

# Orthostatic Intolerance: What the body does when you stand up POTS, NMH, and Fainting

By Kay E. Jewell, MD  
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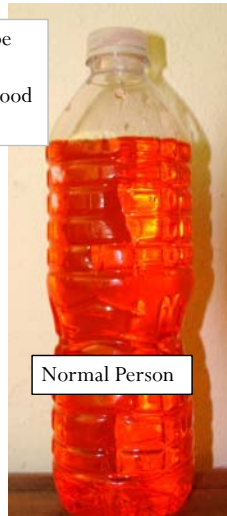
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## Refresher: Amount of Blood in a 'Normal' Person

This would be the 'Normal' amount of blood in the body.



Normal Person

This is where the blood level drops to right after a person with a 'normal' system stands up.

- The 300-800 ml pooled in the legs.



Normal Person Standing Up  
Blood Drops to the Legs

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## With Orthostatic Intolerance: The Amount of Blood in the Body Changes



With **orthostatic intolerance**, the amount of blood in the body is lower than 'normal'.

It is about 300 - 400 ml lower.

It starts out about here.

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## Orthostatic Intolerance: Shift in Blood with Standing Up



This is where the blood **starts** in a person with Orthostatic Intolerance

As you can see – it's below the level that gets enough blood back to the heart.

This means the heart does not have enough blood to send out to the head & body even it was adjusted to standing up.

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### Person with Orthostatic Intolerance: Shift in Blood with Standing Up



Amount of blood in the body to start  
**Person with orthostatic intolerance.**



Shift in the blood when you stand up.  
**Person with orthostatic intolerance.**

When you stand up, gravity pulls 300 to 800 ml of the blood down to the legs and abdomen.

### Orthostatic Intolerance: Shift in Blood with Standing Up



Amount of blood in the body  
**Person with orthostatic intolerance.**




Shift in the blood when you stand up.  
**Person with orthostatic intolerance.**

As you can see – it's way below the level that gets enough blood back to the heart.

### With Orthostatic Intolerance

The body's reaction to the blood pooling in the legs



**SITUATION:**  
There isn't enough blood getting to the heart for it to pump to the brain and body.


**STEP 1:**  
The baroreceptors in neck and aorta send a loud message to the brain:  
"Not enough blood – send help now!"

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### With Orthostatic Intolerance

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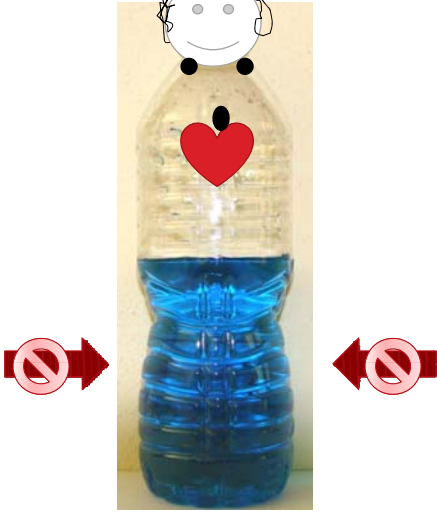
**BUT** the baroreceptors have changed their sensitivity.

- They react more slowly.
- The message they send does not match the situation.

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With Orthostatic Intolerance –  
The message doesn't go through right



The brain sends a chemical message to the body but it doesn't go through right .


Things don't happen the way they're supposed to.

- The blood vessels don't tighten up.
- The blood does not get sent back to the heart.

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What happens?



1. The blood stays pooled in the veins of the legs and abdomen.
2. The heart doesn't get enough blood coming back to it. It doesn't have enough to pump the blood to the head and body that it needs.
3. If the brain and body don't get enough blood from the heart - they start to 'hurt'

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## Symptoms of not getting enough blood



**The head** – gets dizzy, light headed.  
Might get a headache at the top of the head.

**The brain** – can hurt – headache. Also  
fuzzy thinking, confusion, problem  
finding words, memory problem.

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## Symptoms with Orthostatic Intolerance



**Eyes** – get spots, tunnel vision.

**Ears** – things sound distant, strange  
sounds.

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## Symptoms of Orthostatic Intolerance



### Lungs – Breathing

People start breathing fast before there are changes in blood pressure or pulse.

The lungs are not getting enough blood to pick up oxygen. The blood with oxygen is supposed to go from the lungs back to the heart and out to the body.

In some cases of continuing to stand up, the blood has low oxygen and changes in the carbon dioxide.

- A person feels 'short of breath' – they can't 'catch their breath'.
- Some have trouble taking a deep breath, they take fast, shallow breaths.

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## Symptoms with Orthostatic Intolerance



### Stomach & Intestines

The body shuts down the blood to the stomach and intestine. It sends the blood to the head & brain.

People get different symptoms:

- First one – nausea
- Indigestion
- GERD= esophageal reflux
- Gastroparesis – slow emptying of the stomach
- Pain especially after eating
- Diarrhea
- Constipation
- Irritable Bowel Syndrome

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## Symptoms with Orthostatic Intolerance



### Back of the head, neck, shoulders (between the shoulder blades)

- The muscles don't get enough blood.
- They 'ache' – hurt!
- This is called 'coat-hanger headache'

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## Symptoms with Orthostatic Intolerance



### Afterward

The whole body hasn't been getting the blood it needs which includes oxygen and nutrition.

This affects everything - the muscles, nerves, organs, and all body parts & cells.

Everything 'hurts'.



**Fatigue – (Super Tired)**

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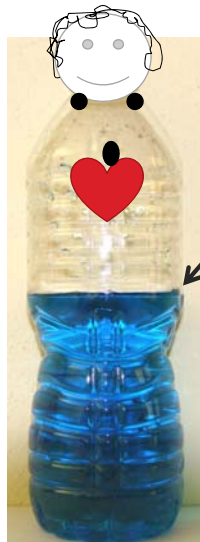


## What else happens with the blood pressure and pulse?

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### Here's a summary of what's happening



1. Blood volume is low to start.
2. With standing,
  - blood pools in the legs.
  - less blood gets back to the heart for it to pump out.

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### Situation with Orthostatic Intolerance

**STEP 3. The brain sends a chemical message to the body.**

This will... back  
up to... heart.

Tells the ves...  
get smaller.

- The blood vessels don't respond. They don't tighten up.
- They stay open.
- Blood stays pooled in the legs.

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### CASE #1: Orthostatic Intolerance

**STEP 3: The brain sends a chemical message to the body.**

**The Heart reacts.**

- It tries to pump harder.
- It does pump (beats) faster to move the blood out faster.


**SITUATION:**

1. Blood volume is too low.
2. Blood stays pooled in the legs.

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**WHEN ALL THIS HAPPENS**



It's not enough - not enough blood is getting out to the head, the brain & the rest of the body.

**BUT**

**3. The Heart reacts.**

- It does pumps (beats) faster to move the blood out faster.
- It tries to pump harder.

**SITUATION:**

1. Blood volume is too low.
2. Blood stays pooled in the legs.

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When all this happens - the person gets



4. Not enough blood gets out to the head, the brain and the rest of the body.

**Orthostatic Symptoms:**  
Lightheaded, nauseated, vision/hearing change, weak

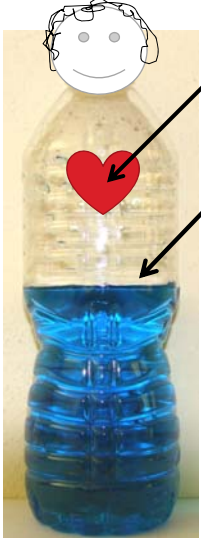
1. Blood volume is too low.

2. Blood stays pooled in the legs.

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### Case #1: If the person has



1. Fast heart rate
- +
2. Low amount of blood in the body, which pools in the legs
- +

**Orthostatic Symptoms**

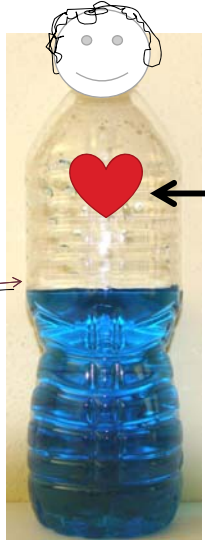
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**Postural Orthostatic Tachycardia Syndrome (POTS)**

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### CASE #2: Orthostatic Intolerance



**SITUATION:**

1. Blood volume is too low.
2. Blood stays pooled in the legs.

**STEP 3: The brain sends a chemical message to the body.**

**The Heart doesn't react the same.**

- It doesn't beat (pump) any faster.
- It doesn't pump harder

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### CASE #2: Orthostatic Intolerance

SITUATION:

1. Blood volume is too low.
2. Blood stays pooled in the legs.

STEP 3: The brain sends a chemical message to the body.

The Heart doesn't react the same.

- It doesn't beat (pump) any faster.
- It doesn't pump harder

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### Case #2 - Orthostatic Intolerance


If the heart is NOT pumping harder or faster  
AND  
the amount of blood coming into the heart is low

**The Blood Pressure has to go down.**

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### Case #2 - Orthostatic Intolerance



**If the Blood Pressure goes down**


**Orthostatic Symptoms:**  
Lightheaded, nauseated, vision/hearing change, weak

**SITUATION:**  
1. Blood volume is too low.  
2. Blood stays pooled in the legs.

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### Case #2 - If



**The Pulse doesn't change**

**+**

**The BP goes down**

**+**

**Orthostatic Symptoms:**  
Lightheaded, nauseated, vision/hearing change, weak


**||**

**Neurally-Mediated Hypotension (NMH)**

**SITUATION:**  
1. Blood volume is too low.  
2. Blood stays pooled in the legs.

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### Case #3 - Orthostatic Intolerance



**SITUATION:**

1. Blood volume is too low.
2. Blood stays pooled in the legs.

Pulse goes **DOWN** (slower)

+


The BP goes **DOWN** (even lower)

↓

**Orthostatic Symptoms:**  
Lightheaded, nauseated, vision/hearing change, weak

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### Case #3 - If



**SITUATION:**

1. Blood volume is too low.
2. Blood stays pooled in the legs.

The Pulse goes **DOWN** (slower)

+

The BP goes **DOWN** (even lower)

+

**Orthostatic Symptoms:**  
Lightheaded, nauseated, vision/hearing change, weak

||

**Faint**

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## What can you do about the orthostatic changes and symptoms?

NEXT

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