

Parkinson's Disease Management

From a Pharmacist's Perspective

Buckle up! It's about to get DEEP!!

HERE WE GO!



The Neuronal System

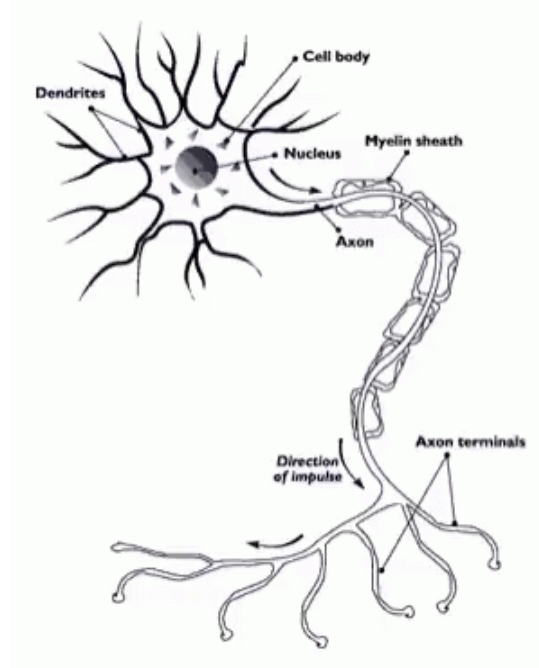
Within our nervous system, a NEURON is an electrically excitable cell that fires electrical signals across a neural network. Neurons communicate with other cells of the body via SYNAPSES which are specialized connections that use minute amounts of neurotransmitters to pass the electrical signal through the synaptic gaps.

The Three Types Of Neurons are:

1. **SENSORY** Neurons - which respond to stimuli like touch, sound or light then send signals to the brain and spinal cord
2. **MOTOR** Neurons - which receives the signals from the brain and spinal cord to control muscle contractions and glandular outputs
3. **INTERNEURONS** - connect neurons to other neurons within the same area of the brain or spinal cord.

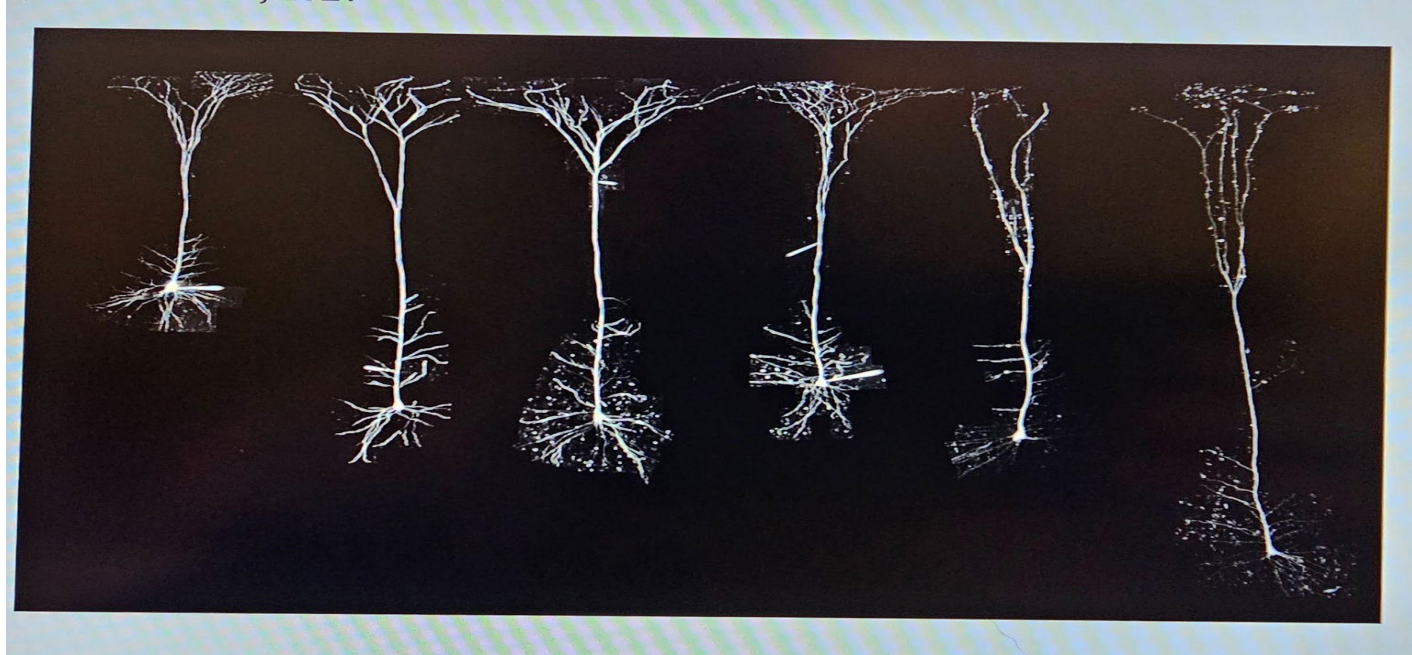
What A Neuron Looks Like...

Motor Neuron



Picture of a human Neuron

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FERRET, GUINEA PIG, RABBIT, MARMOSSET,
MACAQUE, HUMAN

Anatomy of the Neuron

The Soma is the body of the Neuron

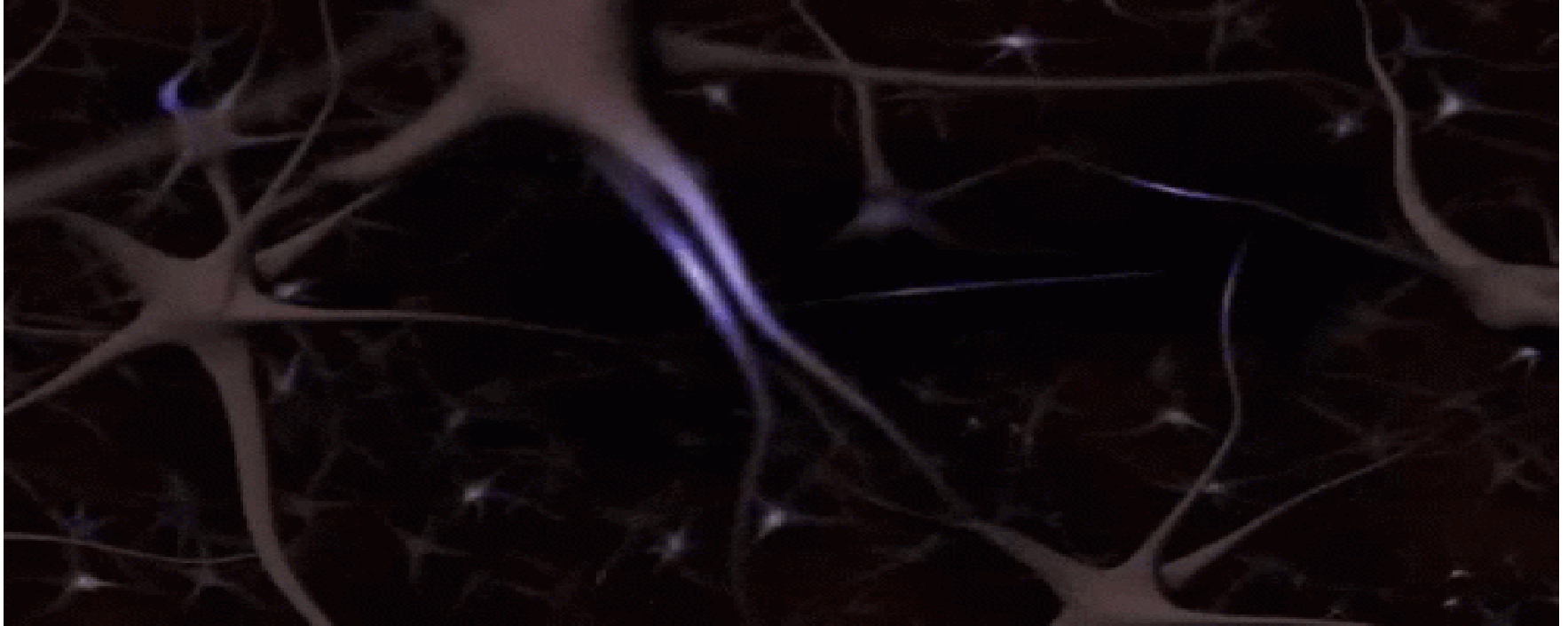
The Dendrite is the branched area where signal input occurs

The Axon is the area that carries information back and forth through its many branches

The Axon Terminal is found at the end of the Axon and it contains Synapses.

This area is where the neurotransmitters are found

Neuronal Network...



THE SYNAPSE



NEURONS MAKING A NEW CONNECTION

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Neurotransmitters

There are over 100 different neurotransmitters in the human body.

Some of the well known ones are:

- Serotonin
- Dopamine
- Norepinephrine
- Acetylcholine
- GABA —Gamma-aminobutyric acid

Dopamine has a role in several functions

1. Movement - it helps the brain to control movement and coordination
2. Mood and Emotions - it is associated with pleasure, reward and motivation
3. Reward and Motivation - When you are doing something pleasurable, the brain releases large amounts of dopamine giving a sense of pleasure and the motivation to seek more of that
4. Alertness and Focus
5. Learning - it is associated with learning, planning and productivity

Dopamine continued

Dopamine is needed to activate the pathways for motor functions

A decrease in Dopamine is responsible for the motor control symptoms of Parkinson's Disease

Pharmacologically speaking, we can increase the amount of Dopamine available to bind to receptors or decrease the destruction of Dopamine to keep it available to receptors to maintain normal motor functions

COMMON DRUG THERAPIES FOR PARKINSON'S

LEVODOPA - IS COMBINED WITH CARBIDOPA AND IS COMMERCIALY AVAILABLE UNDER THE TRADE NAME OF SINEMET.

LEVODOPA CAN PASS THROUGH THE BLOOD BRAIN BARRIER AND PASS INTO THE BRAIN REGION WHERE IT IS CONVERTED INTO DOPAMINE

CARBIDOPA IS ADDED TO LEVODOPA TO IMPROVE THE EFFECTS OF DOPAMINE. IT PREVENTS PERIPHERAL CONVERSION OF LEVODOPA TO DOPAMINE SO THAT MORE IS AVAILABLE TO GET TO THE BRAIN.

CARBIDOPA/LEVODOPA

SINEMET - is available as immediate release tablets and extended release tablets

Most common side-effects include: Nausea and vomiting, decreased appetite, lightheadedness, decreased blood pressure and confusion

** It is better to take this medicine 1 hour before or 2 hours after a protein rich meal as this decreases the absorption of the drug into the bloodstream.

Long term use of LEVODOPA may cause dyskinesia to develop. (involuntary, erratic movements of the face arms legs and trunk. This is dose related- it increases when doses of Levodopa have increased.

DOPAMINE AGONIST

DOPAMINE AGONISTS are drugs that act like Dopamine in the brain.

The most commonly used drugs of this category are : Ropinirole, Pramipexole, Neupro Patch and Apomorphine

They have a long half life -so they decrease “off time” episodes

Common side effects include: daytime sleepiness, visual hallucinations, confusion, swelling of the legs and impulsive behavior

COMT- Inhibitors

Catechol-o-methyl transferase is an enzyme that deactivates Levodopa in the body before it is absorbed into the blood stream and taken to the brain

These drugs block COMT which makes Levodopa more available to the brain.

Side Effects include : confusion, hallucinations, discoloration of the urine and diarrhea.

Common drug names are Entacapone, Tolcapone and Opicapone.

These drugs can be given with Levodopa

AMANTIDINE

This drug was originally created as an anti-flu drug.

It was found to decrease tremors in Parkinson's Patients

It can also decrease Levodopa induced dyskinesia

In patients with low kidney function, the dose must be reduced.

Common side effects include: nausea, dry mouth, lightheadedness, insomnia, confusion, pedal edema (and purple discoloration of the legs) and hallucinations

ANTICHOLINERGIC DRUGS

There is a delicate balance in the normal brain between AcetylCholine (another neurotransmitter)and Dopamine. This balance gets disturbed when Dopamine levels are reduced.

Drugs that block the effect of AcetylCholine have the potential to restore this balance.

Common drug names are : Trihexyphenidyl and Benztropine

Side Effects include: dry mouth , blurry vision , urinary retention, decreased short term memory

ADENOSINE A2a ANTAGONIST

These drugs are used with Carbidopa/Levodopa to decrease “off time” symptoms

Adenosine Receptor Antagonists act to block the receptor sites for the neurotransmitter Adenosine, which acts as a central nervous system depressant.

An interesting point.. Those people who smoke may require a higher dose because smoking causes the liver to decrease the breakdown and elimination of the drug

Common drug name is Nourianz

Actions of Adenosine

Adenosine is a neurotransmitter in the brain that regulates neuronal activity, neurotransmitter release and cerebral blood flow.

The imbalance of Adenosine and Dopamine in Parkinson's leads to motor symptoms such as tremors, rigidity and bradykinesia.

With the decrease in Dopamine there is an overactivity of Adenosine in the brain exacerbating motor symptoms

Blocking A2a Receptors leads to increased dopamine release which alleviates motor symptoms such as rigidity tremors and bradykinesia

Gut Health

YOU ARE ONLY AS HEALTHY
AS YOUR GUT!!!!!!

THE NEW FRONTIER OF STUDY

THE NEW AREA OF STUDY FOR PARKINSON'S DISEASE IS THE GUT MICROBIOME.

THE GUT IS NOT JUST FOR "WASTE". THERE IS CONSTANT COMMUNICATION BETWEEN THE BRAIN AND THE GUT.(GUT-BRAIN AXIS)

NUTRIENTS ARE ABSORBED IN THE INTESTINE AND THE BRAIN HELPS TO DIRECT THEM TO WHERE THEY ARE NEEDED.

THE HEALTH OF THE IMMUNE SYSTEM ALSO DEPENDS GREATLY ON THE GUT.

DISRUPTION IN THE GUT MICROBIOME MAY PLAY A ROLE IN THE DEVELOPMENT AND PROGRESSION OF PARKINSONS

WAYS TO IMPROVE GUT HEALTH

PREBIOTICS AND PROBIOTICS

PREBIOTICS ARE NON-DIGESTIBLE FIBERS OR COMPOUNDS THAT SERVE AS FOOD FOR BENEFICIAL BACTERIA IN THE GUT

SOURCES INCLUDE FRUITS, VEGETABLES, WHOLE GRAINS, LEGUMES AND CERTAIN TYPES OF FIBER SUPPLEMENTS

PROBIOTICS: INCLUDE LACTOBACILLUS ACIDOPHILUS, BIFIDOBACTERIUM BIFIDUM, BIFIDOBACTERIUM LACTIS AND OTHERS

BEST BRANDS ARE PHILLIPS COLON HEALTH AND FLORAGEN

PARKINSON'S MEDICATION DOSING

1. Medication timing - You should take your Parkinson's medication on an empty stomach with a glass of water. (especially carbidopa/levodopa)
2. The presence of food in the stomach will delay the absorption of your medication and delay your symptom relief
3. Water will flush the medication through the gut which will improve the absorption and enhance symptom relief

PARKINSON'S MEDICATION DOSING

CARBIDOPA/LEVODOPA uses the same transport system to get to the brain that certain amino acids (proteins) use.

There is a competition for this system between proteins and the drug which delays the absorption of the medicine

You should take your medication 1 hour before or 2 hours after a high protein meal

Parkinson's Medication Dosing cont.

CONSTIPATION

THE SLOWED MOVEMENT OF CONTENT THROUGH THE ALIMENTARY CANAL CAN AFFECT THE ABSORPTION OF MEDICATION FROM THE SMALL INTESTINE.

STAYING REGULAR WITH BOWEL MOVEMENTS IS IMPORTANT TO HELP YOUR MEDICATION MOVE THROUGH AND GET ABSORBED MORE EFFICIENTLY

MEDICATION INDUCED PARKINSON'S DYSKINESIA

DYSKINESIA - MEANS ABNORMAL MOVEMENT

IT IS OFTEN CAUSED BY LONG TERM USE OF CARBIDOPA/LEVODOPA OR OTHER RELATED MEDICATION

ONE OPTION IS TO REDUCE THE DOSE OF CARBIDOPA/LEVODOPA OR OTHER RELATED MEDICATION

OR IF NEEDED YOUR DOCTOR CAN PRESCRIBE MEDICINE TO DIRECTLY TREAT THE DYKINESIA - LIKE AMANTIDINE

MEDS AND HOSPITAL STAYS

ALWAYS MAINTAIN A COMPLETE CURRENT MEDICATION LIST TO INCLUDE DOSAGES AND TIME OF DAY THAT YOU TAKE THEM

ALSO BRING A LIST OF YOUR CURRENT SYMPTOMS AS HOSPITAL STAFF MAY NOT BE FAMILIAR WITH “ON” “OFF” SYMPTOMS

HOSPITAL STAFF SHOULD BE INFORMED ABOUT HOW YOUR MOVEMENT AND ABILITIES CHANGE DURING “ON” AND “OFF” TIMES

MEDICATIONS SHOULD BE GIVEN “ON TIME” TO PREVENT SYMPTOMS

THE WAIT STRATEGY

1. MEDICATIONS SHOULD BE STARTED IF PARKINSON'S SYMPTOMS INTERFERE WITH EVERYDAY FUNCTIONING TO IMPROVE QUALITY
2. START WITH DOPAMINE AGONIST TO LESSEN SIDE EFFECTS AND ADVERSE EVENTS
3. USE LOWEST DOSE OF CARBIDOPA/LEVODOPA INITIALLY , DOSE WILL INCREASE WITH PROGRESSION
4. THE MEDICINE DOES NOT STOP WORKING OVER TIME... BUT PROGRESSION LEADS TO MORE SYMPTOMS

QUESTIONS?