair damaged sites of vessels. Low-density makes the problem worse and high density helps fix it by strengthening artery walls
    - Plaques formed: deposits that restrict blood flow
    - Eventually can get a blood clot (thrombus through the process of thrombosis)🡪can stop or kill heart muscle
* Coronary Heart Disease
  + Causes: Clots in the arteries of the heart (coronary arteries) deprive the heart of oxygen
  + Symptoms: High BP and constricted coronary arteries leads to three main versions of CHD:
    - Angina pectoris: severe pain in heart, usually from exercise, because of lack of oxygen. Not deadly.
    - Heart attack/ myocardial infarction: blood can’t get to part of the heart and that portion dies, causing extreme pain and potential death
    - Heart failure: weakened heart muscle slowly fades and stops. It slowly fades away, moving towards the light at the end of the arterial tunnel.
  + Treatment: Can do a coronary bypass—remember this?
* Stroke
  + Causes: Blood vessel in the brain bursts or clogs
  + Symptoms:
    - Brain tissues deprived of oxygen (bad)
    - Can kill, can cause mild to severe disability (paralysis, loss of speech, etc.)
* Epidemiology: more serious issue in developed countries, leading cause of premature death. More likely to affect men than women, considered a disease considered with increasing wealth.
* Causes overall: Theorized link with diet (worse diet means a worse heart with sticky arteries), well supported link with smoking, also genetic factors.
  + What to do? Treatment options include anticoagulant drug therapy, cholesterol-lowering medications, bypass surgery, and heart transplants in the most serious of cases.