**Date : 14/9/2014**

**Lec#1 .. Pharmacology**

**The doctor started the lecture by talking about the syllabus and telling us the topics we are going to take during this course. Then he mentioned the objectives we need to know from this lecture “refer to slide #2 if you want to know them “ ..**

**This lecture will be talking about the Basic Principles of Pharmacology ^\_^

Starting with Pharmacology there are two definitions we need to know ;**

 **Pharmakon = Drug; Logos = Science**

 **And pharmacology by itself is The study of drugs and their interactions with living systems .**

* **With the development of life and almost by the 19th century we proceeded more in pharmacology and we succeeded in the isolation of active substances in a particular plant that can be used as a drug .**

**“ Plants are the major source of drugs untill now. “**

**Many plants are used in the management of different defects “ diseases “ in the human being. the isolation of the active ingredients help in curing a disease without producing side effects.**

**In the 20th century they started to identify the chemical structures of the drugs we take from the plants , so it became very easy to synthesize them using what’s called Recombinant DNA Technology “ genetic engineering “ ; they can even synthesize complexes as insulin .. Also they reached a point where they can synthesize a drug that works to reverse the action of another one “ agonist and antagonist “ .**

* **It became very easy to know how drugs interact with the living systems , how drugs do their works and we can know the mechanism of action . If we can understand how the disease is produced then we can easily reverse it by using drugs .. So all we need to know is the pathological process that caused the disease ^\_^**
* **HOW DO WE DEFINE DRUGS ?**

**A drug is a chemical substance that is primarily used to reverse a pathophysiological defect .**

* **All chemical can be used as drugs.**
* **All drugs are toxins but not all toxins are drugs ; drugs are chemicals and there is no single drug which is free of side effects & that’s the disadvantage of a chemical substance that’s used in human being.**
* **Drugs are considered chemicals substances that are used to treat , control and prevent.**

**Treating is to give a drug or a cure for a period of time and then stopping it “ for example bacterial infection ; the doctor said that you can never leave a dental clinic without the dentist gives you either Cephalosporiens as an antibiotic or Analgesic as a pain killer “ .. he gave us another example ; tonsillitis that can be treated by Amoxicillin “ antibiotic “ ..**

**while controlling is to give a drug for life to control the symptoms of certain disease “ for example diabetes mellitus , hypertension and ischemic heart disease . We are more successful in controlling field than treating ..**

**there are now researches on diabetes , they are about to discover a treatment for this disease not only controlling it.**

* **Prevention is represented by vaccines ; they should be given on time .. In America if a kid had been ignored by his parents and he wasn’t given a vaccine for poliomyelitis " شلل اطفال " he can sue his parents when he gets old .**

**We also can use chemical substances in diagnosing specific diseases in order to know where the defect is , is it in the hypothalamus , pituitary gland or other target organ ..**

* **Prevention of pregnancy ; the doctor disagrees with sorting contraceptives “ used for birth control “ with drugs ; because it prevents pregnancy which is a normal process while the definition of drugs is to reverse pathological process that’s abnormal , so the doctor sees that it doesn’t fulfill the broad definition of drugs.**

**p.s : a women that uses contraceptive constantly puts herself in a risk that she might not be able to get pregnant anymore.**

**- Clinical Pharmacology :**

**the interaction of drugs and people , It involves study of drugs in patients as well as in healthy volunteers during new drug development or to limit the transmission of a disease sometimes “ e.g. Tuberculosis “** ..

**\*\* Not only drugs can be used to treat a person ; also surgery can be one of the ways ; But here in pharmacology we care the most about the drugs.**

* **Management of drugs :**
* **The first step of using a drug is the discovery of certain substance that can be used to treat a specific disease ; and this discovery starts usually with Hypothesis or an idea.**
* **What helps in the discovery is the experience of other people or other medical science or the good knowledge in the chemistry 🡪 because knowing the structure can make us relate that this drug can be used to manage certain diseases .**
* **Following the discovery we have lots of searches that need to be done on the drug to know the dose we should take and the side effects before it goes to the markets .**
* **Assessment of efficacy in vitro & in vivo studies .. testing certain dose of the drug we discover , we can try it on animals “ e.g. Rats “** 🡪 **if they died then ofcourse we cant send the drug to the markets .**
* **We should always try to find a drug that doesn’t produce dangerous side effects and that also helps our patient in controlling or treating the pathological problem .**
* **Always we should be aware of the safety of the drug .**
* **As we all know , we can make the drug in many forms ; oral tablets , injections … etc .**
* **Finally , the drug should be approved by FDA .**

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* **What the body does to a drug ?**

**What’s known as pharmacokinetic**

**process ; this involves absorption,**

**distribution , and elimination or**

**excretion .**

**For example a drug that’s given**

**orally ; it has to be absorbed to**

**blood because we need this drug**

**to reach the site of action .**

**what we really need is a drug that reaches the site of action in a proper concentration , good enough to prevent the pathophysiological process without producing side effects .**

**for example ; someone has headache , he takes a 500 mg tablet of “ Panadol or Revanin 🡪 both contain Paracetamol or Acetaminophen “ , this tablet is taken orally , it goes to the stomach and gets absorbed into the blood after disintegration and keeps circulating until it reaches the defected area, some of it will be excreted also . in our example we mentioned headache so it has to go through the blood brain barrier which doesn’t allow toxins to get into the brain . By this process we will lose some of the substance and we might only get 10 microgram instead of 500 mg. So in order to make this 10 microgram reach the brain we need to take in consideration this process and to give the patient a dose of 500 mg .**

**\*\* Extra Note : some drugs can stop prostaglandin major mediators of pains such as “nonsteroidal anti-inflammatory drugs (nsaids) “ ..**

* **When we hear about lung infection we expect the infection to be mainly in the lungs so we need a drug that goes to that organ in specific 🡪 this is called selectivity “ depends on the receptors and we will talk about it in dynamics “ .**
* **Definitions we need to know :-**
* **1) Pharmaceutical process :**

**Make the drug in suitable dosage form**

* **2) Pharmacokinetic process:**

**Is the drug getting to its site of action.**

* **3) Pharmacodynamic process:**

**Mechanism of action .**

* **4) Therapeutic process (clinical pharmacology):**

**The therapy required to cure a specific disease .**

* **5) Phrmacogenetics :**

**Individual variations in responding to drugs + gene therapy 🡪 we can find two sisters ; one of them needs 500 mg of Panadol to stop headache while her sister needs 100 mg.**

* **Many drugs act on the genome on DNA by binding to specific nuclear receptors.**
* **There are natural products that are natural products that are produced in our bodies such as hormones “ hypertension can be managed by sympathetic and parasympathetic control , same thing about prostaglandins ; some of them can reduce the blood pressure while others can increase it ; and they work in balance in a normal person “.**
* **Knowing natural mediators help us in developing and discovering many drugs like epinephrine , Ach , Histamine and many others.**
* **Its important to know that whenever we want to synthesize a drug we should avoid highly reactive substances because they are usually toxic .**
* **Again ; plants and animals can help in supporting our Hypothesis .**
* **Ages ago they used to take insulin from the pancreas of some animals like pigs and cows but now we use genetic engineering to make insulin without side effects comparing to the animals insulin.**
* **Clinical studies :**

**We have to test the safety of the drug before we give it to humans .. we can try it on a group of animals by giving them different doses on different periods of times, Determination of LD50 “ if half of them died ..** LD50 **🡪** It is the amount of the substance required to kill 50% of the test population  **“ .. and finally test their cells if they got affected from it .. if we noticed any dangerous side effects we should not try it on humans .**

**Best of luck and sorry for any mistake ^\_^**

**Ala’a B. Bashir**