



University of Jordan
Faculty of Medicine



Medical Committee
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Community Medicine



Lecture Title:	Air pollution				
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Air pollution

- **Definition** :adding something like (contaminants) to the original component or changing the original components ,to the extent that can affect human being, animals , plants , possessions , or interfere with our enjoyment to the environment .(people in there homes cannot open the windows or sit out side due to air pollution)
- If we want to judge an air sample whether it's normal or abnormal we need a reference .Scientists came up with a **hypothetical composition** for air and they use it as a reference because it is too difficult to find an air sample that represent the original air sample (so it is hypothetical) but the composition of air that we use as a reference has some problems which we have to accept them.

[in medicine we have standards to follow, such as a standard for the cholesterol level ,or the blood pressure ...etc].

Classification of air pollution sources :

Natural VS man made sources .

1.natural sources:

They might come before the man made sometimes ,more potent .like storms , earthquakes , volcano , forest fires [in summer >>caused by friction of the branches (high heat),,in winter >>caused by lightning]
In Mexico 1982 a volcano had erupted, many countries of the world far away from there had been affected .

***sometimes the scale of those natural powers might not be limited to certain area ,,they have a global impact .

Tsunami (2004 I think) distributed from Japan to Oman ,and the effect disseminated to many oceans there .

Also there was another devastating tsunami (2011)

What about swamps ??

They're considered as natural air pollutant ,with it's dirty water and anaerobic microorganisms they can create alot of gases that come out as a result of the feeding habits of those creatures so they become an air pollutants where the swamps are common.

Forests : can be a major source of pollution (referring back to the definition ,air pollutants might be substances that cause health problems)

so pollens that come out from a forest may cause fever or allergy to some people .

[**VOC's**] ...(volatile organic carbons) could be a source of pollution .

We have to know that natural powers are so severe ,so bad , can influence a huge part of the globe .

2.man- made sources :

we have 3 ways for classification of the man-made powers :

A-mobile VS fixed sources .

Mobile sources :cars , airplanes ,and all the vehicles that can move and cause air pollution .

Fixed (stationary) sources: homes , factories ...etc .

B- point VS non- point sources:

Point :a well-defined source of pollution (air or water pollution) [if you define the source and you know it, so it's a point source].such as a factory with a stack and the pollutants come out of it, cars , and air planes .

Non-point sources: diffused sources and not easy to identify , like a huge # of factories together ,and the polluted air comes to your city is not well-known from where it is coming .

e.g a tube coming from a house with sewage pollute a water sources

.>>>this is a point source.

But if you find in a river certain pesticides or fertilizers ,and this river passing near a farms area it's so difficult to tell from which farm these pollutant come from ,,so we consider the whole area as diffused or non-point sources .

***point sources are easy to control ..but non-point ones we cannot because we don't know exactly the source of pollution .

C .point VS linear sources :

we talked previously about the point sources .

Linear sources :highways made of cars , each car represents a point ,so if you live near a highway it's considered as a line of pollution .also airlines ,,and trains .

Classification of pollutants :

here also we have 3 routes for classification .

A. **chemical ,,biological ,,and physical contaminants .**

if you live close to a waste treatment station ,,what type of pollutants can reach your house??

There are biological contaminants like viruses that escape from the treatment process ,in form of water droplets ,and move by air .

And there are chemical also might reach (WHY??) ,,many gases produced upon treatment .

***so more than one type of contaminants can reach the air from a given source .

B. **according to the state of matter into :liquid ,, solid ,,or gaseous materials .**

Solids :example of solid ones are dust ,pollens ,and lead (Pb).

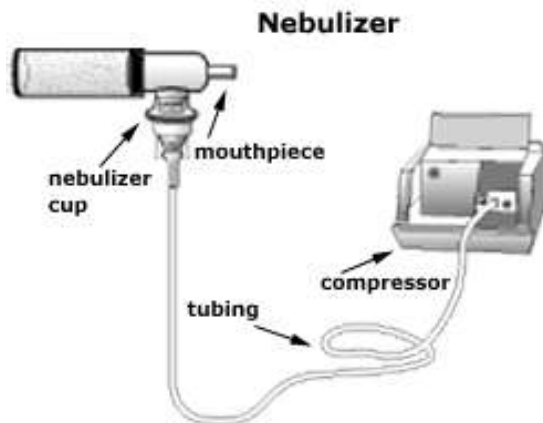
Pb :present in an air sample in the form of tiny particles (as a solid material in the air)

Liquids :near if you are passing by a sea ,river , ocean , or a lake ,there might be air droplets carrying some salts ,and this is by it self a problem for some people .

***in medicine patients who have bronchial asthma are given sprays ,inside it there is a fluid ,and when it's shaken ,then pressed ,,something called [**nebulizer**] on the top of this instrument ,,will break down this fluid into small particles using the ULV technique ,*[an abbreviation for(ultra low volume) a technique used to degrade the fluids such as pesticides ,that may look like a gaseous material but it's not ,,it's liquid]* these small particles are easy for the patient to inhale them (if he inhale them as fluids they will go through the GIT ,but as tiny particles they end to lungs through bronchi) so ULV in treatment of asthma is very efficient , and quickly reaching the target which is bronchi cause their dilatation after they have been constricted during the disease interval .

Note:

In medicine, a **nebulizer** (or nebuliser) is a drug delivery device used to administer medication in the form of a mist inhaled into the lungs



The same thing with pesticide ,in one of it's formulas is the liquid form ,and there bottles have also a nebulizer in order to produce the small particle form [mainly for distribution and hanging in the air to prolong the time of existence]

***if you throw a pencil upward it will come back directly ,while those pesticide particles will not ,,???

The pencil will follow Newton law ,but for the pesticide if they follow Newton law they fall down on the ground directly and become useless .instead pesticides follow the Stock law ...and that's why they hang in the air for longer time causing there effects

[it's a trick ,,changing the matter status to petite particles to avoid the Newton law and follow the stock law. and that's why perfume's smell can stay for along time in the air]...we need this long time ,,so that the contact between pesticide and pests will be prolonged ,,increasing the possibility for it's impact .

In US ..Israel ,,they use air planes to spray large amount of pesticide from high altitude ,it will drift and cause harm to a very far away places [wide distribution].in America it's beneficial ,,due to the massive area of farmlands that need this huge amount of pesticides .but it's a problem in the limited areas ,which can affect people living adjacent to there **Gases** :huge # of gases,,nitrogen gases ,carbon ,,sulfur,,VOC's ...etc. An air sample had been tested in America contained 189 type of gases .

Going to the third classification ..

C. according to the pollutants health effects :

1. asphyxiants (خانق) :

affect your breathing make it difficult . naturally ..we can suffocate someone Mechanically by closing his nose ,,or compressing his neck .Air pollutants are Chemicals that cause suffocation .either chemical or mechanical they close the air pathway within the respiratory tract .

2. irritants (مخرشات):

irritate the skin, the eye and the URT(upper respiratory tract)

3. respiratory and circulatory pollutants :

have bad impact on these systems .

4. mild anesthetic pollutants:

sleeping tendency, feeling lazy .and incomplete body strength
***most of the anesthesia used in surgeries are organic compounds ..and some air pollutants are organic so they might have this effect .

5. cancer-causing pollutants

6. death-causing pollutants: in some occasions ..air pollutant instead of causing acute or chronic diseases ,they can cause death to people directly .

***the ULV technique we mention above is NOT part of air pollutants
it's just an example of ULV usage .