Clinical Study Results

Inspired by patients. Driven by science.

Study Sponsor: UCB Biopharma SRL

Treatment Studied: Pyrimidine nucleosides and nucleotides

Protocol Number: MT-1621-101

Study Purpose: An observational study to learn about the safety of pyrimidine nucleosides and nucleotides and how well they work for people living with thymidine kinase 2 deficiency (TK2d)

Thank you

UCB thanks all the participants of this observational study and their caregivers. All the participants and caregivers helped the researchers learn more about using pyrimidine nucleosides and nucleotides in people with TK2d.

This is a summary of this observational study. An independent, non-profit organization helped prepare this summary, which included feedback from patients.

We think it is important to share the results with the participants, their caregivers, and the public. We hope this summary helps the participants and their caregivers understand their important role in medical research.

The purpose of this summary is only to share information. If you or the child you care for needs medical advice, please contact your or your child's doctor. If you or the child in your care participated in this study and has questions about the results, please speak with study staff.

This summary was approved by UCB Biopharma SRL on 6 November 2026. The information in this summary is current as of this date.

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Why was the research needed?

Thymidine kinase 2 deficiency (**TK2d**) is an ultra-rare genetic disease that affects the muscles. An “ultra-rare” disease is a condition that affects fewer than 1 in 50,000 people worldwide. Genes are what give the body instructions for how to work. Genetic diseases are caused by certain harmful changes in genes.

People with TK2d have changes in a gene called ***TK2***. This gene produces an enzyme in the mitochondria that helps the body keep mitochondrial DNA healthy. **Mitochondria** are parts of cells that help make energy. The **mitochondrial DNA** is the genetic code inside the mitochondria. In people with TK2d, changes in the *TK2* gene can make it harder for the body to keep enough healthy mitochondrial DNA.

When mitochondria do not have enough healthy DNA, they may be unable to make enough energy for the muscles. This can make it harder for muscles used for movement, breathing, and eating to work as they should. People with TK2d may have muscle weakness, trouble moving, trouble breathing, and/or trouble eating. These problems can get worse over time and may be life-threatening.

Pyrimidine nucleosides and nucleotides are substances that are naturally present in the body and help the body make and repair mitochondrial DNA. In people with TK2d, there are decreased levels of pyrimidine nucleosides and nucleotides due to changes in the *TK2* gene.

Researchers sometimes do observational studies to get information about how well a treatment works and about how safe it is. One type of observational study is called a **retrospective** study where researchers review medical records of people with a certain condition. This means that the researchers collected all the information in this summary from medical records, and the participants **did not take any additional treatment** as part of the study.

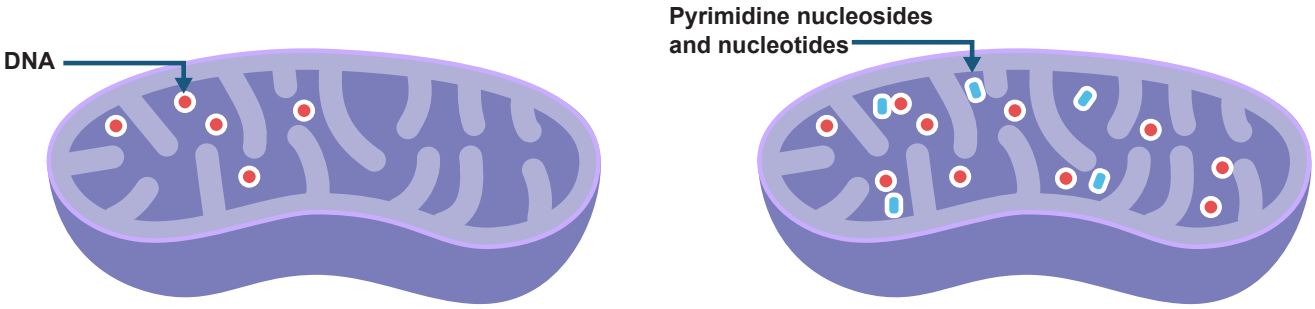
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Clinical Study Results

In this observational study, the researchers reviewed medical records from people with TK2d who had already taken pyrimidine nucleosides and nucleotides as part of their regular treatment. The researchers wanted to learn if these people with TK2d lived longer, how their overall health changed, and what medical problems happened during or after taking pyrimidine nucleosides and nucleotides.

In people with TK2d, changes in the *TK2* gene can make it harder for the body to keep enough healthy mitochondrial DNA

Pyrimidine nucleosides and nucleotides are substances that may help the body make and repair mitochondrial DNA

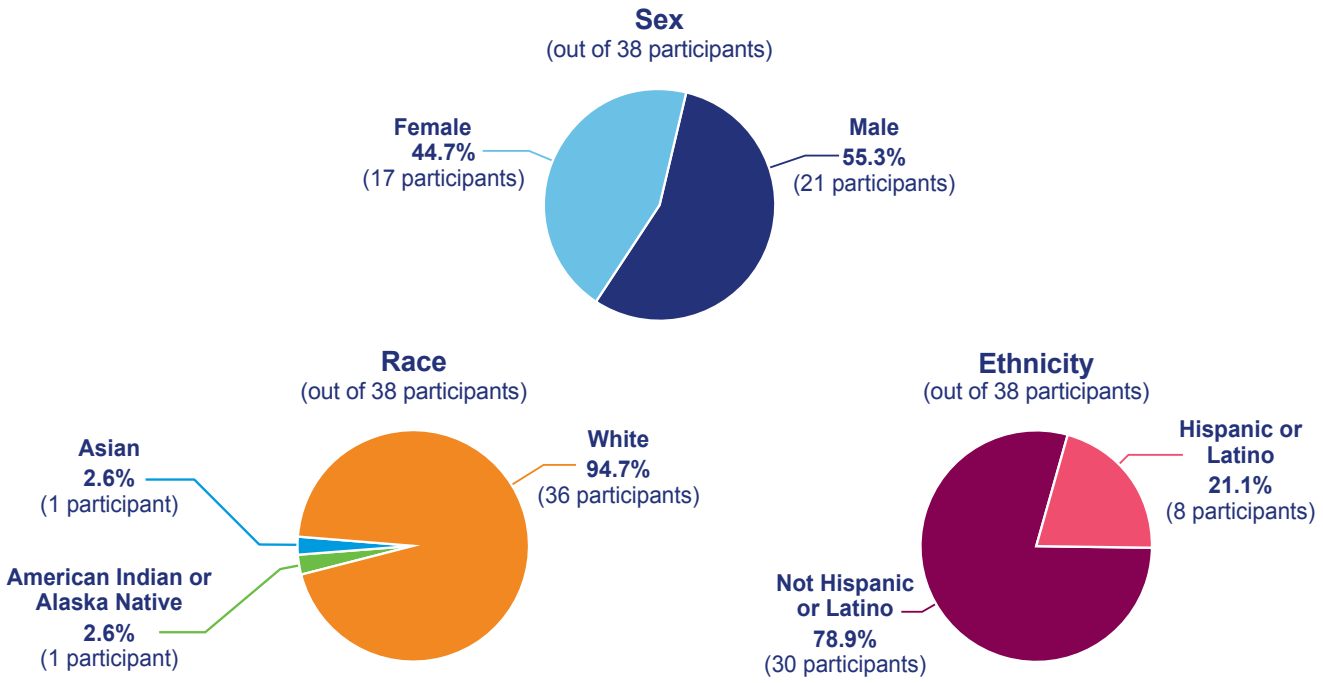


Mitochondria

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Who participated in the study?

There were 38 participants with TK2d in this study. They were 6 months to 60 years old when the study began. Most of the participants had their TK2d symptoms start at or before the age of 12 years.



In this study, the researchers included participants living with TK2d who:

- Had a confirmed change in the TK2 gene
- Had medical records available from the time their TK2d symptoms started
- Had already taken pyrimidine nucleosides and nucleotides as treatment for TK2d before joining this observational study

This study started in October 2018 and ended in March 2019.

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What treatments did the participants take?

This was an observational study. This means the researchers collected information from medical records, but the participants did not take any additional treatment as part of this study.

However, all the participants had already taken pyrimidine nucleosides and nucleotides as part of their standard medical care before this study started.

The chart below shows the people that the researchers studied:

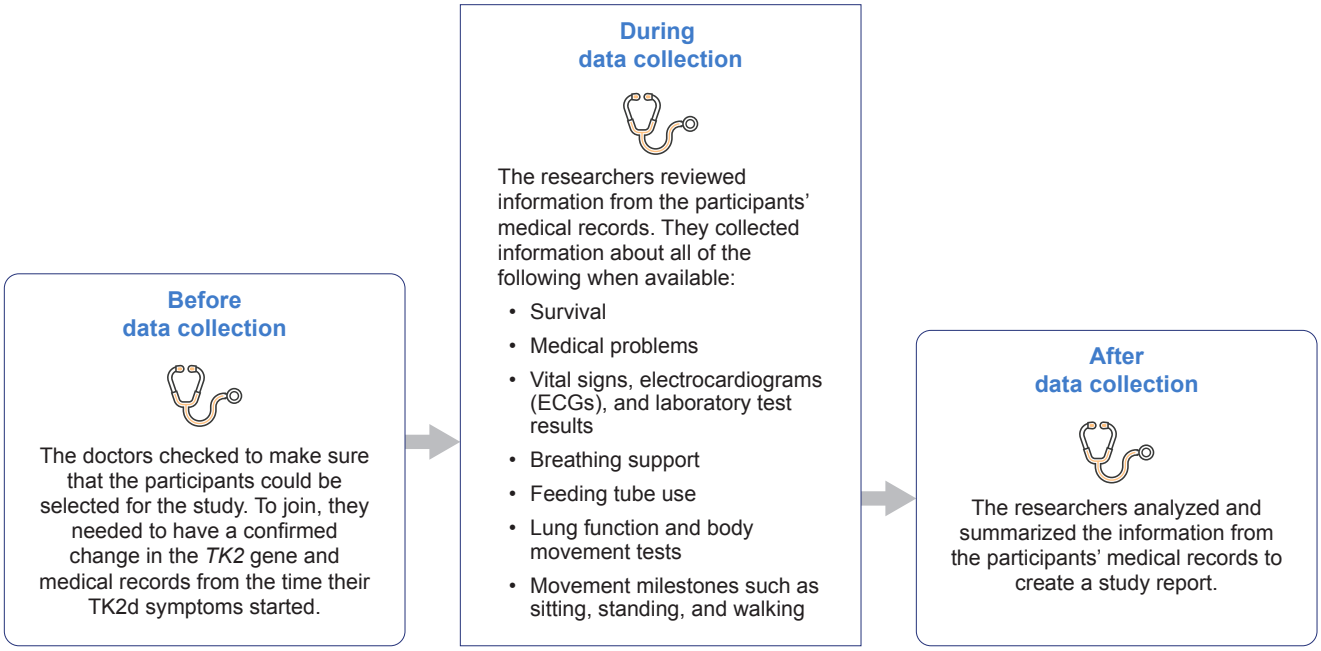
	38 participants
	The participants had taken pyrimidine nucleosides and nucleotides as part of their standard medical care.

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What happened during this study?

All the participants, and/or their parents or caregivers, first learned about the study and then decided whether to provide access to their medical records. This is called “informed consent”.

The chart below shows what happened during this observational study:



What were the results of the study?

This is a summary of some of the main results from this study. These are the results from all the participants combined. The individual results of each participant might be different and are not in this summary.

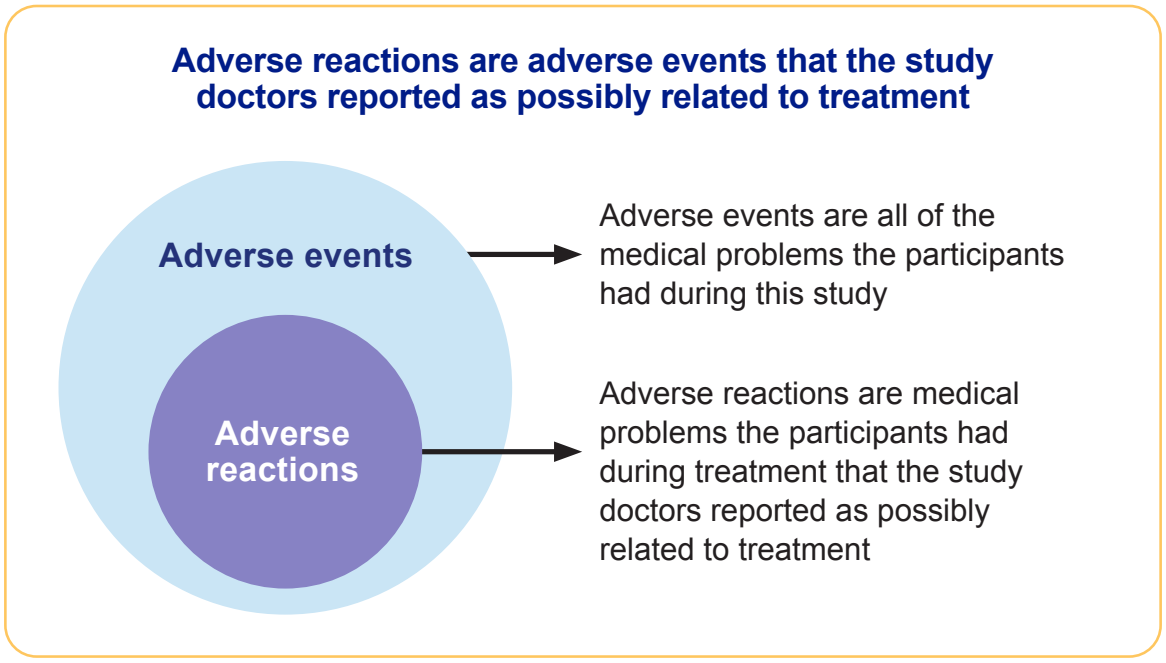
Deciding which treatments work best usually takes results from several studies. Other studies may provide new information or different results. Always talk to a doctor before making any treatment decisions.

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What did the researchers learn about the safety of the treatment?

To answer this question, the researchers reviewed medical records of tests and measurements of the participants' health taken throughout their treatment. Overall, the researchers found that these tests and measurements showed small changes to the participants' safety during the study. But, the researchers did not consider any of these changes to be significant because they were small and similar to what the researchers expected to see. The researchers found no new safety concerns about pyrimidine nucleosides and nucleotides during this study.

The researchers also looked at whether the participants had any other medical problems during their treatment. In this summary, there is information about 2 different types of medical problems that the participants had. An **adverse event** is **any** medical problem that a participant has during treatment. In clinical studies, doctors keep track of all adverse events that happen, whether or not these may be related to treatment. An **adverse reaction** is different from an adverse event because it is reported by the doctor as **possibly related** to treatment. An adverse event or adverse reaction is considered "serious" when it is life-threatening, causes lasting problems, or requires hospital care.



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The information below is a summary of the **adverse events** that happened in this study.

Adverse events in this study	
	All participants (out of 38 participants)
How many participants had **serious** adverse events?	36.8% (14 participants) 
How many participants had adverse events?	94.7% (36 participants) 
How many participants stopped taking treatment due to adverse events?	5.3% (2 participants) 

Each serious adverse event in this study happened in 2 or fewer participants. The serious adverse events that happened to 2 participants were:

- A type of lung infection called pneumonia
- Broken thigh bone, also called the femur
- Difficulty breathing due to a condition preventing the lungs from fully expanding and working properly (Restrictive pulmonary disease)
- Lungs not working properly (Chronic respiratory failure)

The most common adverse events in this study were:

- Diarrhea
- Fever
- Increased levels of the enzyme creatine phosphokinase in the blood, which can mean there is an injury to the muscle tissue
- Increased levels of a protein called alanine aminotransferase (ALT) in the blood, which may be a sign that liver or muscle cells are irritated, inflamed, or damaged

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The information below is a summary of the **adverse reactions** that happened in this study.

Adverse reactions in this study	
	All participants (out of 38 participants)
How many participants had **serious** adverse reactions?	10.5% (4 participants) 
How many participants had adverse reactions?	76.3% (29 participants) 

What serious adverse reactions did the participants have?

The table below shows the serious adverse reactions that happened during the study. Some of the participants had more than 1 serious adverse reaction.

Serious adverse reactions	
Serious adverse reaction	**All participants** (out of 38 participants)
Broken bone	2.6% (1)
Diarrhea	2.6% (1)
Feeling irritable	2.6% (1)
Kidney stones	2.6% (1)
Kidney stone removal	2.6% (1)
Seizure	2.6% (1)
Unable to urinate	2.6% (1)

None of the participants died during this study.

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What adverse reactions did the participants have?

The most common adverse reaction was diarrhea.

The table below shows the adverse reactions that happened in 3 or more participants in this study. There were other adverse reactions, but those happened in fewer participants.

Adverse reactions

Adverse reaction	**All participants** (out of 38 participants)
Diarrhea	68.4% (26)
Increased levels of a protein called alanine aminotransferase (ALT) in the blood, which may be a sign of liver or muscle cells are irritated, inflamed, or damaged.	13.2% (5)
Increased levels of a protein called aspartate aminotransferase (AST) in the blood, which may be a sign that liver or muscle cells are irritated, inflamed, or damaged	10.5% (4)
Vomiting	10.5% (4)

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Did pyrimidine nucleosides and nucleotides help people with TK2d live longer?

From the results of this study alone, the researchers could not conclude whether the study treatment helped people with TK2d live longer. However, none of the participants in this study died after they started treatment.

This result should be understood with some limitations.

- This was an observational study of participants taking pyrimidine nucleosides or nucleotides. This means that there was no group taking a different treatment or a placebo to compare the results with.
- All participants had to be alive to have a visit with the study doctors between June 1, 2018, and December 15, 2018.
- TK2d is an ultra-rare disease, so the number of people included in this study was small.

Because of these limitations, the results from this study alone cannot prove that the treatment benefited participants. But, the results can help researchers learn more about TK2d and treatment with pyrimidine nucleosides and nucleotides.

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What did the researchers learn from this study?

The results of this study have helped researchers learn more about using pyrimidine nucleosides and nucleotides for people living with TK2d.

In this study, the researchers found that:

- There were no new safety concerns. There were changes to the participants' overall health, but the changes were small and similar to what the researchers expected to see.
- 76.3% of participants (29 out of 38) had adverse reactions to treatment. Diarrhea was the most common adverse reaction, and most cases were mild or moderate.
- No participants in this study died after starting treatment. But, because of the limitations in this study, the researchers could not say for sure if the treatment helped the participants live longer.

This summary shows only some of the main results from this one study. Other studies may provide new information or different results.

The purpose of this summary is only to share information. If you need medical advice about your or your child's health or situation, please contact your or your child's doctor.

When this document was approved, further clinical studies with pyrimidine nucleosides and nucleotides were planned.

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Where can I learn more about this study?

You can find more information about this study at the website listed below:

- www.clinicaltrials.gov/ct2/show/study/NCT03701568

If you have questions about this study, UCB contact information is available at https://www.ucb.com/UCBCares.

Study Information

Protocol Number: MT-1621-101

National Clinical Trial Number: NCT03701568

Study Sponsor: UCB Biopharma SRL sponsored this study. It is referred to as UCB in this summary.

Full Study Title: A Retrospective Study of the Combination of Pyrimidine Nucleos(t)ides in Patients with Thymidine Kinase 2 Deficiency (TK2)

Thank you

Participants in clinical studies belong to a large community of people who take part in clinical research around the world. They help researchers answer important health questions and find medical treatments for patients.

CISCRP REVIEW PANEL

This summary was last updated on 6 November 2026.
The final clinical study report is dated 31 March 2023.

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