Plain Language Summary of Publication

Journal of Comparative Effectiveness Research

Prednisone and deflazacort in Duchenne muscular dystrophy: a patient perspective and plain language summary publication of the Cincinnati study

Brenda L Wong[1], Tiffany Cook[2] & Hawken Miller[3]

[1]Department of Pediatrics, University of Massachusetts Medical School, Worcester, MA, USA; [2]Former employee of CureDuchenne and caregiver author; [3]Patient author

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Summary

What is this summary about?

This is a summary of an article about the Cincinnati study, which was published in the *Journal of Comparative Effectiveness Research* in January 2020. The Cincinnati study reviewed data from 435 males with Duchenne muscular dystrophy, also known as DMD, who were treated at the Cincinnati Children's Hospital Medical Center. DMD is a rare disease that worsens over time. People with DMD experience inflammation in their muscles and muscle loss over time. They also experience bone problems such as an abnormally bent spine, also known as scoliosis, as well as heart and lung problems.

How to say (double click to play sound)...
- **Duchenne:** doo-SHEN
- **Dystrophy:** DIS-truh-fee
- **Prednisone:** PRED-niz-own
- **Deflazacort:** deh-FLAZ-uh-kort

What happened in the Cincinnati study?

Prednisone and **deflazacort** are steroids that help to reduce muscle inflammation and are used as treatments for DMD. The study researchers wanted to further understand the differences between using **prednisone** and **deflazacort** in males with DMD by reviewing data from past medical records of patients seen in clinics rather than in clinical studies. This is known as gathering real-world evidence. In the Cincinnati study, the researchers compared males with DMD who started taking **prednisone** as their first steroid treatment with males who started taking **deflazacort** as their first steroid treatment.

What were the results?

Overall, the researchers found that the participants who took **deflazacort** were able to walk until a later age before they needed to use a wheelchair, compared with those who took **prednisone**. They also had a lower risk of scoliosis and developed it at a later age.

What do the results of the study mean?

These results helped the researchers to learn more about the differences between how well **prednisone** and **deflazacort** work in males with DMD based on their medical records.

Where can I find the original article on which this summary is based?

You can read the original article published in the *Journal of Comparative Effectiveness Research* for free at: https://www.futuremedicine.com/doi/10.2217/cer-2019-0170

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Who is this article for?

This summary is co-authored by a patient, a caregiver and a treating physician. It includes the patient perspective to help patients with DMD and their caregivers to understand the results of the Cincinnati study. It may also be helpful for anyone who may be interested in understanding treatment options for patients with DMD. This could include patient advocates, healthcare professionals, medical students, researchers, or people working for medical insurance companies.

What is Duchenne muscular dystrophy?

Duchenne muscular dystrophy is also known as DMD. DMD is a rare disease that affects about **1 in 3500** newborn males.

DMD is genetic, meaning it is present from birth and is caused by a change in a gene that is usually passed down from the mother to their sons, but may sometimes happen randomly.

A change in a gene is also called a **mutation**. People with DMD have a mutation in a gene that makes a muscle protein called **dystrophin**. Dystrophin is important for keeping muscles intact, healthy and working. Mutations in the DMD gene mean that dystrophin is of abnormal size or absent. This leads to muscular damage that worsens over time.

The typical life expectancy without treatment for a person with DMD is about **22 years**. There is no cure for DMD, but there are treatments for symptoms and also for some specific types of DMD mutations.

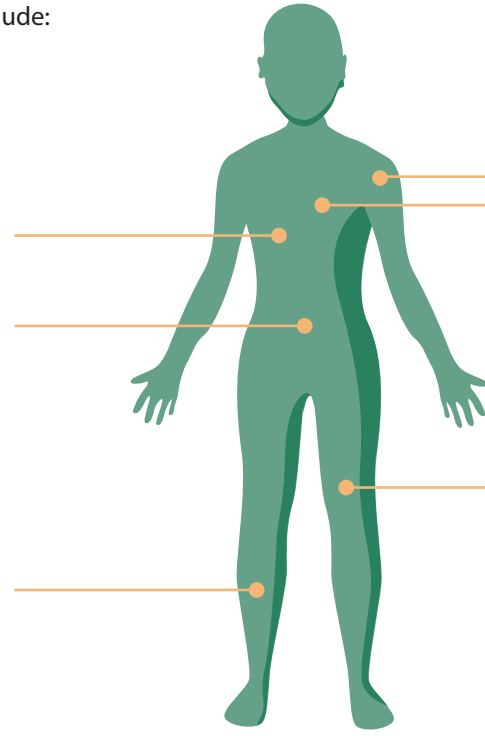
Author's note

The numbers shown in this section were considered correct at the time the article on which this summary is based was published in January 2020. Since then, doctors now think that:

- DMD affects up to 1 in 5000 newborn males
- the typical life expectancy for a person with DMD is about 28 years.

These numbers were published in a different article, entitled "Life expectancy in duchenne muscular dystrophy", which was published in *Neurology* in October 2021. You can read this article for free at https://n.neurology.org/content/97/23/e2304.

The signs and symptoms of DMD include:



Muscle loss over time.

Heart problems such as decreased heart function and irregular heartbeats.

Lung problems such as infections and difficulty breathing.

Abnormally bent spine, known as **scoliosis**.

Reduced ability to walk and move around easily, known as reduced **ambulatory function**. As symptoms get worse, people with DMD usually need mobility aids such as wheelchairs.

Fragile bones that are more likely to break, known as having low **bone density**. Steroid treatments such as prednisone and deflazacort can make this symptom worse.

What are prednisone and deflazacort?

Prednisone and **deflazacort** are both steroid treatments, known as **corticosteroids or glucocorticoids**, that people with DMD can take as tablets or liquids by mouth. They work by reducing inflammation in the muscles. Reducing inflammation can help slow the progression of DMD symptoms.

However, using steroids for a long time can cause other problems, such as slow growth, increased weight and increased risk of low **bone density**.

Why was this study needed?

Researchers have already performed clinical studies that have shown **prednisone** and **deflazacort** can slow the progression of DMD symptoms for the participants of those studies.

The researchers in this study wanted to find out about the differences between using **prednisone** and **deflazacort** in males with DMD who are not in clinical studies.

To do this, the researchers looked at data from the past medical records of patients with DMD who were seen in clinics. This type of study is known as a **retrospective, real-world study**.

This means that the researchers only looked at data that already existed to see how people respond to treatments in their day-to-day lives, to help to guide future healthcare decisions.

Who took part in this study?

435 males with DMD were included in this study

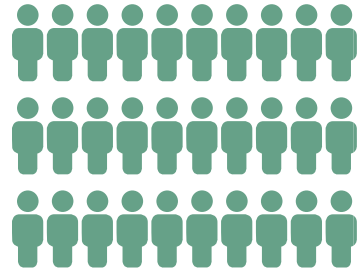
The participants were patients at Cincinnati Children's Hospital Medical Center, also known as **CCHMC**.

The researchers used the data from males with DMD who had started taking either **prednisone** or **deflazacort** between 2004 and 2017. The participants or their caregivers provided consent for the researchers to use their data.

The participants included:

105 participants who started taking prednisone as their first steroid

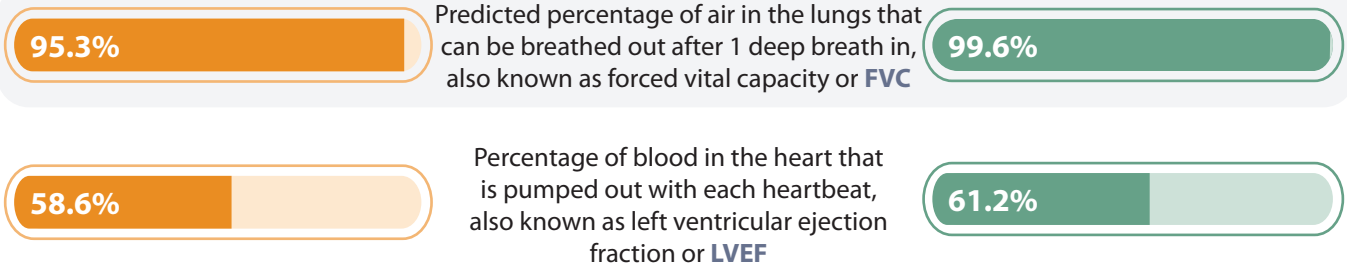
330 participants who started taking deflazacort as their first steroid



Below are some of the average characteristics and the scores of tests done in the clinic at the time when the participants first started taking steroids.

7.9 years	Age when started visiting CCHMC	6.0 years
125.4 centimeters	Height	113.2 centimeters
33.0 kilograms	Weight	24.2 kilograms
19.7 BMI	Body mass index, also known as **BMI**	18.1 BMI
64.1%	Percentage of body weight from muscles and organs, also known as **lean body mass**	70.0%
6.4 years	Age when started taking steroids	5.7 years
67.7% (69 participants)	Percentage of participants who started taking their first steroid every day	95.1% (310 participants)
41.9% Switched to deflazacort (44 participants)	Percentage of participants who switched to the other steroid during their time at CCHMC	4.2% Switched to prednisone (14 participants)
2.5	**Ambulatory function**, measured using a score on the Functional Mobility Scale, also known as **FMS**. FMS is scored between 0 and 6 based on a person's ability to walk and move around. A higher score means worse ambulatory function	1.9

4.7 seconds	Time taken to stand up from sitting	2.8 seconds
5.8 seconds	Time taken to walk or run 30 feet	5.2 seconds
3.6 seconds	Time taken to climb 4 stairs	3.7 seconds



What was the purpose of this study?

Some of the main questions the researchers wanted to answer in this study were:

- How old were the participants when they were no longer able to walk?
- How old were the participants when scoliosis was diagnosed?
- Were there any important differences in the various clinical test scores between the participants who took **prednisone** and the participants who took **deflazacort**?

What were the results of this study?

The information needed to answer the first 2 questions was not available for all of the participants. So, the results below are for a smaller group of participants than the total of 435 in the study.

1 How old were the participants when they were no longer able to walk?

To answer this question, the researchers looked at the participants' past medical records to determine the age at which they were no longer able to walk. The researchers used the participants' **FMS** scores from their clinic visits. A high **FMS** score means that someone's ability to walk is reduced. An **FMS** score of 4 or more usually means that someone is no longer able to walk and requires a wheelchair.

The researchers found that the average age at which the participants had an **FMS** score of 4 or more was:

13.5 years old
for the participants who took **prednisone**

15.6 years old
for the participants who took **deflazacort**

From these results, the researchers calculated that the participants who took **deflazacort** were 53% less likely to get to an **FMS** score of 4 or more and lose the ability to walk than the participants who took **prednisone**.

2 How old were the participants when scoliosis was diagnosed?

To answer this question, the researchers looked at the participants' medical records to determine the age of the participants when **scoliosis** was diagnosed.

Overall, the researchers calculated that the average age of participants when scoliosis was diagnosed was **18.6 years old** for those who took **prednisone**.

They could not calculate the average age when scoliosis was diagnosed for the participants who took **deflazacort** because many of these participants had not yet developed scoliosis.

Overall, the researchers found that fewer participants in the **deflazacort** group developed scoliosis than participants in the **prednisone** group. To be able to determine an average age for the participants taking **deflazacort**, the researchers will need to study this question again after more time has passed and the participants are older.

3 Were there any important differences in the various clinical test scores between the participants who took prednisone and the participants who took deflazacort?

To answer this question, the researchers looked at the differences in the scores from various clinical tests comparing the participants who took **prednisone** as their first steroid with the participants who took **deflazacort** as their first steroid. The researchers calculated which group of participants had better average scores in each test during their time at CCHMC.

These results are shown below:

Clinical test	Which group of participants had better better average results?	
	Prednisone	Deflazacort
Height	✓	
Weight		✓
Percentage of **lean body mass**		✓
Percentage of body weight from fat		✓
Time taken to stand up from sitting		✓
Time taken to walk or run 30 feet		✓
Time taken to climb 4 stairs		✓
Predicted **FVC**		✓
LVEF	No notable differences between groups	
Bone density	No notable differences between groups	

What do the results of this study mean?

Overall, the results of this study helped to confirm what researchers already thought about using **prednisone** or **deflazacort** for DMD. This was that **deflazacort** further slowed the progression of DMD symptoms compared with **prednisone**.

These results helped the researchers to learn more about the differences between **prednisone** and **deflazacort** in males with DMD who are not in clinical studies.

What does this study mean for the patient community?

This section has been answered by the patient author:

"The decision to begin steroid use is a difficult one for many DMD families. They must weigh the side effects (weight gain, growth stunting, weaker bones) with the reduction of inflammation, and as this study shows, improved ambulation for longer.

What the results of this study tell me is that the benefits to steroid use outweigh the negative side effects. I've been able to successfully manage weight gain with portion control and a healthy diet with plenty of fruits and vegetables. I used human growth hormone to help make up for my short stature because of **deflazacort**. And I've taken alendronate, a medication that prevents osteoporosis, to strengthen my bones.

As a result, I was able to walk unassisted until 18 and my heart and pulmonary function are far higher than what is expected for someone with DMD. This is a variable disease, of course, but I believe a lot of my success in overcoming DMD is owed to long-term steroid use since I was around 6 years old (I'm now 25). It's important, however, to get the input of the patient and gauge whether they are willing to sacrifice going through puberty later or have a risk of gaining weight, among other side effects. Dealing with the side effects is by no means easy, but I believe it's worth it in the long run."

– H Miller

Glossary of abbreviations used in this summary

Ambulatory function
The ability to walk and move around easily.

BMI
Body mass index, a measurement of height and weight used to analyze if your weight is healthy.

Bone density
A measurement of how dense and strong bones are.

CCHMC
Cincinnati Children's Hospital Medical Center, where the participants in this study were all patients.

Corticosteroid or glucocorticoid
A category of steroid treatments that includes prednisone and deflazacort.

Dystrophin
A protein that helps to keep muscles intact, healthy and working.

FMS
Functional Mobility Scale, a way to measure ambulatory function. FMS is scored between 0 and 6 based on a person's ability to walk and move around. A higher score means worse ambulatory function.

FVC
Forced vital capacity, the percentage of air in the lungs that can be breathed out after 1 deep breath in.

Lean body mass
The percentage of body weight from muscles and organs.

LVEF
Left ventricular ejection fraction, the percentage of blood in the heart that is pumped out with each heartbeat.

Mutation
A change in a gene.

Retrospective, real-world study
A type of study that looks at past medical data from people who are not in clinical studies.

Scoliosis
An abnormally bent spine.

Where can readers find more information on this study?

The original article this summary is based on, entitled "Real-world outcomes of long-term prednisone and deflazacort use in patients with Duchenne muscular dystrophy; experience at a single, large care center", was published in the *Journal of Comparative Effectiveness Research* in January 2020. You can read the original article for free at:
https://www.futuremedicine.com/doi/10.2217/cer-2019-0170

Educational resources

You can find out more information about the research, care and community of Duchenne muscular dystrophy at:
www.cureduchenne.org

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Financial & competing interests disclosure
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