



# HOW MEDICATION WORKS



**The Right  
Dose at the  
Right Time**

*Written By: Brett LeClaire*

The majority of people, at some point in their lives, will need to take medication. Some for only a short time, and for others (like those with Parkinson disease) it will be a lifelong journey. It is important to note that everyone is unique (especially those with Parkinson's), they will take different medications and/or doses, and experience benefits and side effects differently.

As Parkinson disease is progressive the need for medication will change over time to help manage symptoms. So, it becomes integral to understand how medication works in our bodies so you can make sure you are getting the most out of each dose you are taking.

Medications can be introduced into the body in several ways including (but not limited to):

- » **Orally** (taken by mouth and swallowed)
- » **Intravenously, intramuscularly, subcutaneously, etc** (via injection)
- » **Sublingually** (under the tongue)
- » **Transdermally** (through the skin via a patch)

In this issue of the magazine, we are primarily addressing oral medications and as such will focus on that aspect of how medication works.

## How does oral medication move through our body?

When you take most oral medications, the process starts with swallowing the medication in the common form of tablets, capsules, or liquids. For some medications, absorption may begin in the mouth and stomach; however, most medications are usually absorbed in the small intestine. Medication moves down the throat and into the stomach where it starts to get broken down. It then moves into the small intestine where it is absorbed and transported via the bloodstream to its target site.

For levodopa specifically there is another unique step – it must cross the blood-brain barrier before it is finally converted into the dopamine that the body needs. The blood-brain barrier is like a protective shield for the brain, made up of tightly packed cells that prevents harmful substances from entering our most vulnerable piece of our body. Since dopamine is a chemical that cannot go across this barrier, Levodopa is used to trick the barrier into letting it

through. Other medications also use different tricks to move across this barrier so that the medication can reach its needed destination in our brains.

## Can anything effect my medication?

The answer is a resounding YES! Things that can affect your medication can typically be divided into two categories – 1) your body throwing up its own roadblocks, and 2) medication adherence. Let's start with the roadblocks.

Our bodies are very complex, and many pieces need to come together to effectively utilize our medications. There are things that can restrict the effectiveness of your doses and stop you from getting the help with your symptoms from the medication. Some of these include (but are not limited to):

- » **Your genetic makeup** can affect your response to certain medications or impact the way the body metabolises medications.
- » **Medication delivery** can be affected by the pH balance of the environment in which it occurs. The pH is a measure of acidity or alkalinity and can vary depending on the tissue, organ, or cell type being targeted for drug delivery.
- » **The intestinal walls and liver** chemically alter (metabolize) many medications, decreasing the amount of medication reaching the bloodstream.
- » **Constipation and other gastrointestinal issues** can decrease or limit the absorption rate of medication.
- » **The slowing down of your digestive track** (as it happens in Parkinson's) can also impact the efficacy of medications.
- » **Food and other drugs in the digestive tract** may affect how much of and how fast the drug is absorbed when a medication is taken orally. This is why some drugs should be taken on an empty stomach, others should be taken with food, others should not be taken with certain other medications, and still others cannot be taken orally at all.

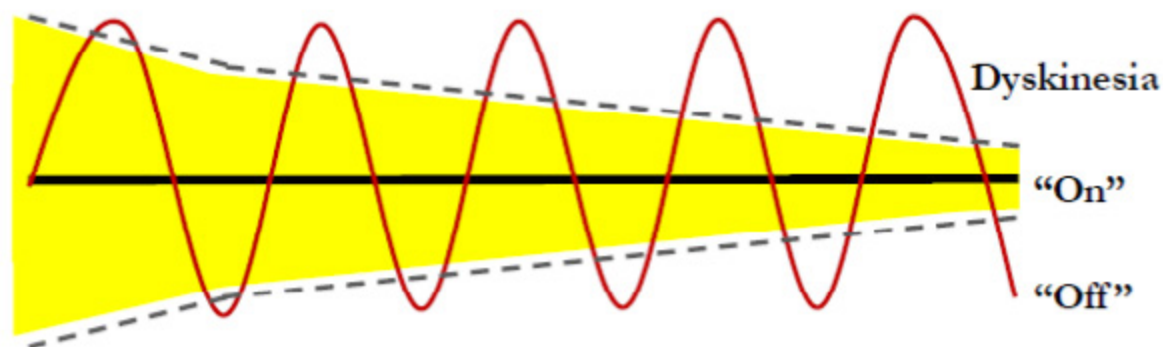
The other part of this is medication adherence. Did you know that according to research only about 50% of medication is taken as prescribed? With people often taking less (or more) than they need, taking it with (or without) something that may or may not be

beneficial, or taking it at random times, or leaving big gaps between doses – all of which can weaken effects.

- » **Taking too much or too little** of your prescribed medication can lead to a host of issues – too much can increase side effects and adversely affect health outcomes; too little and you won't have the right amount of medicine in your body at the right time to manage your illness or condition.
- » **Food, beverages, and other substances** can interact with medication metabolism and absorption, which can enhance or interfere with the effectiveness of the medication.
  - *For some people (but not all) protein can affect medication absorption. The body readily recognizes and wants protein to sustain one's systems and so it often will choose to break down and intake it over medications.*
  - *Dehydration can change how your body reacts to medication.*
  - *The body may metabolize medications differently when other substances, like caffeine, alcohol, or compounds from tobacco smoke are present.*
- » **Timing** is the number one thing that can affect our medication.



# THERAPEUTIC WINDOW



Durrough and Dygulski | 2016

It takes time for your body to transport the medication to where it needs to go and be effective; if your timing is off or erratic you may not be experiencing the most optimal effects and/or see symptoms returning prior to the release of your next dose. Further, missing a dose can have a lasting effect where the benefit you receive from your medication is negatively impacted for the next day or two.

Now these are not the only things that can influence the effectiveness of your medication; the progression of Parkinson's, stress, other medical conditions, and other medications can all change/impact how your body reacts with taking medication so make sure to be aware of how you are feeling, and your body is reacting before and after taking your medication(s). If you feel your medication may not be addressing your issues speak with your health care team to help get you back on track.

## Right dose, right time – why timing is SO important when it comes to Parkinson's (and other) medications.

Now that we've explored how medication moves throughout your body and the role played by the small intestine in absorbing medications, it is important to talk about how medication works once it is absorbed into the body. Typically, we are told by our doctors and/or pharmacists when to take our medication and I bet you have heard members of your healthcare team say something along the lines of "take your medication on time every time". What we may not be aware of is

WHY it is so important. Well we know that everyone's experience with taking medication is a little different; and we know that medication takes time to absorb and move through our system; and we know that benefits last only so long per dose. This "cycle" (as it relates to Parkinson disease) is what is referred to as going between on times or off times. On times is where your medications are effectively treating your symptoms and the medication is doing its job. And when your medication has worn off and you are in need of your next dose it is referred to as your off time. Because it takes time for a pill or tablet to make it to your small intestine then your brain, you need to be taking your medication at the directed times so that you can actively aim to be in an "on time" more consistently. This becomes your "goldilocks zone" often referred to as the therapeutic window. This is where the medicine works just right keeping you in an "on" time without causing troublesome side effects such as dyskinesia. This window can lessen over time as Parkinson's progresses and more medication is needed to help alleviate your symptoms. Finding the right amount of medication becomes more difficult and makes finding that perfect balance harder. This means that the decrease in your therapeutic window does not come from a resistance or "tolerance" to the medication but from a combination of progression and the subsequent increase in medication needed to balance out increased symptoms.

Knowing how medication works in your body has hopefully grown your understanding of the importance of timing, consistency, and whole-body health when it comes to receiving the best outcomes from your medications.