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Q 1 Ans :

* Drug receptors.

Receptor is a macromolecule in the membrane or inside the cell that specifically (chemically) bind a ligand (drug). The binding of a drug to receptor depends on types of chemical bounds that can be established between drug and receptor.

Various types of drugs receptor

* Ligand-gated ion channels :

 Also commonly referred to as ionotropic receptors, are a group of transmembrane ion-channel proteins which open to allow ions such as Na⁺, K⁺, Ca²⁺, and/or Cl⁻ to pass through the membrane in response to the binding of a chemical messenger, such as a neurotransmitter

* G protein-coupled receptors (GPCRs),

 Also known as seven-(pass)-transmembrane domain receptors, 7TM receptors, heptahelical receptors, serpentine receptors, and G protein-linked receptors (GPLR), form a large group of evolutionary related proteins that are cell surface receptors that detect molecules outside the cell and activate cellular responses. Coupling with G proteins, they are called seven-transmembrane receptors because they pass through the cell membrane seven times.

* An enzyme-linked receptor,

Also known as a catalytic receptor, is a transmembrane receptor, where the binding of an extracellular ligand causes enzymatic activity on the intracellular side. Hence a catalytic receptor is an integral membrane protein possessing both enzymatic catalytic and receptor functions.

* Intracellular receptors are receptors located inside the cell rather than on its cell membrane. Classic hormones that use intracellular receptors include thyroid and steroid hormones.
* Second messengers

Are intracellular signaling molecules released by the cell in response to exposure to extracellular signaling molecules—the first messengers. (Intracellular signals, a non-local form or cell signaling, encompassing both first messengers and second messengers, are classified as juxtacrine, paracrine, and endocrine depending on the range of the signal.) Second messengers trigger physiological changes at cellular level such as proliferation, differentiation, migration, survival, apoptosis and depolarization.

QNo2 Ans :

* Drug interactions

Drug interactions involve combinations of a medication with other substances that alter the medication’s effect on the body. This can cause the medication to be less or more potent than intended or result in unexpected side effects.

If you use multiple medications, have certain health conditions, or see more than one doctor, you should be especially mindful of your medications. You also need to make sure that each of your doctors know all of the drugs, herbs, supplements, and vitamins you’re using.

Even if you take only one medication, it’s a good idea to talk with your doctor or pharmacist about what you’re using to identify possible interactions. This advice applies to both prescription and nonprescription drugs.

* Types of drug interactions

There are several different types of drug interactions to be aware of. Let’s explore each one a little further.

* Drug-drug

A drug-drug reaction is when there’s an interaction between two or more prescription drugs.

One example is the interaction between warfarin (Coumadin), an anticoagulant (blood thinner), and fluconazole (Diflucan), an antifungal medication. Taking these two drugs together can lead to a potentially dangerous increase in bleeding.

Drug-nonprescription treatment

This is a reaction between a drug and a nonprescription treatment. These include over-the-counter (OTC) medications, herbs, vitamins, or supplements.

An example of this type of interaction can occur between a diuretic — a drug that attempts to rid the body of excess water and salt — and ibuprofen (Advil). The ibuprofen may reduce the diuretic’s effectiveness because ibuprofen often causes the body to retain salt and fluid.

* Drug-food

This happens when food or beverage intake alters a drug’s effect.

For example, some statins (used to treat high cholesterol) can interact with grapefruit juice. If a person who takes one of these statins drinks a lot of grapefruit juice, too much of the drug may stay in their body, increasing their risk for liver damage or kidney failure.

Another potential outcome of the statin-grapefruit juice interaction is rhabdomyolysis. This is when skeletal muscle breaks down, releasing a protein called myoglobin into the blood. Myoglobin can go on to damage the kidneys.

* Drug-alcohol

Certain medications shouldn’t be taken with alcohol. Often, combining these drugs with alcohol can cause tiredness and delayed reactions. It can also increase your risk for negative sideDrug-alcohol

* Drug-disease

This interaction is when the use of a drug alters or worsens a condition or disease. Additionally, some medical conditions can increase the risk of side effects from specific drugs.

For example, some decongestants that people take for colds can increase blood pressure. This is a potentially dangerous interaction for people with high blood pressure (hypertension).

Another example is metformin (a diabetes drug) and kidney disease. People with kidney disease should use a lower dosage of metformin or not take it at all. This is because metformin can accumulate in the kidneys of people with this disease, increasing the risk of severe side effects

* Drug-laboratory

Some medications can interfere with specific laboratory tests. This can result in inaccurate test results.

For instance, tricyclic antidepressants have been shown to interfere with skin prick tests used to determine whether someone has certain allergies.

* Pharmacokinetic interactions

Modifications in the effect of a drug are caused by differences in the absorption, transport, distribution, metabolism or excretion of one or both of the drugs compared with the expected behavior of each drug when taken individually. These changes are basically modifications in the concentration of the drugs. In this respect, two drugs can be homergic if they have the same effect in the organism and heterergic if their effects are differendru

* Other factors in drug interactions

While it’s important to educate yourself on your potential for drug interactions, understand that this information doesn’t tell you everything you need to know. Just because a drug interaction can occur doesn’t mean it will.

* Genetics

Variations in individual genetic makeup can make the same drug work differently in different bodies.

As a result of their particular genetic code, some people process certain medications more quickly or more slowly than others.

* Weight

Some drugs are dosed according to how much a person weighs.

Weight changes could affect dosage and also increase or decrease the risk of drug interactions

* Age

As we age, our bodies change in many ways, some of which may affect how we respond to medications.

* Sex (male or female)

Differences between the sexes, such as anatomy and hormones, can play a part in drug interactions

* Types of drug interactions

Drug-drug. A drug-drug reaction is when there’s an interaction between two or more prescription drugs. ...

Drug-nonprescription treatment. This is a reaction between a drug and a nonprescription treatment. ...

Drug-food. ...

Drug-alcohol. ...

Drug-disease. ...

Drug-laboratory

QNo 3 Ans

* **General** **anesthesia**

Affects the entire body and makes the person unconscious. The unconscious person is completely unaware of what is going on and does not feel pain from the surgery or procedure. General anesthesia medicines can be injected into a vein or inhaled.

* **Local** **anesthesia**

Is any technique to induce the absence of sensation in a specific part of the body, generally for the aim of inducing local analgesia, that is, local insensitivity to pain, although other local senses may be affected as well.

* **Stages** **of** **Anesthesia**
* **Stage** I

(stage of analgesia or disorientation): from beginning of induction of general anesthesia to loss of consciousness.

* **Stage** II

(stage of excitement or delirium): from loss of consciousness to onset of automatic breathing. Eyelash reflex disappear but other reflexes remain intact and coughing, vomiting and struggling may occur; respiration can be irregular with breath-holding.

* **Stage** III

(stage of surgical anesthesia): from onset of automatic respiration to respiratory paralysis. It is divided into four planes:

* **Plane** I

– from onset of automatic respiration to cessation of eyeball movements. Eyelid reflex is lost, swallowing reflex disappears,

* ,**Plane** II

 – from cessation of eyeball movements to beginning of paralysis of intercostal muscles. Laryngeal reflex is lost although inflammation of the upper

* **Plane** III

 – from beginning to completion of intercostal muscle paralysis. Diaphragmatic respiration persists but there is progressive intercostal paralysis, pupils dilated and light reflex is abolished

* **Plane** IV

– from complete intercostal paralysis to diaphragmatic paralysis (apnea).

* **Stage** IV

: from stoppage of respiration till death. Anesthetic overdose-caused medullary paralysis with respiratory arrest and vasomotor collapse. Pupils are widely dilated and muscles are relaxed.

QNo4 Ans:

* **Heart** **Failure**

Heart failure is a chronic, progressive condition in which the heart muscle is unable to pump enough blood to meet the body’s needs for blood and oxygen. Basically, the heart can’t keep up with its workload.

Heart failure, sometimes known as congestive heart failure, occurs when your heart muscle doesn’t pump blood as well as it should. Certain conditions, such as narrowed arteries in your heart (coronary artery disease) or high blood pressure, gradually leave your heart too weak or stiff to fill and pump efficiently.

Not all conditions that lead to heart failure can be reversed, but treatments can improve the signs and symptoms of heart failure and help you live longer. Lifestyle changes — such as exercising, reducing sodium in your diet, managing stress and losing weight — can improve your quality of life.

Heart failure signs and symptoms may include:

* Shortness of breath (dyspnea) when you exert yourself or when you lie down
* Fatigue and weakness
* Swelling (edema) in your legs, ankles and feet
* Rapid or irregular heartbeat
* Reduced ability to exercise
* Persistent cough or wheezing with white or pink blood-tinged phlegm
* Increased need to urinate at night
* Swelling of your abdomen (ascites)
* Very rapid weight gain from fluid retention
* Lack of appetite and nausea
* Difficulty concentrating or decreased alertness
* Sudden, severe shortness of breath and coughing up pink, foamy mucus
* Chest pain if your heart failure is caused by a heart attack

Pathophysiology. In heart failure, the heart may not provide tissues with adequate blood for metabolic needs, and cardiac-related elevation of pulmonary or systemic venous pressures may result in organ congestion. This condition can result from abnormalities of systolic or diastolic function or, commonly, both.

**Part** **B**

**Drugs** **used** **for** **heart** **failure**

* **Angiotensin**

-converting enzyme (ACE) inhibitors. These drugs help people with systolic heart failure live longer and feel better. ACE inhibitors are a type of vasodilator, a drug that widens blood vessels to lower blood pressure, improve blood flow and decrease the workload on the heart. Examples include enalapril (Vasotec), lisinopril (Zestril) and captopril (Capoten).

* **Angiotensin** II

receptor blockers. These drugs, which include losartan (Cozaar) and valsartan (Diovan), have many of the same benefits as ACE inhibitors. They may be an alternative for people who can’t tolerate ACE inhibitors.

* **Beta** **blockers**.

 This class of drugs not only slows your heart rate and reduces blood pressure but also limits or reverses some of the damage to your heart if you have systolic heart failure. Examples include carvedilol (Coreg), metoprolol (Lopressor) and bisoprolol (Zebeta).

These medicines reduce the risk of some abnormal heart rhythms and lessen your chance of dying unexpectedly. Beta blockers may reduce signs and symptoms of heart failure, improve heart function, and help you live longer.

* Diuretics.

Often called water pills, diuretics make you urinate more frequently and keep fluid from collecting in your body. Diuretics, such as furosemide (Lasix), also decrease fluid in your lungs so you can breathe more easily.

Because diuretics make your body lose potassium and magnesium, your doctor may also prescribe supplements of these minerals. If you’re taking a diuretic, your doctor will likely monitor levels of potassium and magnesium in your blood through regular blood tests.

* **Aldosterone** **antagonists**

 These drugs include spironolactone (Aldactone) and eplerenone (Inspra). These are potassium-sparing diuretics, which also have additional properties that may help people with severe systolic heart failure live longer.

Unlike some other diuretics, spironolactone and eplerenone can raise the level of potassium in your blood to dangerous levels, so talk to your doctor if increased potassium is a concern, and learn if you need to modify your intake of food that’s high in potassium.

**Inotropes**.

These are intravenous medications used in people with severe heart failure in the hospital to improve heart pumping function and maintain blood pressure.

* **Digoxin** (**Lanoxin**) .

 This drug, also referred to as digitalis, increases the strength of your heart muscle contractions. It also tends to slow the heartbeat. Digoxin reduces heart failure symptoms in systolic heart failure. It may be more likely to be given to someone with a heart rhythm problem, such as atrial fibrillation.

QNo5 Ans

**Part** **A**

A **broad**-**spectrum** antibiotic is an antibiotic that acts on the two major bacterial groups, gram-positive and gram-negative, or any antibiotic that acts against a wide range of disease-causing bacteria.

* **Examples** of broad-spectrum antibiotics

Aminoglycosides (except for streptomycin)

1. Ampicillin.
2. Amoxicillin/clavulanic acid (Augmentin)
3. Azithromycin.
4. Carbapenems (e.g. imipenem)
5. Piperacillin/tazobactam.
6. Quinolones (e.g. ciprofloxacin)

Tetracycline-class drugs (except sarecsarecyclin

A **narrow**-**spectrum** antibiotic is an antibiotic that is only able to kill or inhibit limited species of bacteria. Examples of narrow-spectrum antibiotics include vancomycin, fidaxomicin and sarecycline

* **Examples** **of** **narrow**-**spectrum** **antibiotics** **are** **the**

Older penicillins (penG), the macrolides and vancomycin. Examples of broad-spectrum antibiotics are the aminoglycosides, the 2nd and 3rd generation cephalosporins, the quinolones and some synthetic penicillins.

* **Classification** **of** **Antibiotic** **drugs**

Antiboitics can be classified into different types based on different classification modes.

The first classification is according to the spectrum: The spectrum means the number of the organisms affected by the same drug.

* **Broad** **Spectrum** **Antibiotics**:

The Broad spectrum antibiotics affect several types of bacteria and fungi and it is usually used where the specific type of the microorganism is unknown.

* **Narrow** **spectrum** **antibiotics**:

Narrow spectrum antibiotics are used only when we know the specific type of the microorganism. These are more effective on specific microorganisms but less effective on others.

The second classification is according to the type of the action of antibiotics. Antibiotics can be divided into two classes based on their mechanism of action.

Bactericidal antibodies: They kill bacteria by inhibiting cell wall synthesis.

* **Examples** **include**:

Beta-lactam antibiotics (penicillin derivatives (penams),

Cephalosporins (cephems), monobactams,

And carbapenems) and vancomycin.

Also bactericidal are daptomycin, fluoroquinolones, metronidazole, nitrofurantoin, co-trimoxazole, telithromycin.

Bacteriostatic antibiotics: They limit the growth of bacteria by interfering with bacterial protein production, DNA replication, or other aspects of bacterial cellular metabolism. They must work together with the immune system to remove the microorganisms from the body. However, there is not always a precise distinction between them and bactericidal antibiotics. High concentrations of some bacteriostatic agents are also bactericidal, whereas low concentrations of some bacteriocidal agents are bacteriostatic

**Part B**

Antivirals are a class of medications that are used to treat viral infections. Most viral infections resolve spontaneously in immunocompetent individuals. The aim of antiviral therapy is to minimize symptoms and infectivity as well as to shorten the duration of illness. These drugs act by arresting the viral replication cycle at various stages. Currently, antiviral therapy is available only for a limited number of infections. Most of the antiviral drugs currently available are used to treat infections caused by HIV, herpes viruses, hepatitis B and C viruses, and influenza A and B viruses. Because viruses obligate intracellular parasites, it is difficult to find drug targets that interfere with viral replication without also harming the host cells.

Agents Mechanism of action Indications Adverse effects

Amantadine

Rimantadine • M2 ion channel blocker

* Weak NMDA receptor antagonist
* Influenza A
* Parkinson disease: See “Medication for Parkinson disease.”
* Neurological
* Ataxia
* Anxiety
* Gastrointestinal
* Nausea
* Vomiting
* Skin: livedo reticularis
* Other: peripheral edema
* Amantadine only
* Orthostatic dysregulation
* QT interval prolongation

Oseltamivir

Zanamivir

Peramivir • Neuraminidase inhibitor: blockage of viral budding and prevention of viral dissemination into the bloodstream by inhibiting neuraminidase enzyme • Treatment of influenza A and B (reduces symptom duration if taken within 1–2 days of symptom onset)

* Prophylaxis of influenza in adults and pediatric patients ≥ 5 years of age • Lung: upper respiratory tract infections
* Gastrointestinal
* Nausea
* Vomiting
* Other: headache