

# Psychopharmacology

→ This lecture discusses the psychopharmacology; that is the advantage use of psychotropic medications to treat psychiatric disorders.

Medications in the psychiatric field fall under four main groups:

- 1- Antidepressants.
  - 2- Antipsychotic.
  - 3- Anti-anxiety.
  - 4- Mood stabilizers.
- Having said that, you need to know that most of drugs that are used in psychiatry are always prescribed by non-psychiatrists and vice versa. For example; Amitriptyline (a tricyclic antidepressant) is usually prescribed by neurologists, cardiologists and rheumatologist; to treat the pain. And also drugs that are used in non-psychiatric fields are prescribed by psychiatrists to treat the physical symptoms of certain psychiatric illnesses, for example; Propranolol is a beta blocker that is used in the treatment of anxiety to reduce the tachycardia that accompanies anxiety!
  - **In a nutshell; Psychiatric drugs aren't exclusively used in the treatment of psychiatric diseases.**

## Antidepressants:

- 1- **Monoamine oxidase inhibitors (MAOI):** as the name implies, these drugs inhibit the enzyme monoamine oxidase -which is responsible for the breakdown of intracellular dopamine, norepinephrine, and serotonin- resulting in an increase in the concentration of **monoamines** in the synapse. However, MAOIs not used much now since they have diet restrictions and may lead to hypertensive crisis.
- 2- **Tricyclic Antidepressants (TCAs):** were considered the gold-standard antidepressants, and now they're used in special cases only since TCAs have **cardio-toxic effects** and are **lethal** when used in high doses. According to a British psychiatric centre – I

wasn't able to catch in the record- it was found that in most suicidal cases TCAs were used in high doses!

- 3- **Specific serotonin reuptake inhibitors (SSRI):** Are the antidepressants that are used widely now.
- 4- **Serotonin-Dopamine reuptake inhibitor (SDRI):** the professor only mentioned that it acts on serotonin and dopamine.
- 5- **Noradrenergic and specific serotonergic antidepressant (NaSSA):** As **Mirtazapine**. This group of antidepressants is used to treat depression in old people.
- 6- **Norepinephrine-Dopamine Reuptake Inhibitor (NDRI):** one drug is **Bupropion** (American trade name) or **zyban** (British trade name); this drug is mainly used to treat sexual dysfunction, since dopamine – unlike serotonin- stimulates sexual functions.

## Antipsychotic:

The antipsychotic drugs fall into two main groups; The Typical Antipsychotic and the Atypical Antipsychotic drugs.

The typical antipsychotic drugs were first used before the discovery of the atypical antipsychotic drugs -which were introduced to the medical field in early 90's-. They're called ATYPICAL because it was believed that they don't cause the **EPS\*** which are normally caused by the TYPICAL antipsychotic drugs, but later that was medically proved wrong! Nowadays, these two groups still exist but with different nomenclature; they typical drugs are called first generation antipsychotics and the atypical are called the second generation antipsychotics.

**EPS;** extrapyramidal symptoms, they include acute dyskinesias and dystonic reactions, tardive dyskinesia, Parkinsonism, akinesia, akathisia, and neuroleptic malignant syndrome.

## Anti-anxiety:

Anti-anxiety drugs fall into two groups; both of them act on GABA.

- 1- Benzodiazepine

2- Hypnotics (also called z drugs because all of the drugs start with z letter)

## Mood Stabilizers:

They're anticonvulsants with the exception of lithium. They act on Na/K channels and block them to slow down the generation of the action potential.

## Mechanism of action:

- As you already know, the neurotransmitters get synthesized in the pre-synaptic neuron and upon stimulation; they get released to the synaptic cleft. Once the NT gets released, the following occurs:
  - 1) Reuptake of the NT back to the pre-synaptic neuron.
  - 2) Degradation of the NT by specific enzymes as monoamine oxidase and acetylcholine esterase.
  - 3) Binding of the NT to its receptor on the post-synaptic neurons.

Now, each one of the aforementioned medications acts on a specific step. For example, the antidepressants mainly target the first step that is the reuptake, as previously mentioned SSRI and SNRI, etc. And antipsychotics act on the third step in most cases by antagonizing the target receptor, as in the case of schizophrenia in which the patient suffers from high levels of dopamine in the synaptic cleft; the antipsychotic in this case antagonize dopamine receptors to block its effect.

So, when a patient presents to the clinic with a psychiatric illness: **First**, you need to diagnose his/her condition.

**Second**, you must choose the most suitable and the right drug for his/her condition. Having said that, you need to understand the **interindividual variation** in the response to any drug, which can be defined as "an effect of varying intensity occurring in different individuals at a specified dose of a drug", or as "a requirement of a range of concentrations (doses) in order to produce an effect of specified intensity in all of the patients." \*Medscape definition

So, there isn't a "drug of choice" to treat each specific illness. Patients respond differently to the same drug.

**Third**, you must select the right dose in such a way that guarantees to give the desired therapeutic effects. The dose is influenced by many factors as the gender and the age.

**Note:** Any medication that is prescribed in the sub-therapeutic dose or in the mega dose, will not give you the desired therapeutic effect!

**Fourth**, choose the route of administration depending on how severely ill the patient is. So, if you have a patient who suffers from severe psychiatric illness and in order to have a rapid response, it's better to use the IV route to reach the max plasma concentration very quickly, if not available then you go to the IM, then the subcutaneous and so on.

**Note: Ketamine** is an antidepressant that is given IV in a medical health setting (so the patient will be better within two hours).

**Esketamine** is a ketamine metabolite that is used as nasal spray.

**Fifth**, consider drug adverse effects. You have to explain the side effects to your patient precisely so that they stick to their medications.

**Sixth**, consider patient preference which refers to the individual's evaluation of dimensions of health outcomes. Always go with the medication the patients prefer, for example, a patient with a history of episodic depression is better able to tell what kind of medications they respond well to. Don't ignore what the patient has to say; you have to take their opinions into account. Another example, if a patient refuses to take a medication that results in increased body weight as an adverse effect, then don't give them that medication! The patient doctor relationship is critical throughout the treatment duration. The more trust and faith the patient has in you, the better the therapeutic outcomes.

**Seventh**, consider the cost, especially in the low-income or middle-income countries. You have to make sure that the prescribed medication is affordable.

## **Drug- Drug interaction:**

For you to be a professional doctor, you have to understand well the 1- pharmacokinetics and pharmacodynamics of the prescribed medication, and you have to know 2- if the patient takes other medications

Regarding the first point→

**Pharmacokinetics**; when the drug enters the body, it gets absorbed, then distributed, then metabolized and eventually excreted.

→Two main things that make the absorption process efficient are:

A- Good gut motility.

B- Enough fluids.

As the person grows older, the gut motility decreases, leading to decreased absorption of the drug and therefore delayed onset of action.

Regarding distribution; three factors affect it:

A- Good gut motility.

B- Enough fluids.

C- Plasma proteins, as you know drugs bind to plasma protein and become protein-bound which are metabolically inactive. Only free particles of the drug are metabolically active.

It's said that when you grow older, you will be swimming in your own fat pool. As the person grows older, he will begin to lose the muscle tissue and it will get replaced by a fat tissue resulting in increased distribution volume. So, when it come to prescribing a drug for an old patient, make sure you choose a drug with a very short half-life.

**Pharmacodynamics** refers to how the medication affects the biological functions. And pharmacokinetics refers to how the body handles the medication.

**Therapeutic index** is quantitative measurement of the relative safety of a drug. It is a comparison of the amount of a therapeutic agent that causes the therapeutic effect to the amount that causes toxicity\* Wikipedia definition.

So, a drug with a low/ narrow therapeutic index means that there are small differences between therapeutic and toxic doses as lithium. Such drugs have to be monitored precisely and a regular blood test must be done to measure the concentration the drug in the blood. As previously mentioned it is very important to know the properties of each drug, it's important to give the right dose to get the required medical outcome and to avoid the sub-therapeutic dose and the toxic dose, too.

Regarding the second point→

For example, NSAIDs as ibuprofen precipitates lithium resulting in increased plasma levels of lithium increasing the chance of lithium toxicity.

**Tolerance and dependence:** Tolerance is defined as a person's diminished response to a drug that is the result of repeated use. And in medical terms, dependence could be either; physical or mental. Physical dependence refers to a physical condition in which the body has adapted to the presence of a drug. If an individual with drug dependence stops taking that drug suddenly, that person will experience predictable and measurable symptoms, known as a withdrawal syndrome.

**At the beginning of this lecture the professor quoted William Osler; a famous Canadian physician. And he said:**

*"The good physician treats the disease; the great physician treats the patient who has the disease."*

*And "It's always better to know what kind of a patient has a disease, rather than what kind of a disease the patient has."*

Treat the patient as a whole, not only the symptoms.

And I personally think that the good doctor is someone who is willing to lighten the load his/her patients carry, a bit. The medical certificates mean nothing if you don't care about your patient and listen to what they have to tell you! We are humans before being medical students. And by that I conclude this sheet. Good luck Doctor 2016 and I hope your upcoming journey will be filled with success and joy.

Your colleague; Sohayyla Yasin Dababseh.

