

PowerNap

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What is Obstructive Sleep Apnea?

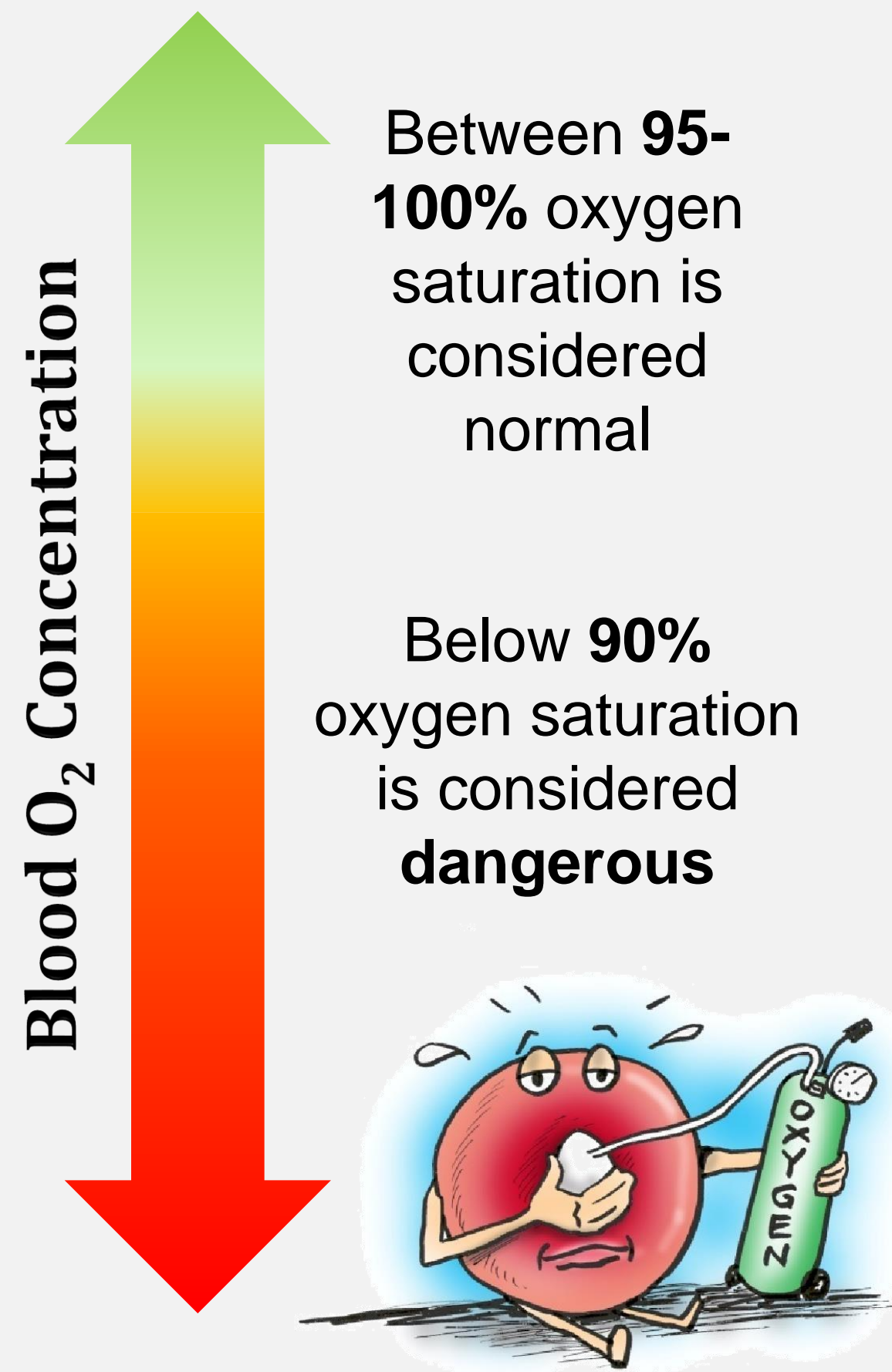
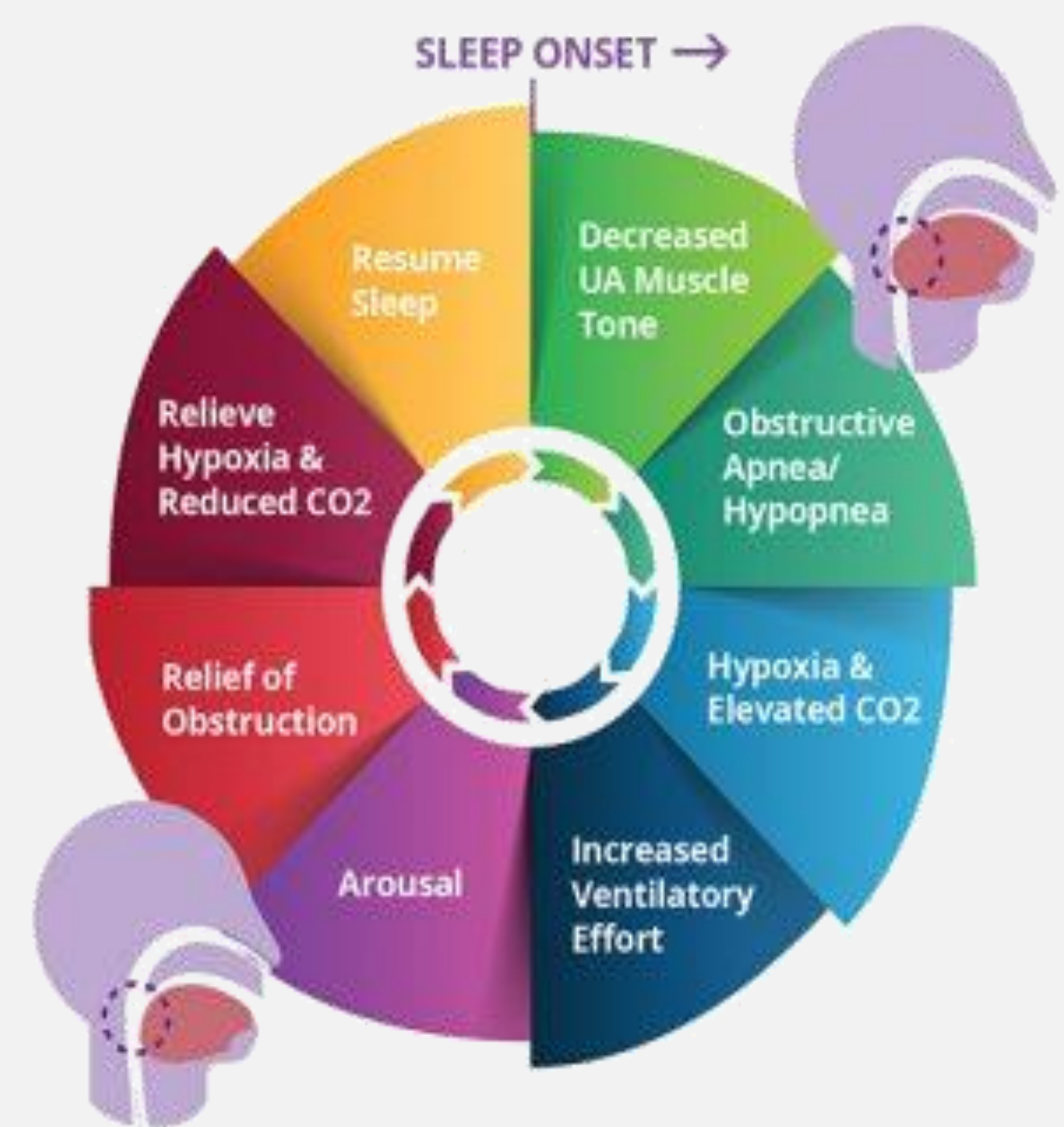
PowerNap: An Electrically Stimulating Oral Appliance

How does pulse oximetry work?

During sleep, the airway becomes **obstructed**, or blocked.



This causes the amount of oxygen in the blood to **drop** to dangerous levels. This causes the brain to wake up patients from sleep, disrupting the sleep cycle.



Symptoms of OSA include **snoring, difficulty concentrating, abrupt awakening, and daytime sleepiness**. If left untreated, patients with OSA are at higher risk of cardiovascular issues like **high blood pressure** or **congestive heart failure**.

What is PowerNap?

Our device depends on **pulse oximetry** to monitor how a patient is breathing throughout the night.

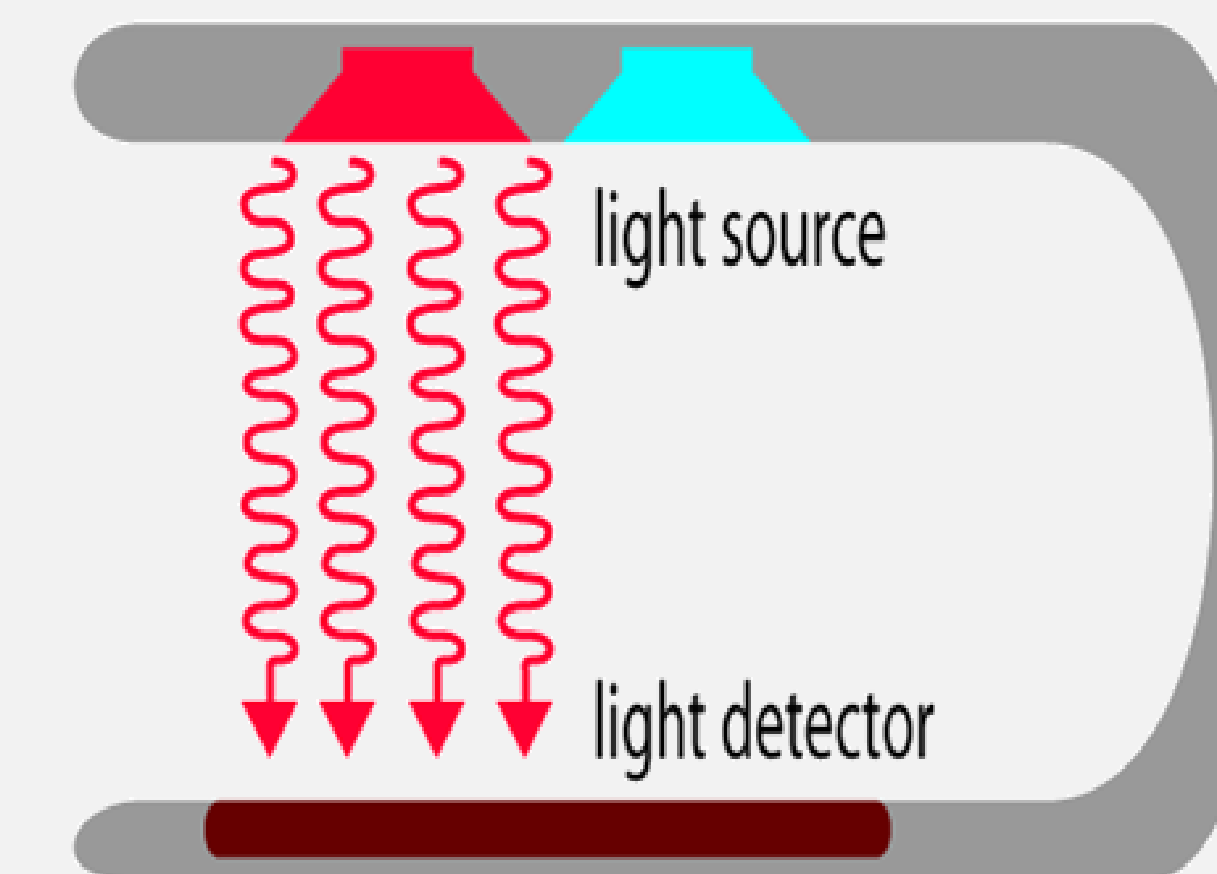
If a patient's blood oxygen level drops too low, our device is designed to respond with **electrical stimulation** to the soft palate. The stimulation clears the airway, allowing patients to breathe easy!



- High blood pressure - 37% also have sleep apnea
- Drug-resistant high blood pressure - 83% also have sleep apnea
- Atrial fibrillation - 49% also have sleep apnea
- Males with congestive heart failure - 76% also have sleep apnea

References:
 "Video: What happens during obstructive sleep apnea?" *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 8 July 2016, www.mayoclinic.org/diseases-conditions/sleep-apnea/multimedia/obstructive-sleep-apnea/vid-20084717.
 Image Sources:
 "Alabama Sleep Clinic." *Alabama Sleep Clinic*, www.alabamasleepclinic.com/sleep-disorders/sleep-apnea.
 "Can Sleep Services Inc." *Can Sleep Services Inc.*, www.cansleep.ca/sleep-chat/page/2/.
 "Derry Medical Services." *Derry Medical Services*, derrymedicalservices.com/derry-medical-center/services/sleep-medicine-program/.
 "How Equipment Works: Pulse Oximeters." *How Equipment Works: Pulse Oximeters*, www.howequipmentworks.com/pulse_oximeter/.

Pulse Oximetry depends on the emission of **light** to determine how much oxygen is in the blood.



Based on how much light is absorbed after being passed through the body, the oxygen concentration can be calculated! How? Blood with a lot of oxygen has a different **absorbance** than blood with only a little bit.

Try it yourself!

Help us find out if blowing up a balloon changes your blood oxygen levels!