Understanding pharmacokinetics

PK

Pharmacokinetics (pharmacology + kinetics), or PK, is the study of the activity of drugs in the body. For people with hemophilia, understanding your unique PK parameters can be a useful tool when working with your doctor to optimize your hemophilia management and treatment.

PK and factor activity levels

Doctors can conduct a PK test to evaluate the factor activity levels in your blood and the severity of your hemophilia. Both are helpful when determining a treatment regimen that is right for you.

Depending on your factor activity levels, you may be categorized as having mild, moderate, or severe hemophilia. Higher levels in your body over time provide better bleed protection. This is why many people with hemophilia use regular infusions of factor replacement therapy to prevent bleeds before they start.

Standard and extended factor therapies

Since PK examines how the body absorbs, spreads around, breaks down, and eliminates drugs, it is helpful when understanding how different factor replacement therapies work to prevent or treat bleeding.

There are two types of factor therapy that are often recommended: standard half-life (SHL) and extended half-life (EHL). These therapies differ in the amount of time it takes after an infusion for factor level to go down by 50%. This is a PK parameter called half-life.

SHL factor therapies

- First-generation factor replacement therapies
- Have a half-life of about 8–12 hours

EHL factor therapies

- Designed so factor stays in the body longer
- Have about 1.5 times longer half-life than an SHL
- Provide higher factor activity levels over time for better bleed protection

It is important to remember that everyone's body is different. Age, weight, metabolism, and other factors can impact how quickly the body breaks down factor therapies. A PK test can help your doctor evaluate the factor activity levels in your blood.

Read on to learn more about key PK parameters and building a PK profile.

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Building a PK profile

PK testing typically calculates six key pharmacokinetic parameters that provide information about factor activity levels in the body. Not everyone with hemophilia needs a PK profile analysis. Your doctor may choose to estimate some of your PK information based on averages taken when studying other people with hemophilia.

If your doctor does recommend a PK profile, this will include measuring factor activity levels in blood samples taken at different times after an infusion.

Here are the steps to building a PK profile:

Step 1: Blood samples are collected at different times after infusions of factor

Step 2: The amount of factor in each blood sample is measured

Step 3: Your unique PK profile is generated based on your measurements

PK testing and hemophilia treatment

A PK profile can help your doctor optimize your factor replacement therapy. Regardless of hemophilia type, the goal of PK profiling is to manage your treatment plan, prevent bleeds, and protect joints.

Key PK Parameters

Your doctor will consider multiple parameters when optimizing your factor replacement therapy. To help understand these parameters, compare them to the data plan your smartphone uses: Everyone has different considerations that determine the right data plan for them. The same is true for your treatment plan.

Peak: Factor activity levels are the highest in the body right after an infusion. This is called the peak.

Think of peak as the start of a new billing cycle, when 100% of your data plan is available.

Half-life: The amount of time it takes for factor level to go down by 50% after an infusion. The longer the half-life of your factor is, the longer it will stay in your body to protect you from bleeds.

Think of half-life as how many days it takes you to use half of your plan.

Clearance: The speed at which factor is eliminated from the body.

Think of clearance as how quickly you use the data in your plan.

Volume of distribution (VOD): A measure of how much factor is in the blood and in other tissues in the body.

Think of VOD as how your data usage is spread across all the different apps you use.

Area under the curve (AUC): Represents the amount of factor in your body over time.

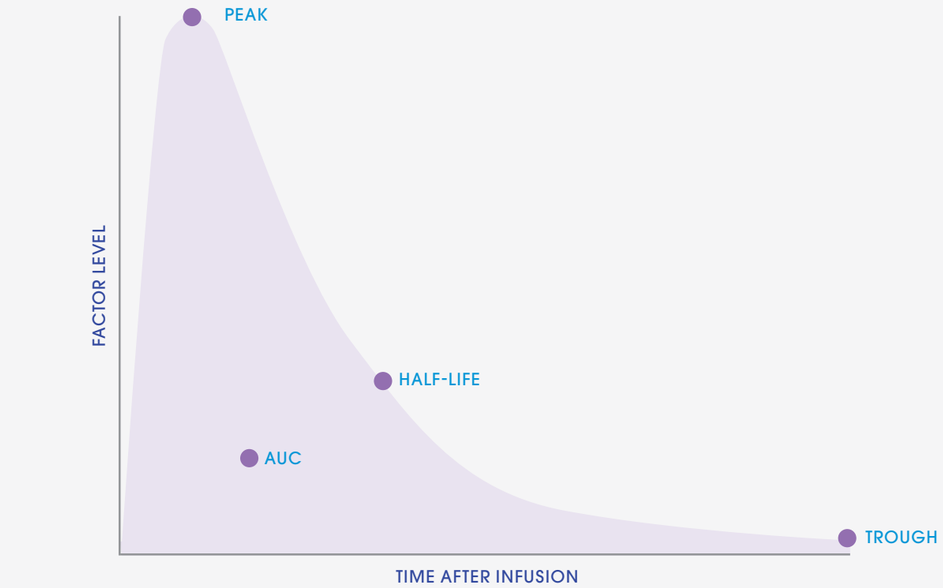
Think of AUC as the total amount of data you use in each billing cycle.

Trough: The lowest level of factor activity right before the next dose is called the trough level.

Think of trough as the data left over on your plan at the end of the billing cycle.

Visualizing PK

Depicting the key PK parameters on a graph helps illustrate changes in factor activity over time.



Clearance and VOD are not shown in this graph.

While hemophilia A and hemophilia B have similarities, there are important differences between the two that might impact how hemophilia is managed.

- A complete treatment assessment may include multiple ways of measuring factor activity levels and can help provide the full picture within the body.
- Every person is unique, and individual bleed rates, joint bleed prevention, and personal goals should be considered as part of treatment management discussions with your doctor.

Ask your doctor

Your doctor can help you understand how pharmacokinetics may impact your hemophilia treatment plan and determine if a PK test is right for you. If you and your doctor decide to do PK testing, be sure to talk through the timeline and plan in advance.

Here are a few suggestions to help start the conversation.

1. Can you help me understand the term pharmacokinetics?
2. What is the half-life of my treatment?
3. How can I ensure that I have high sustained factor activity levels?

Notes

Have more questions about hemophilia?
Ask your CoRe for additional resources to help understand your condition.

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