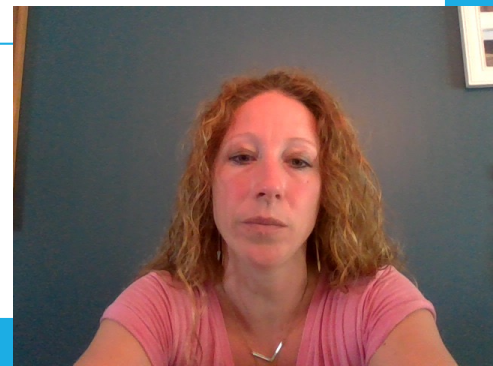


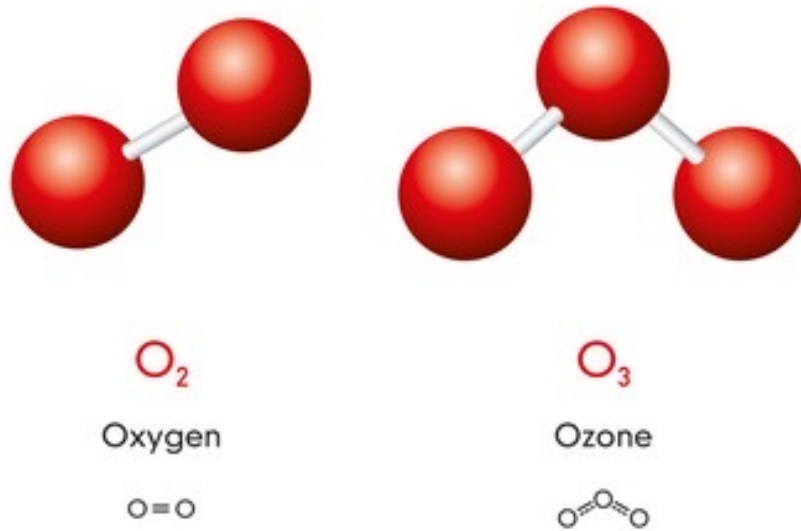


# OZONE

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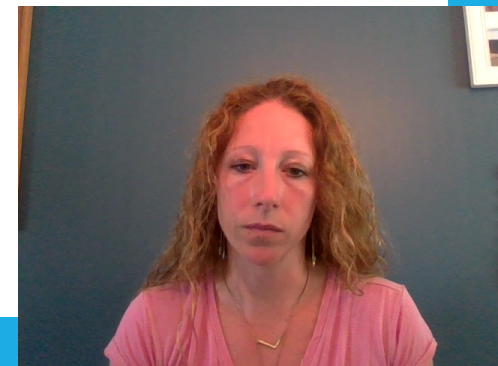


# What is Ozone?

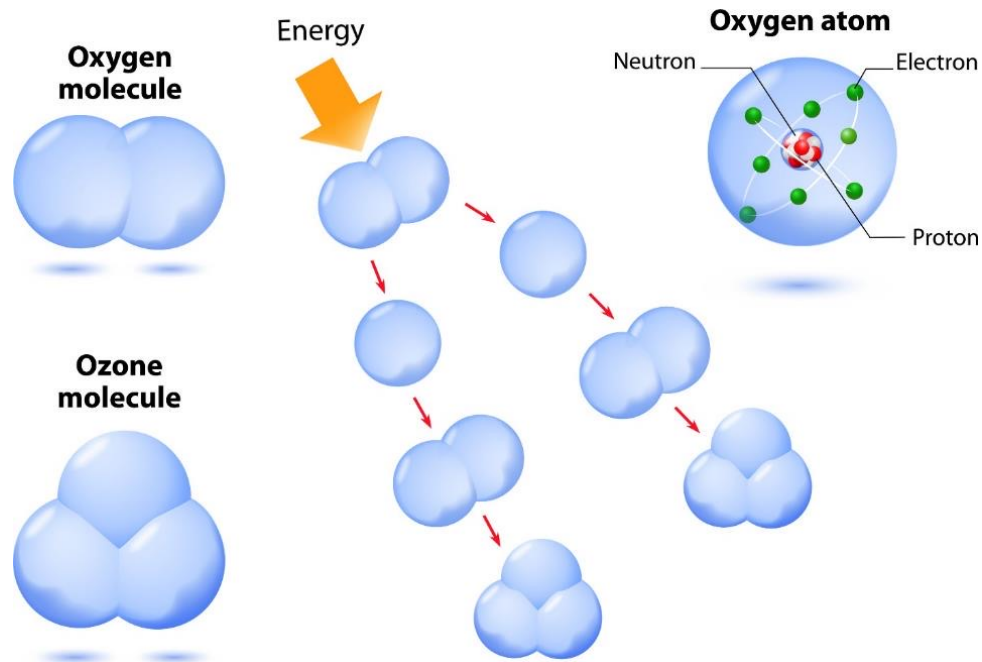


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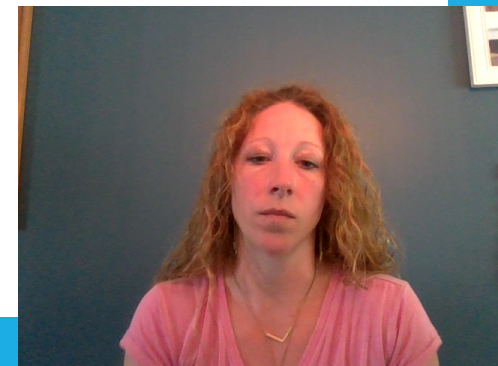
- Oxygen we breath is 2 oxygen atoms
- Ozone is made up of 3 oxygen atoms
- This formation of 3 oxygen atoms is very reactive and unstable formation

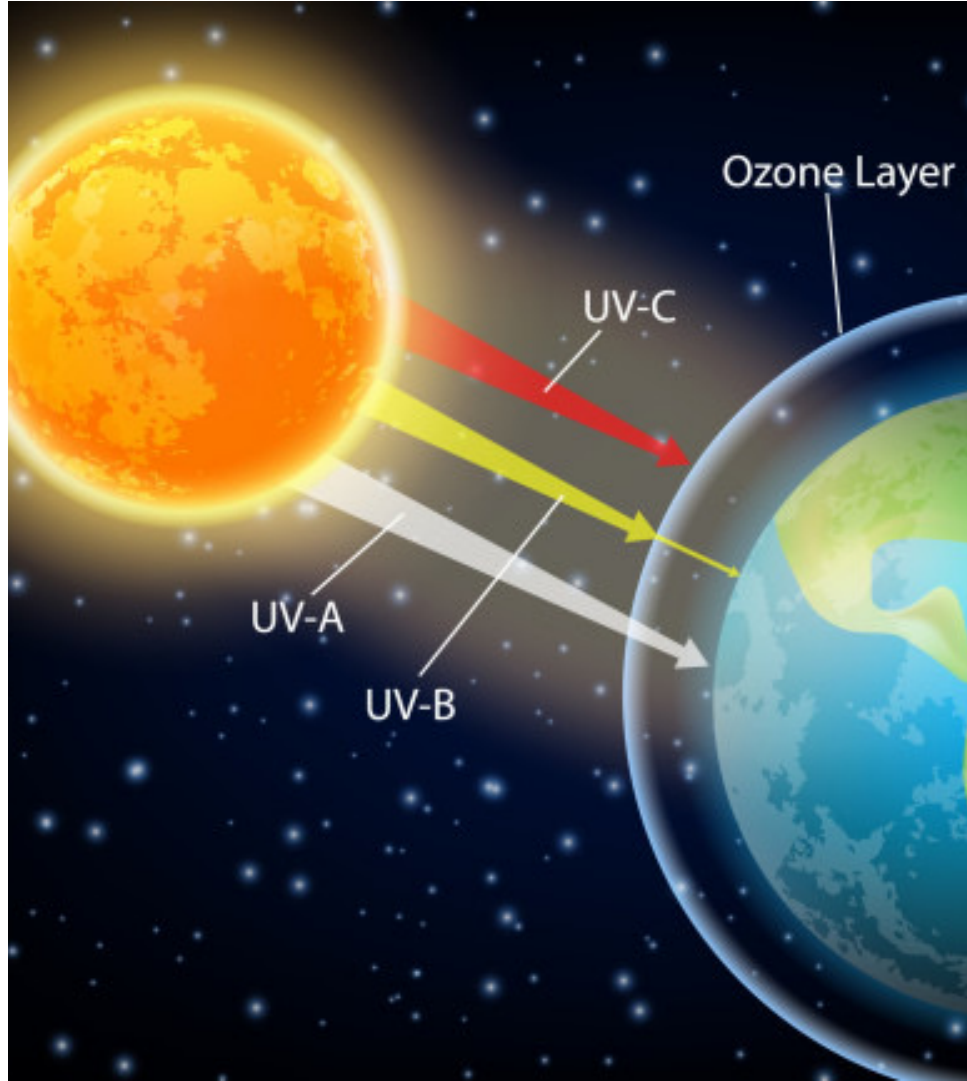


## FORMATION OF OZONE



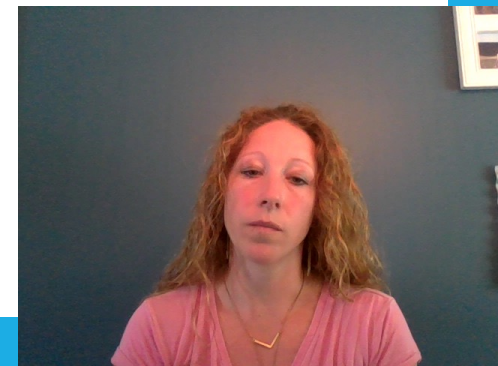
- Energy is used to break apart the 2 atom oxygen molecule
- When the atoms are separated, they will temporarily combine and form a 3 atom molecule called ozone
- However, this 3 atom molecule is highly unstable and will separate quickly to reform a 2 atom oxygen molecule





# Ozone in Nature:

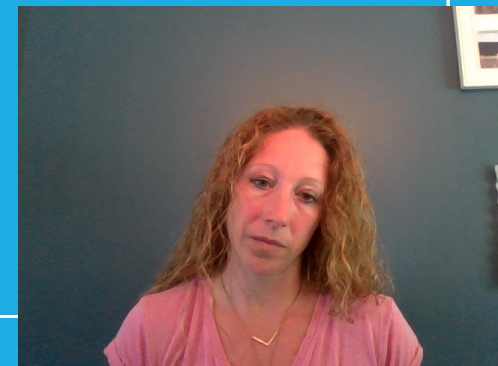
- Ozone has a purpose in nature:
  - The ozone layer = stratospheric ozone formed naturally through interaction of solar ultraviolet radiation with oxygen ( $O_2$ )
    - The ozone layer is approximately 6-30 miles above the Earth's surface
  - The purpose of the ozone layer is to reduce the amount of harmful UV radiation reaching the Earth's surface

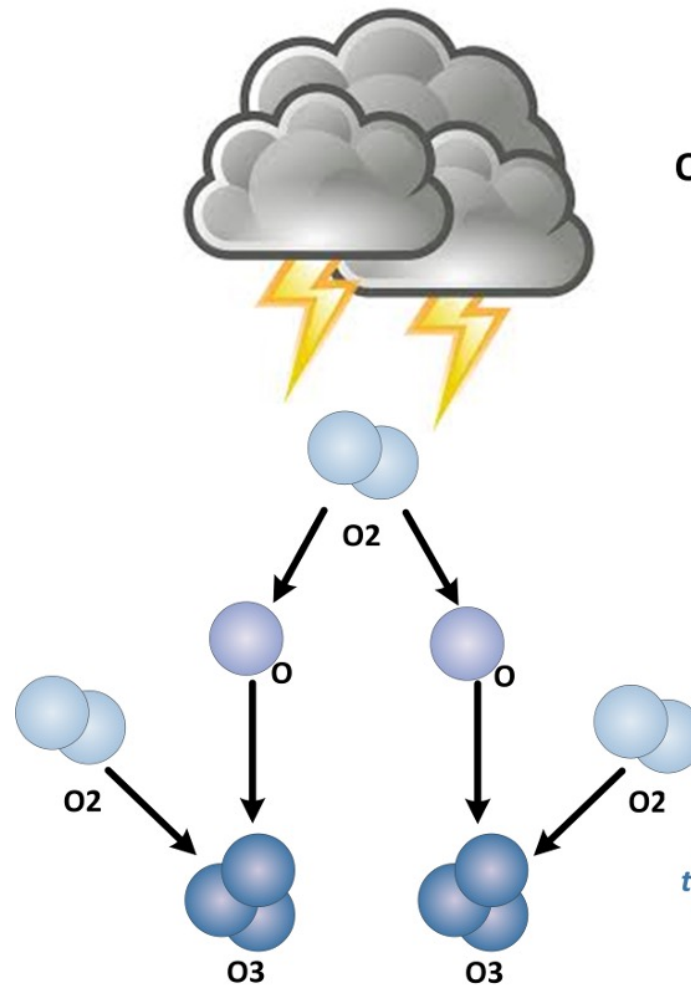






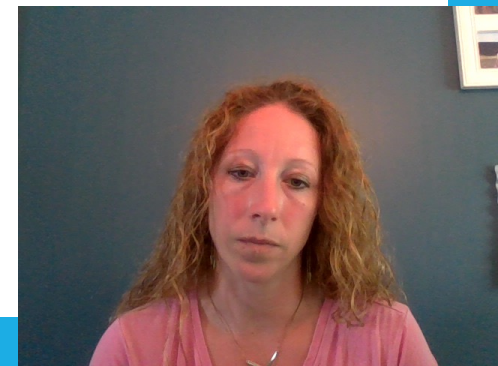
Storms also produce ozone which is nature's way to detoxify and purify the air





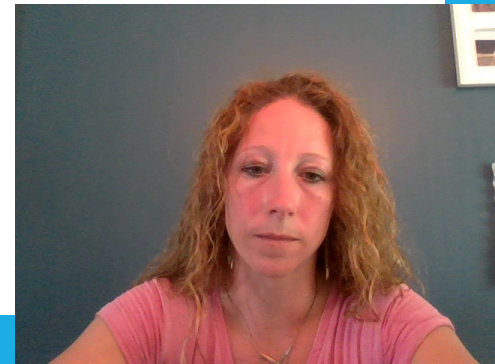
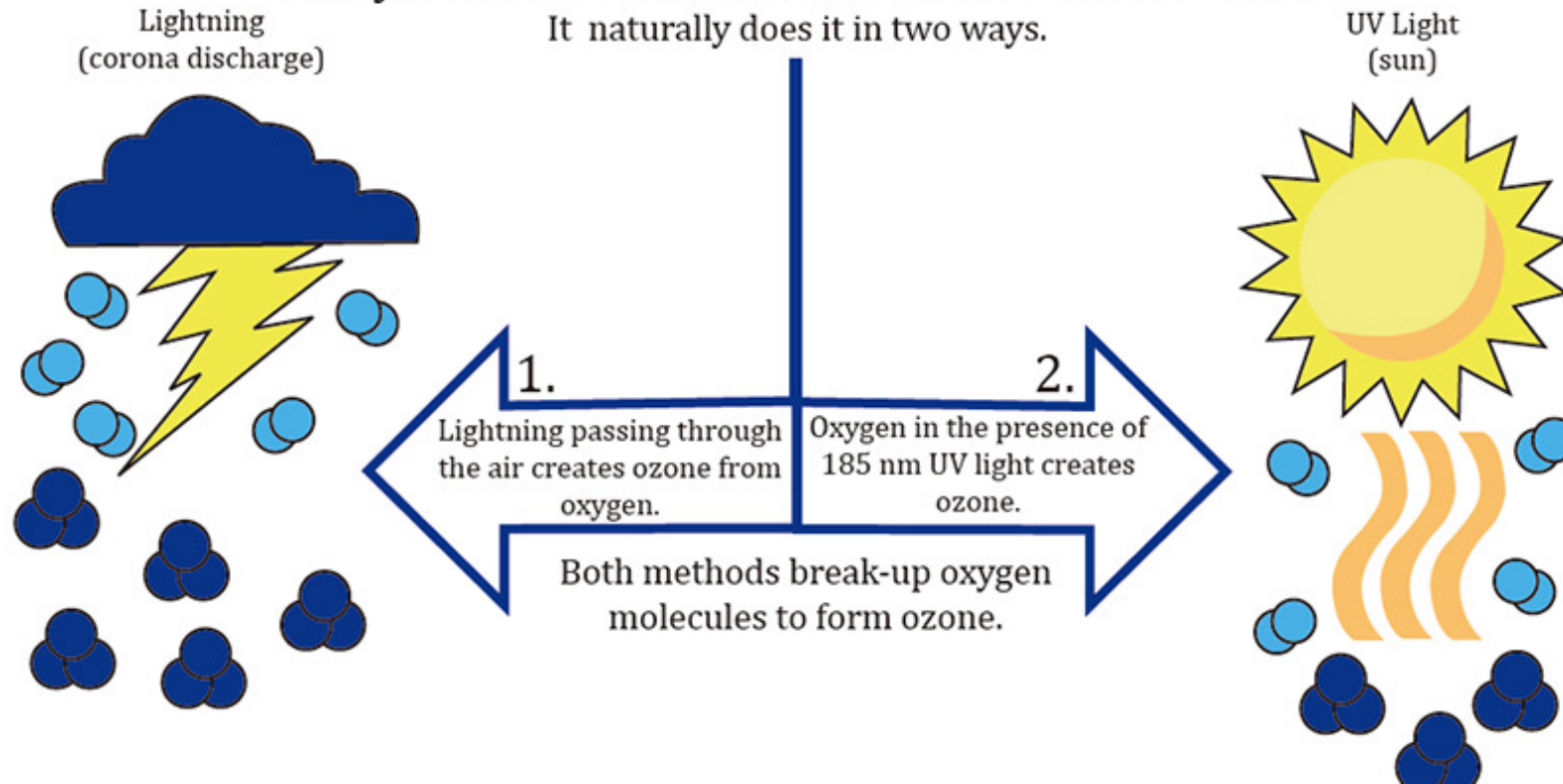
Ozone formation naturally  
from Lightning.

*Lightning, and electrical spark will split  
the oxygen molecule into atomic oxygen.  
These oxygen atoms will quickly bind to  
oxygen molecules to form ozone.*



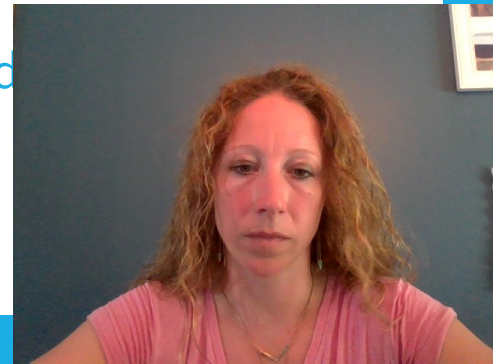
## Did you know that ozone is made in nature?

It naturally does it in two ways.

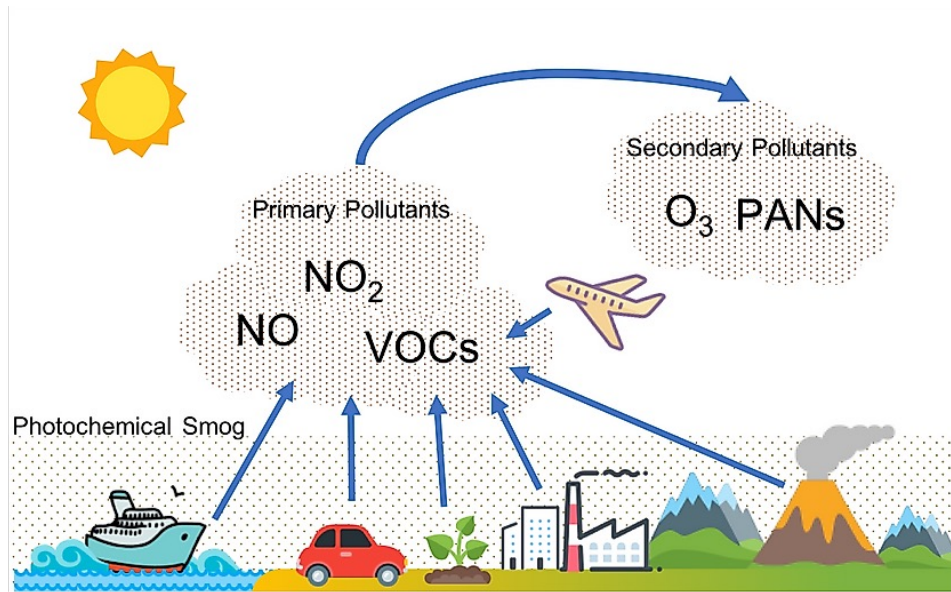


# Ozone Produced by a Storm

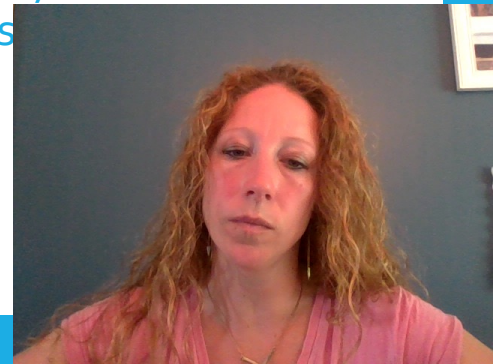
- Notice the clean, fresh smell in the air after a thunderstorm
- This occurs when the high voltage lightning breaks oxygen apart (remember, 2 oxygen atoms), these 2 atoms quickly hop back together into ozone (3 oxygen atoms)
- Remember,  $O_3$  is unstable and highly reactive, so it is quickly looking for another molecule to bind with (these molecules include our air pollution),
  - When ozone attaches to the contaminant/pollution it is OXIDIZING it, this destroys the molecule/pollution, leaving behind pure  $O_2$
  - The destruction of the pollutant actually converts it back to carbon dioxide and hydrogen, which we can breathe
- Ozone has this same reaction with: chemicals, bacteria, molds, odors, etc
- Once a pollutant is oxidized by ozone it is no longer toxic, allergenic, viruses or odors causing



# Pollutant Ozone



- Ground level ozone:
  - Formed primarily by reactions between air pollutants, volatile organic compounds and nitrogen oxides
  - VOC come from chemical plants, gasoline pumps, oil-based paints, auto-body shops, print shops
  - Nitrogen oxides come from high temperature combustion
  - These pollutant chemicals react with oxygen in the air and cause “smog” (which you’ll hear on the news in bigger cities such as







# Ozone and Smog

Smog is the combination of ozone, hydrocarbon, nitrogen, and sulfur oxides in the air from pollutants

Scientists use the ozone level as an indicator that the hydrocarbon, nitrogen, and sulfur oxides are becoming excessively high.

SO when it is announced that the the ozone levels in the air are high. They are warning people not because of the actual ozone being the problem but because the other pollutants in the smog with ozone is what is creating respiratory problems for people with lung conditions. 4

The warnings are being issued to warn patients about the presence of hydrocarbon, nitrates, peroxides, and sulfur oxides.

An elevated ozone level indicates that these toxic molecules are also high and can cause substantial respiratory injury. But actually the ozone level during severe smog conditions are well below the toxicity level. However, ozone is used as monitoring toxic levels for the past 30 years to determine pollution level, has mistakenly given ozone a bad name.



# Vitamins

Vitamin Toxicity Symptoms

Vitamin D	Vitamin A	Vitamin B <sub>6</sub>	Vitamin C	
Abdominal cramps, nausea, vomiting, calcium crystal deposits that affect liver, kidney, lungs (calcium salts are irreversible)	Water in the brain, vomiting, tiredness, constipation, bone pain, brittle nails, hair loss, birth defects	Mobility issues such as tingling and numbness in the hands and feet, trouble walking, trouble grasping small objects (difficult to reverse symptoms)	Kidney and gallbladder stones in those prone, but normally it just makes really expensive urine	
Folate	Vitamin B <sub>12</sub>	Vitamin K	Niacin	Vitamin E
Pernicious anemia, kidney damage	Diarrhea, swelling, blood clots in legs	Anemia in adults, death in infants	Flushed skin, nausea, diarrhea, liver damage	Headaches, tiredness, double vision, diarrhea, Vitamin A, D, K deficiency

# Medications



It is true that ozone can be a very potent respiratory toxin in high enough levels.

Medical grade ozone is pure oxygen and does not contain any of the toxins we think of when we refer to ozone in smog.

However, just like any medication, food, or vitamin that all have a safe and toxic dose, so does ozone.

Even pure oxygen is irritating to the lungs.

The air we breath contains only about 21% oxygen levels.

If we were to breath 100% pure oxygen, this is harmful to our lungs.

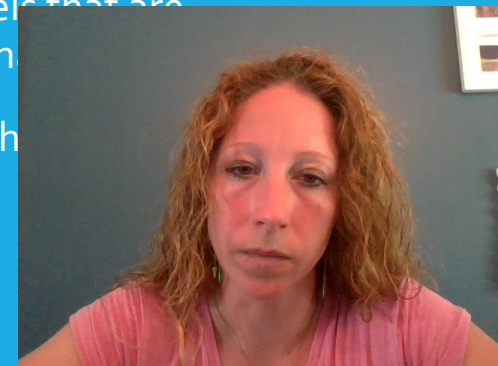
Ozone is no different. There are levels that are completely safe, and higher levels th

Too much of any good thing can be h

# Food

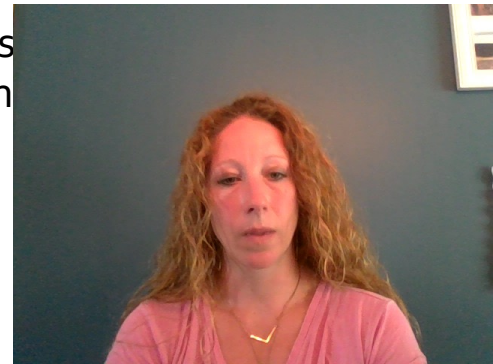


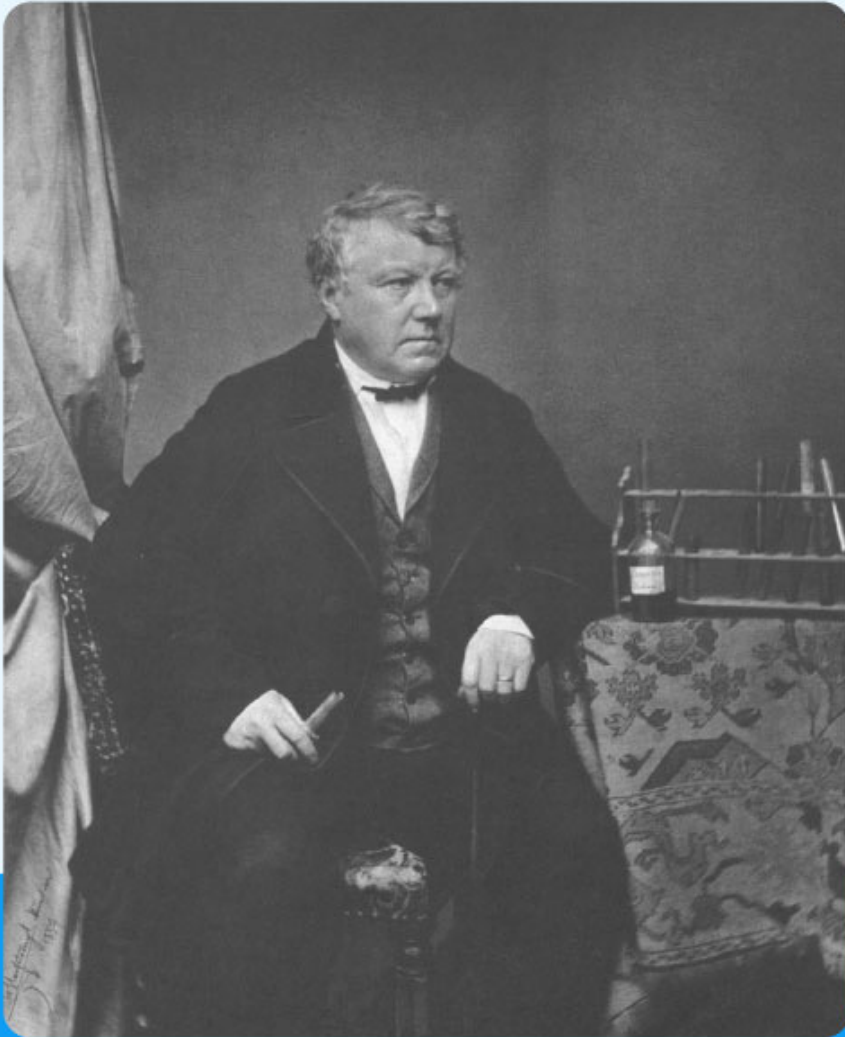
# Alcohol



# History

- Ozone has been used almost 150 years
- 1840 many studies began on the disinfection mechanism of ozone.
- 1870 first German doctor used ozone for water sterilization
- 1873 before antibiotics were discovered, German doctors discovered ozone was a potent anti-microbial agent
- 1881 ozone began to be used as a disinfectant
- 1911 Dr. Noble Eberhart in the United States used ozone to treat: tuberculosis, anemia, tinnitus, whooping cough, asthma, bronchitis, hay fever, insomnia, pneumonia, diabetes, gout and syphilis
  - Created the first university program to teach ozone therapy
- 1913 Dr. Wolf a chief surgeon in the German army used ozone therapy to treat infected wounds, frost bite and gangrene



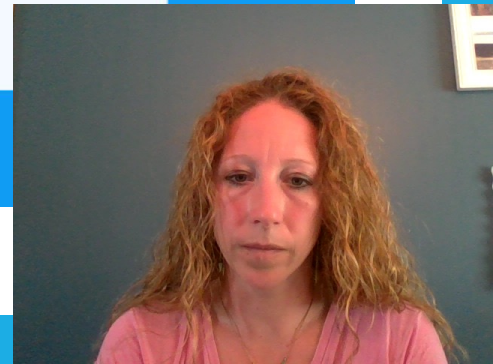


# OZONE DISCOVERY

## Christian Friedrich Schönbein

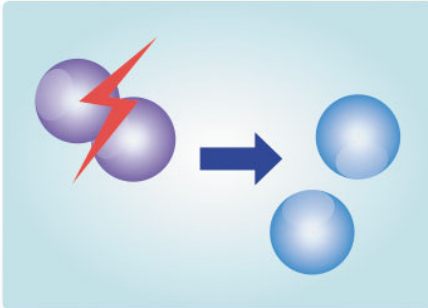
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Schönbein's ozone discovery occurred in the late 1830s, while he was doing experiments on the electrolysis of water. He noticed a distinctive odor, similar to the smell following a bolt of lightning. In 1839 he succeeded in isolating the new chemical substance and named it from the Greek word "ozein," meaning "to smell."



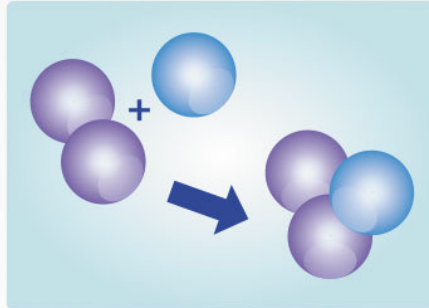


STEP 1



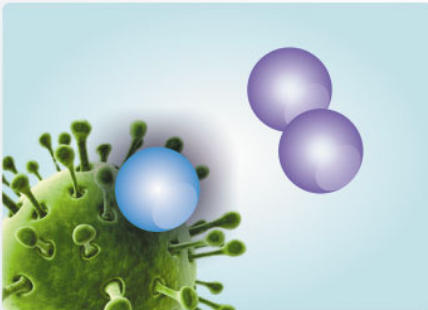
Oxygen Molecule is exposed to electric high voltage, the Oxygen Molecule split into two Oxygen Atoms

STEP 2



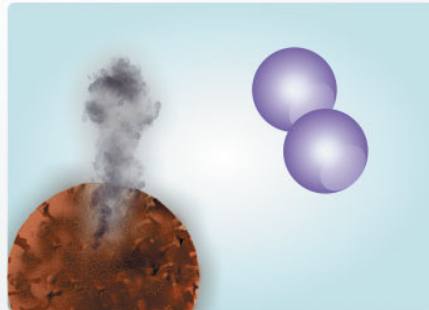
Oxygen Atom then connects to Oxygen Molecule & Ozone is formed, which infused into the ordinary air

STEP 3



Ozone quickly attacks and eliminates contaminants it comes in contact with

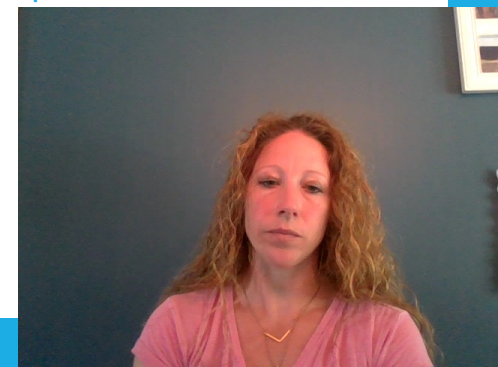
STEP 4



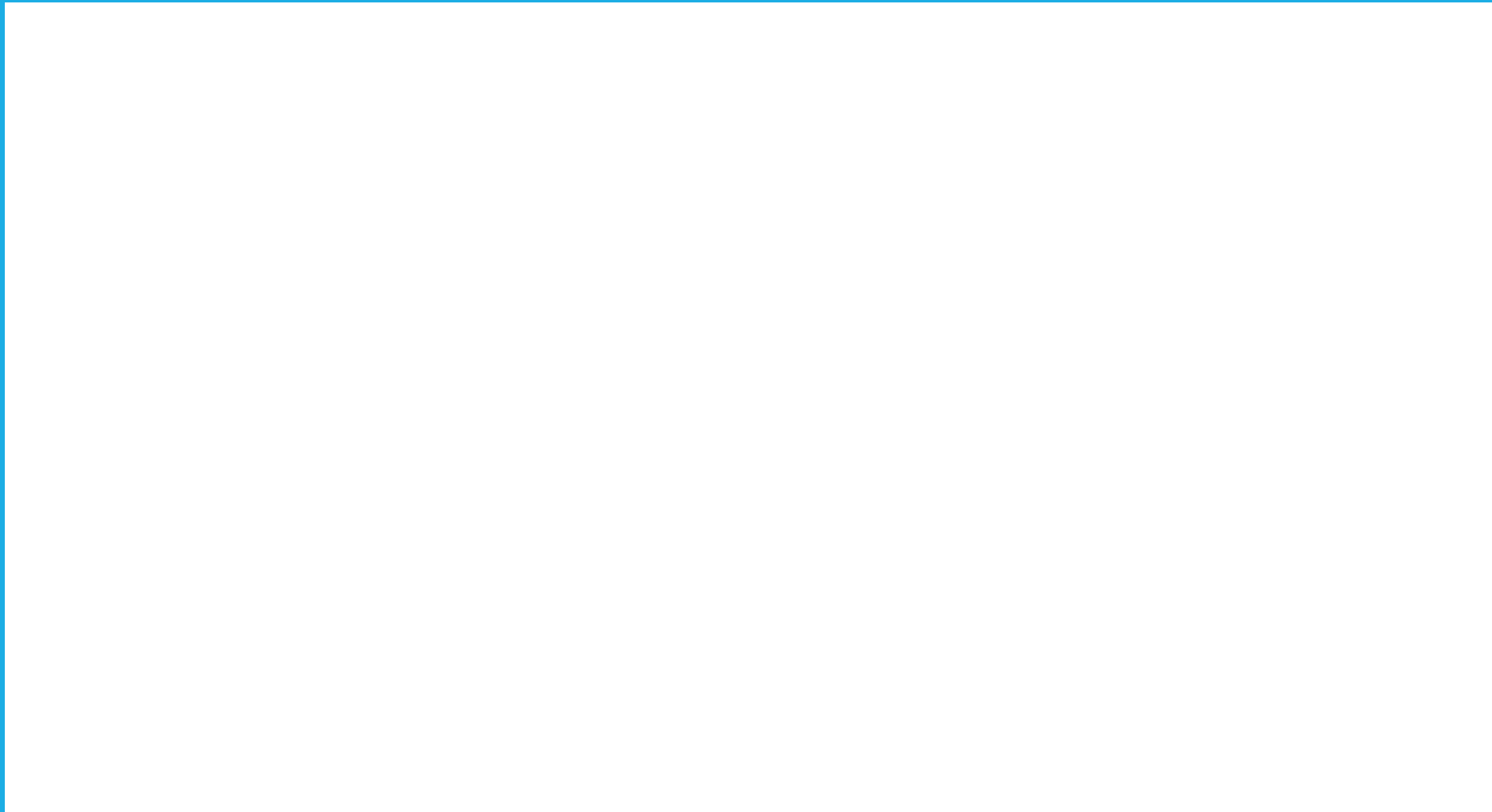
Only pure oxygen and air remain after the ozone cleans and sanitizes

# Today's Use:

- Ozone is known to be a very potent sterilizer.
- Today it is often used for controlling bacteria, viruses, and odor
- Because of it's sterilization abilities ozone TODAY is used for:
  - Sterilizing almost all the world's water systems to purify water
  - Sterilize the interior of planes before boarding (you may even notice the lingering smell of ozone)
  - Sterilization of medical equipment/facilities
  - It can be used in pretty much in any indoor facility.
- We will further discuss later it's medical implications







# Why the need for ozone?

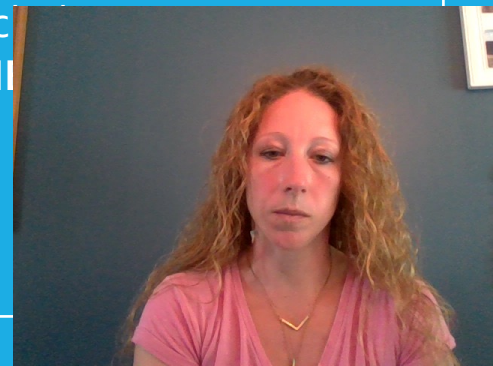
Every medical disease is associated with **LOW OXYGEN LEVELS**. Infections, cancer, compromised organ function: all of these diseases have one thing in common, that is there is **lower level of oxygen** in these affected areas.

Many are familiar with the term “free radicals” within the body. This is often associated with causing damage to organs. Overtime, free radical damage causes aging, breakdown of organs, and general sickness from various diseases.

However, the more efficient **oxygen metabolism** and utilization is, the better the body can get rid of free radical damage which leads to better health and longer life.

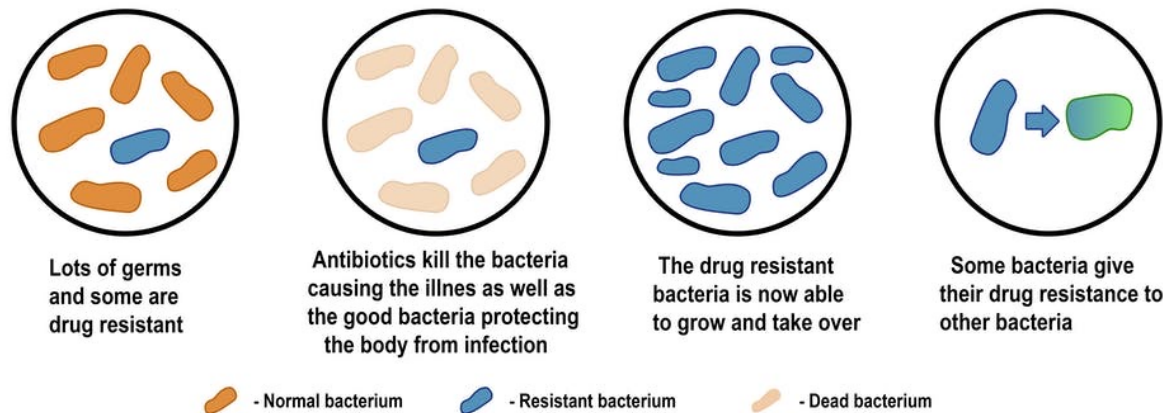
Every individual cell within the body is made up of almost 50% mitochondria. Roughly 10% of the body weight is mitochondria. How well cells function are directly related to oxygen utilization by the mitochondria. The more oxygen that can get to the mitochondria the more efficiently individual cells can function to keep the body healthy and fight off any disease inc

Ozone stimulates the mitochondria cells **10 TIMES** more than oxygen can

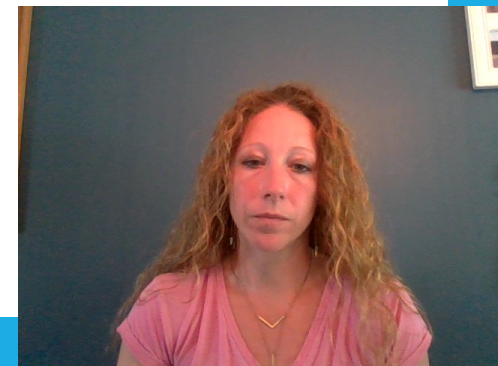


# Why the need for ozone?

## HOW ANTIBIOTIC RESISTANCE HAPPENS

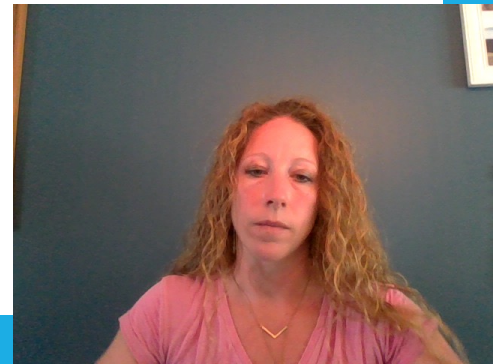


- Antibiotic resistance is a huge issue that is only getting worse.
- When antibiotics are used in combination with ozone therapy, they are much more **EFFECTIVE** and they reduce the risk of antibiotic resistance to almost zero



# What is Ozone Therapy?

- Ozone therapy is a medical treatment that uses activated oxygen (ozone) to treat many chronic and acute diseases. It reduces chronic inflammation, destroys pathogens, and activates the immune system. It can be applied topically, infused into the blood and tissue through various means or introduced into a fluid or oil which acts as a carrier.

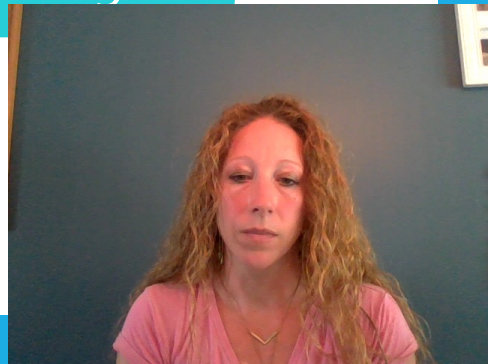


# REASONING

*"Ozone stimulates and stabilizes rather than suppressing biological functions...(ozone) itself does not produce the healing effect.*

*Instead, it induces the body's innate healing mechanisms to create the healing effect.*

*Thus, unlike medications and herbs, it can be successfully used in essentially every medical condition regardless of the diagnosis." – Dr. Frank Shallenberger*

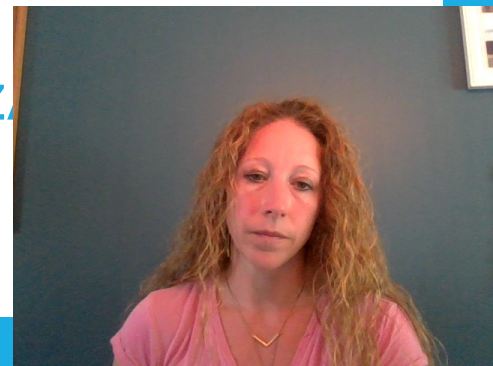






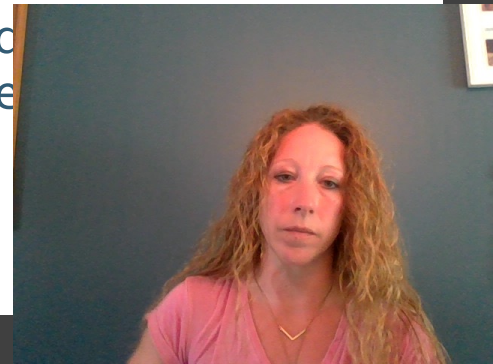
# Misconception

- We have the misperception that just because our pets do not show us any signs of disease, and their bloodwork and exam are normal that they are perfectly healthy.
- Unfortunately, this is not true for many of our pets. Their bodies are constantly fighting off bacteria/viruses/diseases/environmental toxins.
- This constant battle requires energy within the body to continue to strive to keep them healthy.
- We know that long before our pets actually get sick, their body has been chronically struggling with oxygen utilization which is the primary cause of all disease.
- **OZONE THERAPY IMPROVES OXYGEN UTILIZATION**



## How can ozone be used medically?

- When ozone is given to the body by injection (NOT by breathing in), it immediately reacts to create ozonides
  - The ozonides are what are helpful to the body
  - This is the key point to understanding how ozone works, it is NOT the ozone itself that is helpful, but the fact that ozone immediately reacts in the body to create ozonides
- Ozonides lead to:
  - The production of powerful antioxidants
  - Reduce oxidative stress on cells
  - Stimulates the immune system
  - Improves blood flow and increases the amount of oxygen blood can carry -> this gives the entire body an incredible boost of energy for ALL cells to: repair damage, fight off infection, combat inflammation, boost the immune system





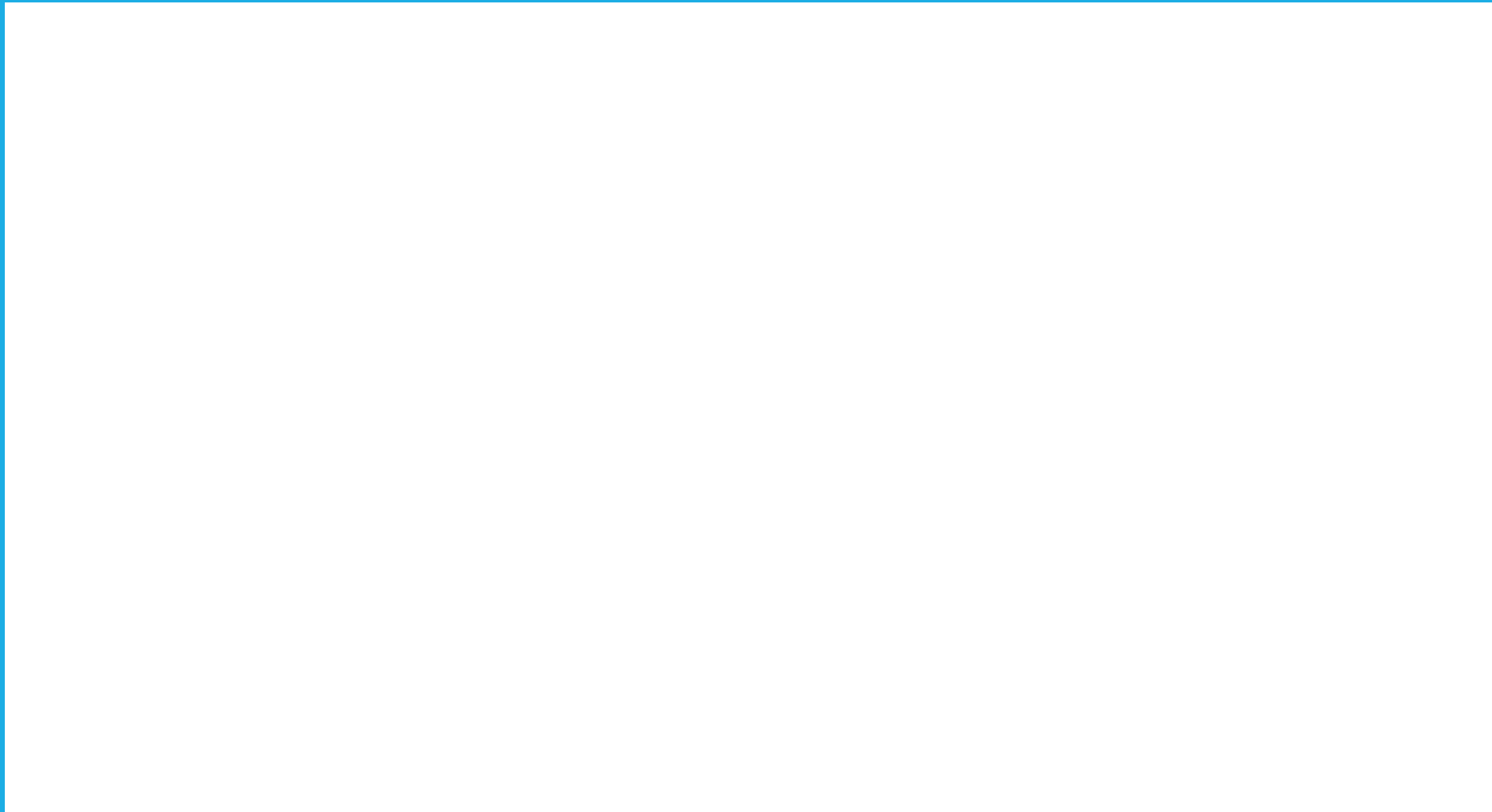
# With One Treatment

When ozone is put into the body, it instantaneously interacts with tissues to form peroxides, which exert all of the healthy effects we see with ozone therapy

These molecules are very stable, and **can last days to weeks in the body**, which means that an ozone treatment can have effects long after a treatment has been performed (days to weeks)

ONE OZONE SESSION can have health benefits on the body for WEEKS after treatment







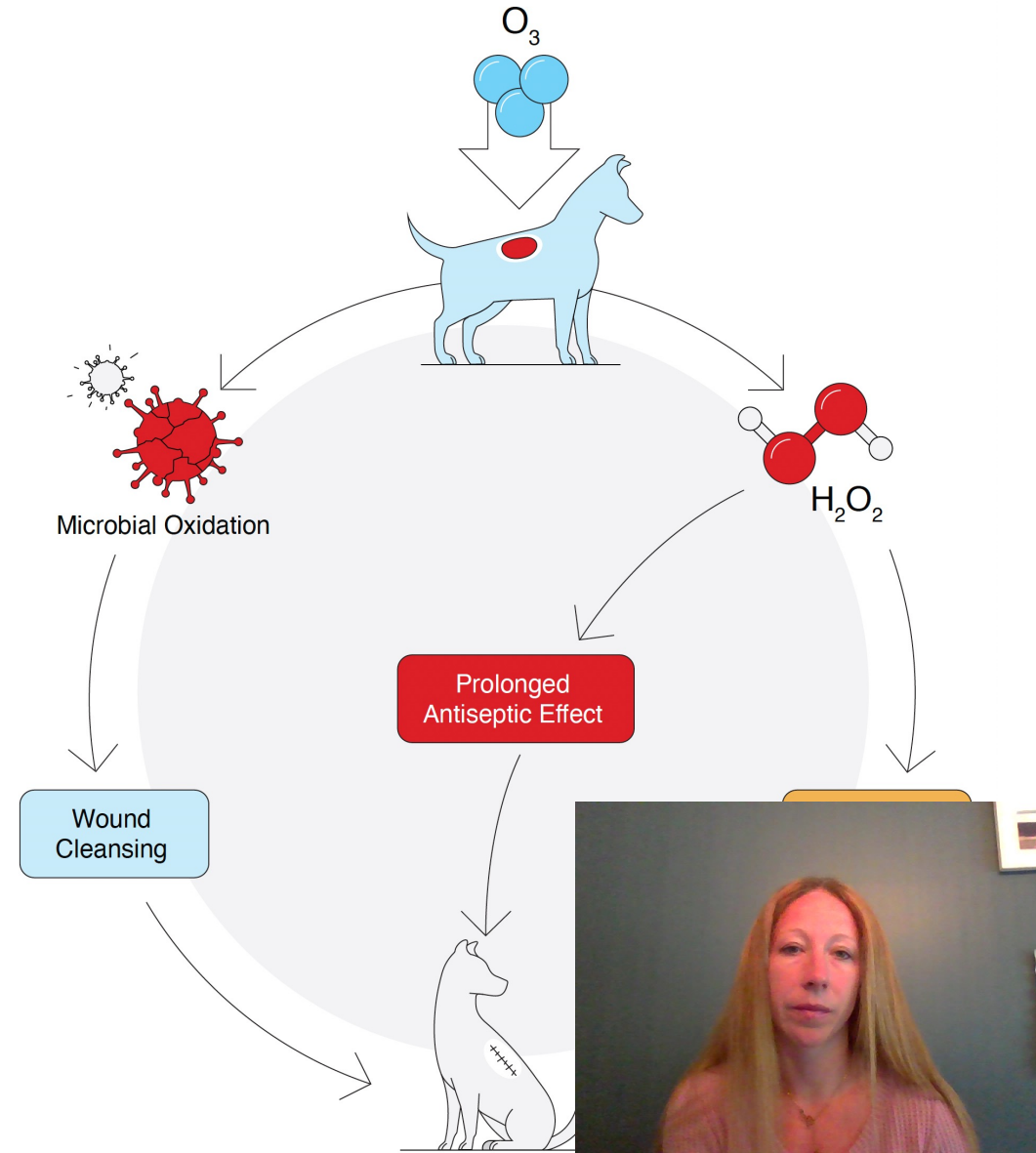
# HOW WE CAN USE OZONE





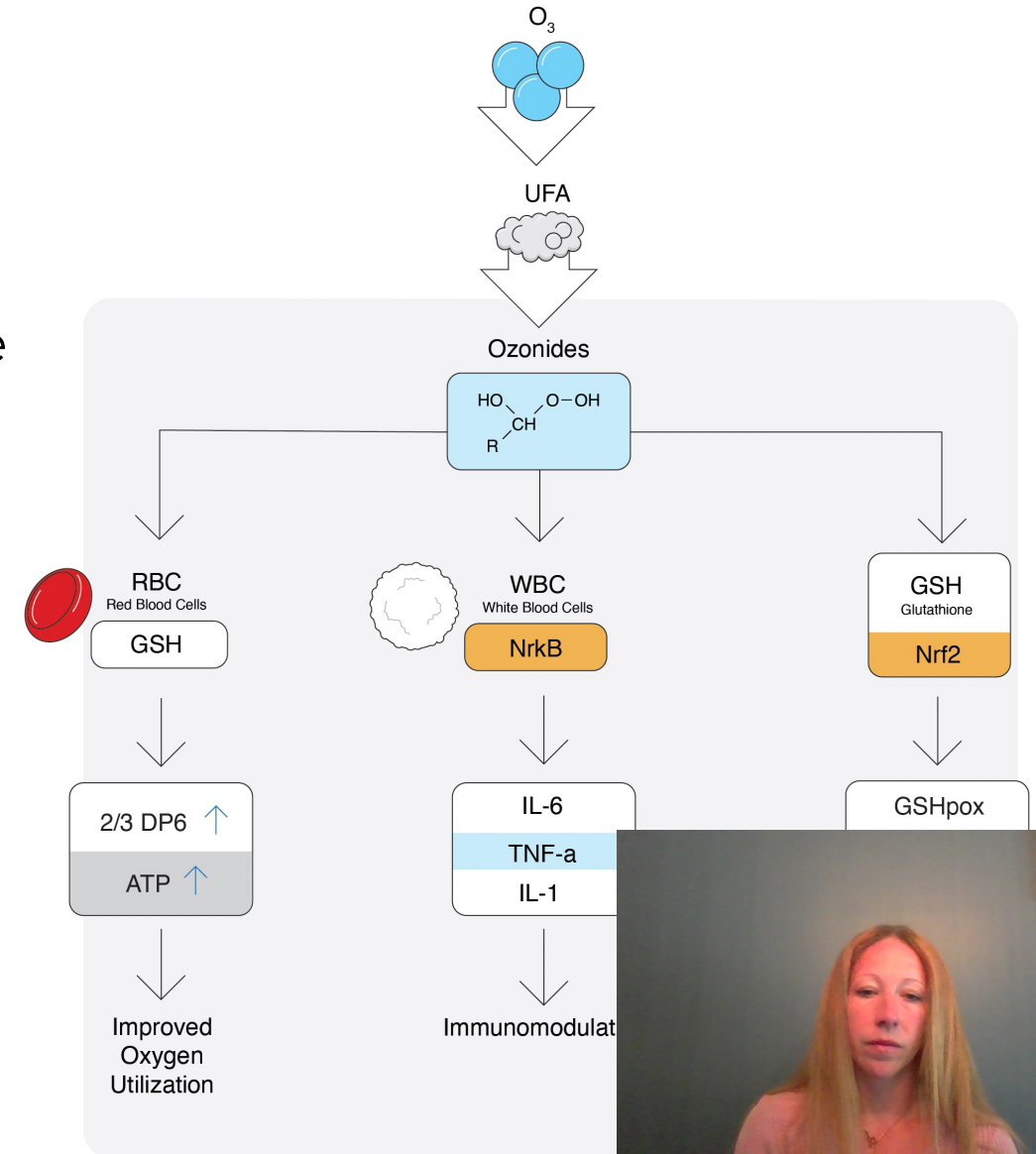
# DIRECT (TOPICAL) MECHANISM

- 🐾 Direct oxidation of pathogens
- 🐾 Immediate wound cleansing
- 🐾 Prolonged antiseptic
- 🐾 Release of growth factors resulting in...
  - Attraction of fibroblasts
  - Stimulation of cellular proliferation
  - Building of extracellular matrix



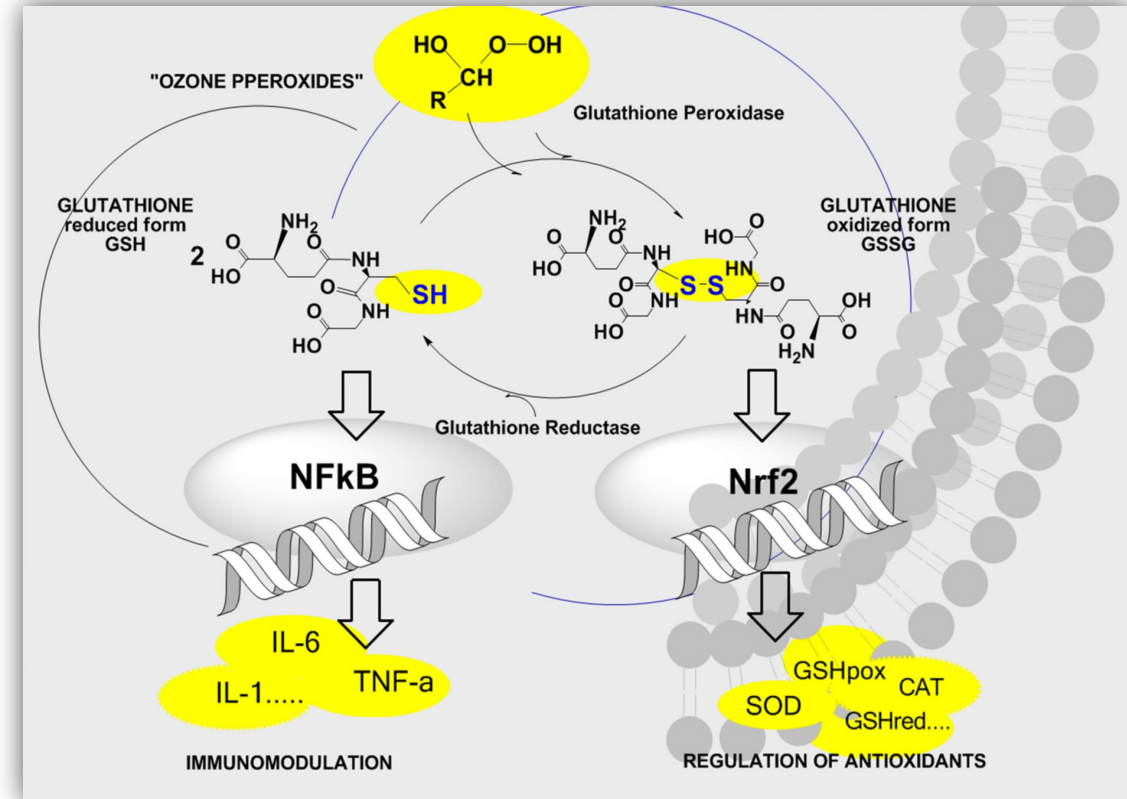
# SYSTEMIC MECHANISMS

- 🐾 Ozone reacts with unsaturated fatty acids to create ozonides
- 🐾 Three primary actions occur:
  1. Activated RBC metabolism improves  $O_2$  release
  2. Immunomodulation through activated NrkB and WBC
  3. Regulation of antioxidants via Nrf2 activation



# SYSTEMIC MECHANISM - GSH

- 🐾 Reaction with GSH
  - activates Nrf2 pathway: upregulates antioxidants and downregulates cytokines decreasing oxidative stress
- 🐾 Ozonides take the place of H<sub>2</sub>O<sub>2</sub> in signaling when reduced by Glutathione
  - GSH (reduced) to GSSG (oxidized)
  - Cycle ensures proper level of GSH

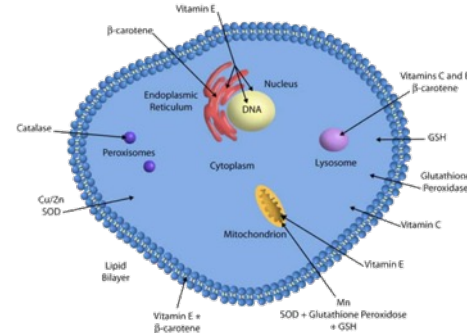


*"Reduced glutathione (GSH) is considered to be one of the most important scavengers of reactive oxygen species (ROS), and its ratio with oxidized glutathione (GSSG) may be used as a marker of oxidative stress."* <https://pubmed.ncbi.nlm.nih.gov/23205122/>



# A SIMPLIFIED VIEW

<https://pubmed.ncbi.nlm.nih.gov/29152215/>

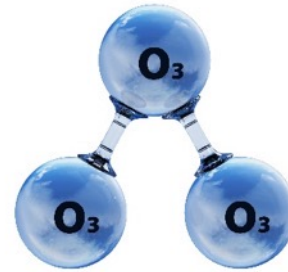


## 1. Increased Antioxidant Capacity

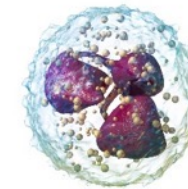
4.



Improved Blood Flow and  
Oxygen Uptake



2.



Immune System  
Activation

3.



Germicidal Activity



# SUMMARY OF BIOLOGICAL EFFECTS

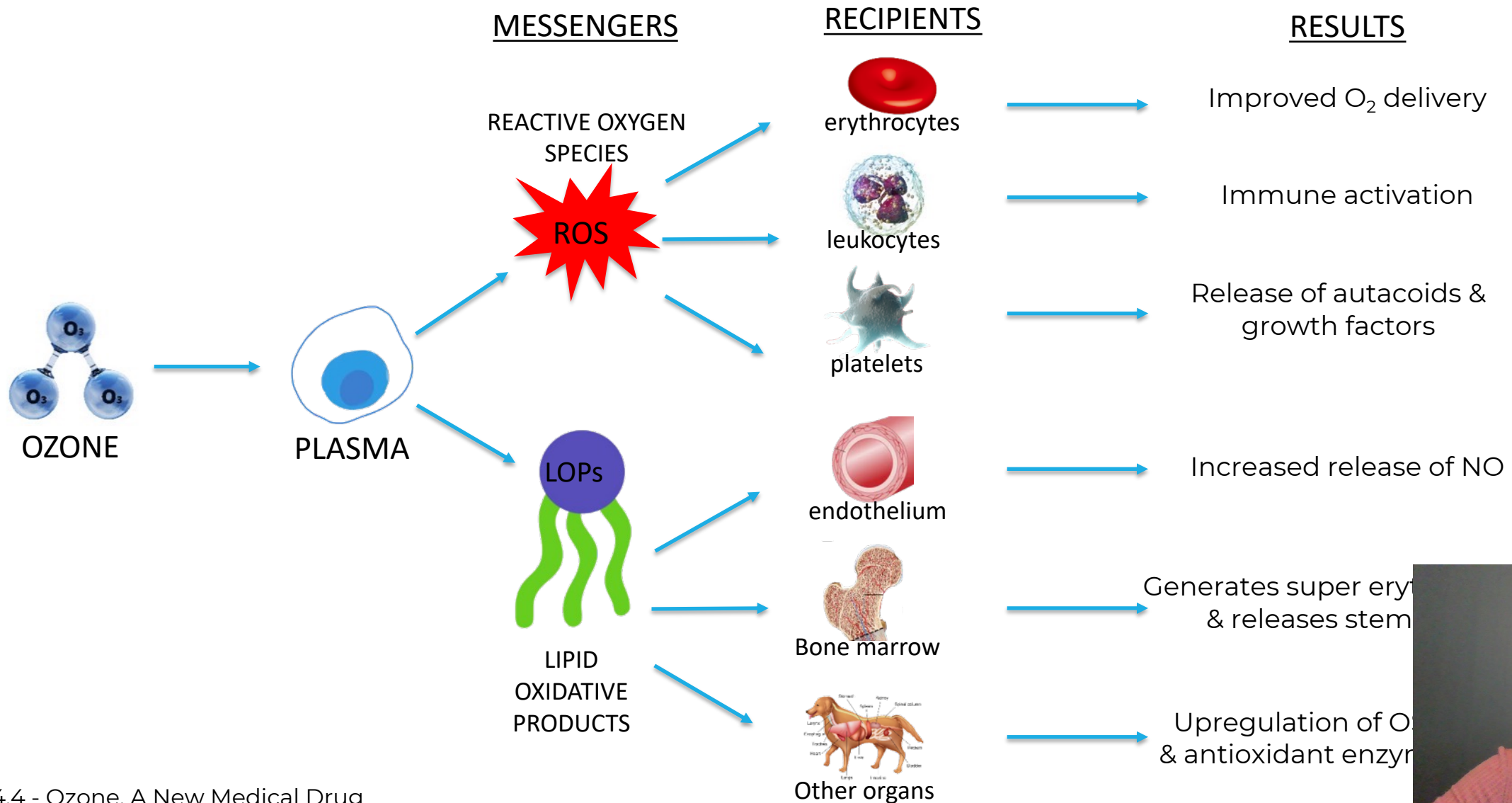
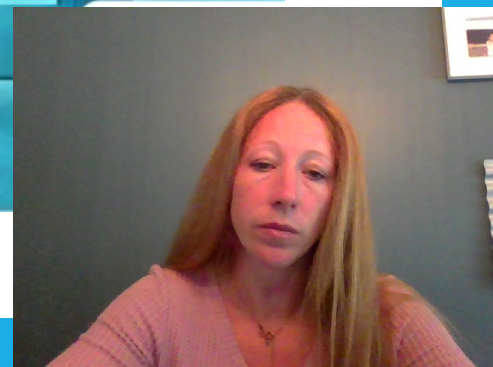


Fig 4.4 - Ozone. A New Medical Drug





*When to use*  
**OZONE THERAPY**  
FOR YOUR DOG





# Aging

- As all creatures age, circulation becomes compromised which leads to less cells getting oxygen
- Cells getting oxygen are less able to utilize that oxygen as we age
- These both lead to decreased cellular energy causing: decreased energy, decreased muscle and bone mass, weight gain, and decreased organ function
- This makes our pets more susceptible to disease



# Auto-Immune Disease

- Auto-immune diseases are diseases where the immune system is malfunctioning and creating systemic inflammation and damaging tissues and organs
- Ozone therapy optimizes and rebalances the immune system by its actions on cytokines
- Ozone therapy enhances results of any conventional therapies making your pet get better sooner and off medications sooner



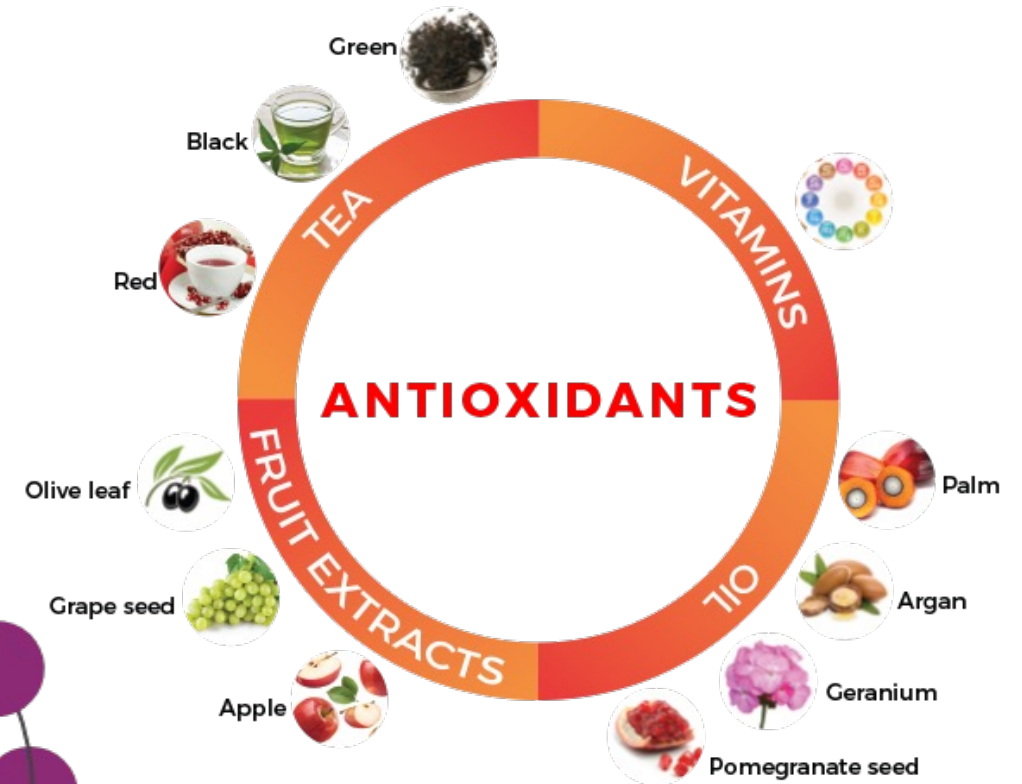
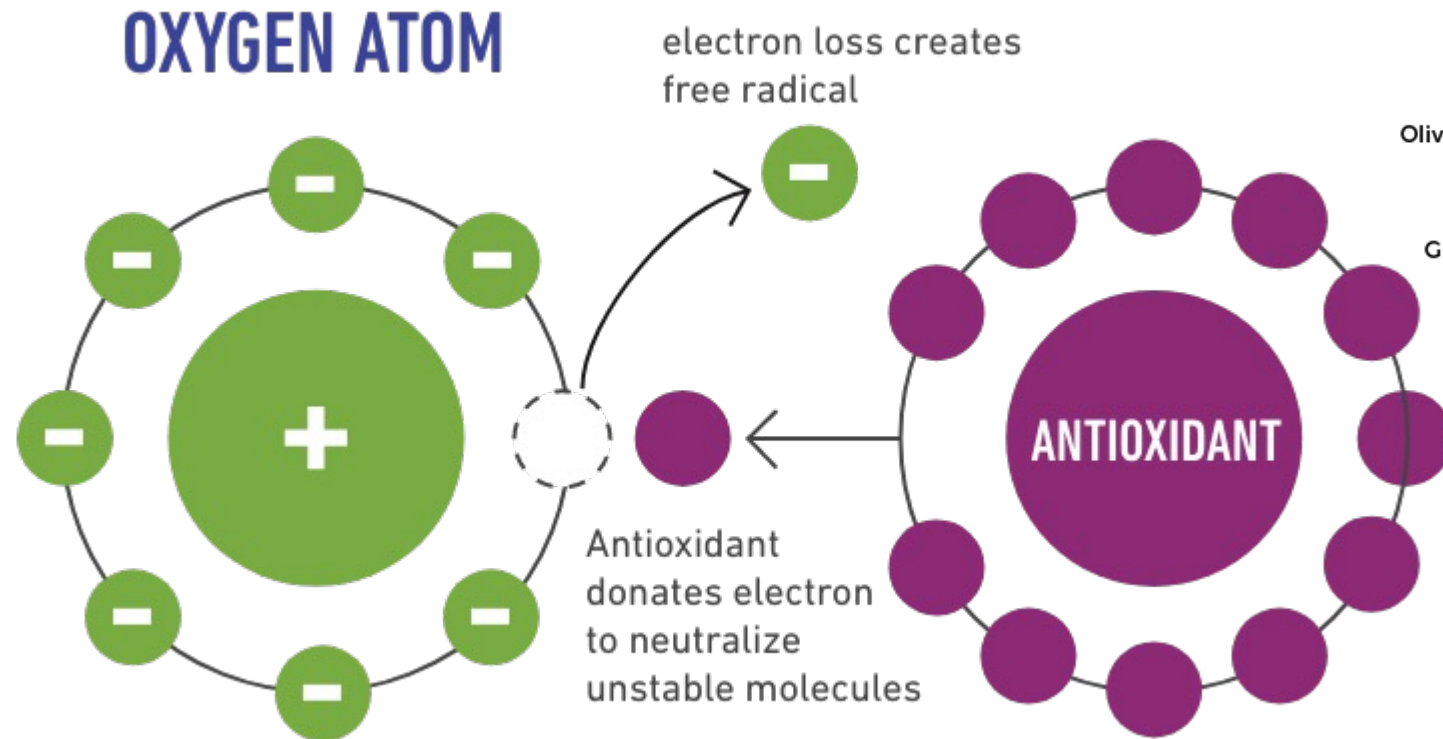
# Cancer

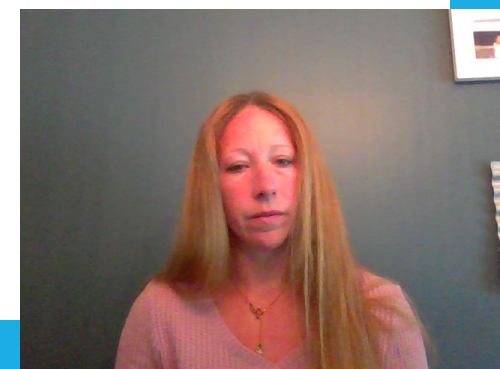
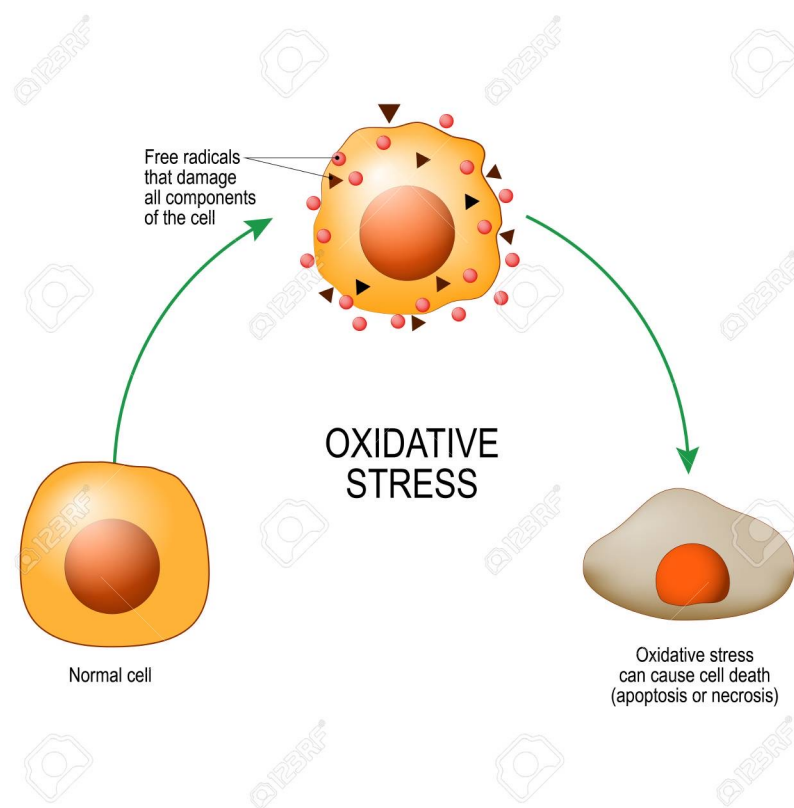
- Ozone therapy by itself is not an effective therapy for cancer
- But used in combination of other therapies (radiation, chemotherapy, nutrition, etc) will make the treatment much more effective
- Reports have shown decreased side effects with other more conventional treatment; and resolution of cancer more quickly



# Antioxidant

- Helps prevent damage to cells/organs





# Using Ozone Gas

- Gas is used in a controlled environment that we call “Limb bagging”
- This treatment method is effective when we are using limb bagging techniques
- Bacteria, fungus, viruses when exposed to ozone are no longer able to reproduce
- Ozone is biocidal which means it kills harmful bacteria, viruses, fungus, even abnormal tissue (cancer)
- This is an excellent method for treating wounds
  - Immediate decontamination of wound
  - Prolong effect of antiseptic (keeping wound clean)
  - Stimulates growth factors which help quicken wound healing





# LIMB/BODY BAGGING



# COMMON EQUINE INDICATIONS

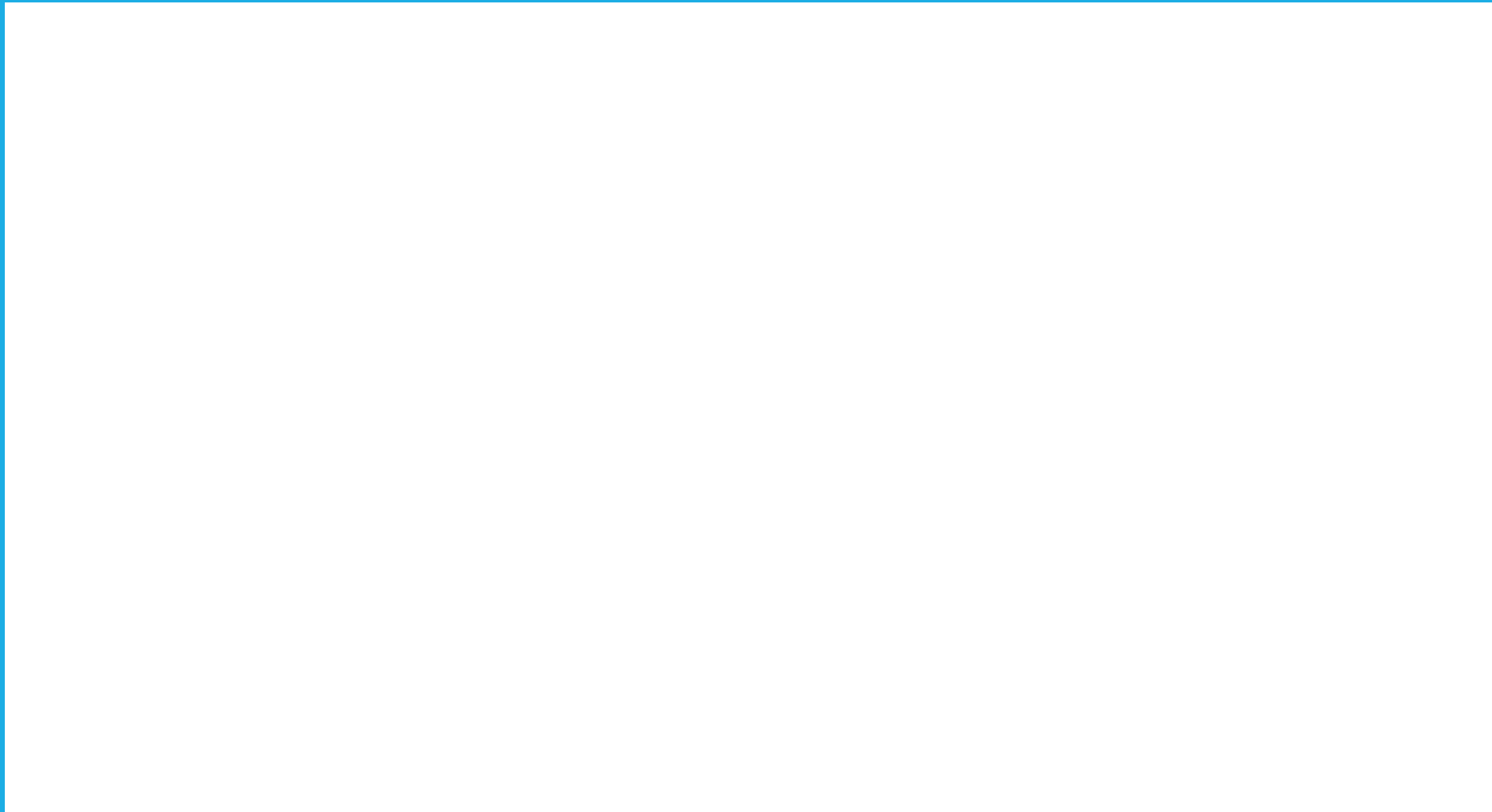
- **Performance** *Ozone treatment and blood lactate variation after thoroughbred racehorses*
- **Pain** Paravertebral O<sub>2</sub> O<sub>3</sub> Treatment in Mechanical Lumbar Pain in Riding Horses
- **Laminitis** Use of ozone therapy in chronic laminitis in a horse
- **Wounds** Ozone therapy in treatment of contaminated wound post-resection of sarcoid in donkey
- **Internal Medicine**

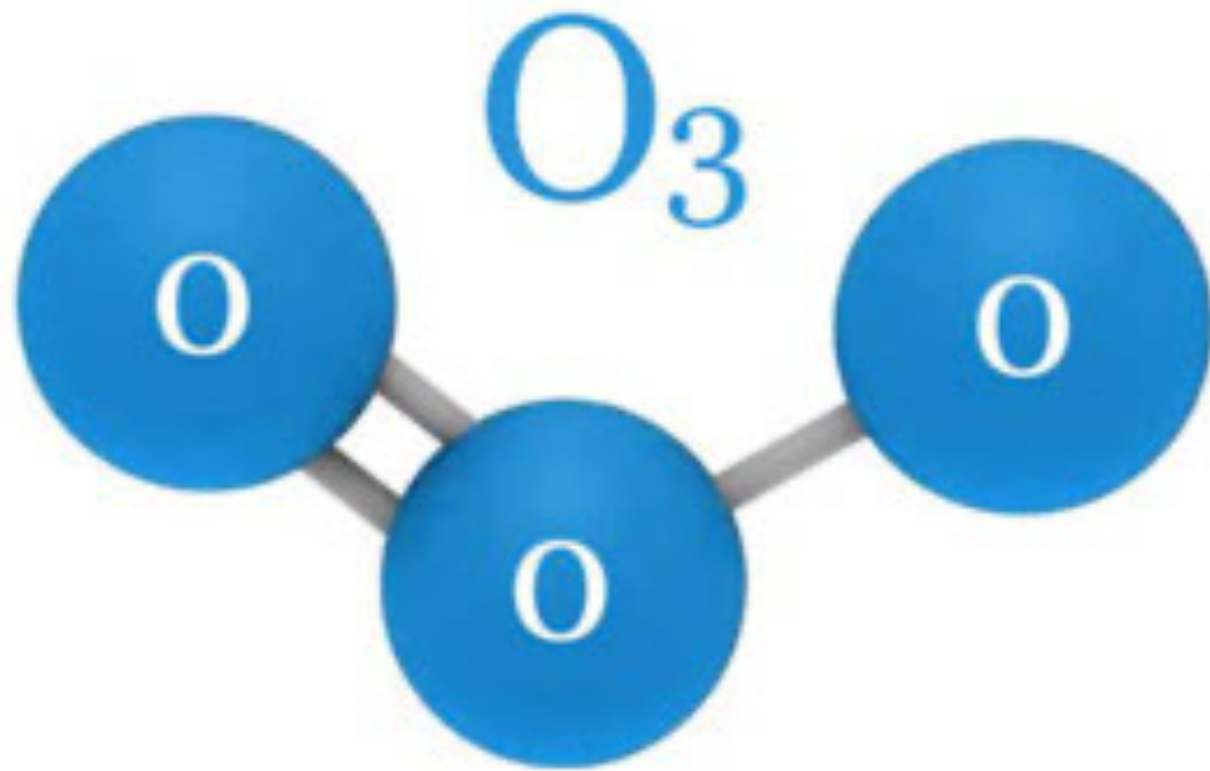


# Injecting Ozone

- We can do this by injecting into an area under the skin, into a vein, or rectally
- Remember, ozone immediately reacts and is converted to ozonide
- Remember the 4 major ways ozonides works in the body:
  - 1) Improves blood flow and oxygen uptake
  - 2) Immune System Activation
    - Modulates the immune system, telling it to turn on or off depending on what we need it to do.  
Thus decreasing inflammation
  - 3) Germicidal Activity (as discussed earlier)
  - 4) Increased antioxidant capacity







# SUMMARY OF WHAT OZONE DOES

---





# 1) Improves Blood Flow and Oxygen Uptake

- Red blood cells are the delivery system of oxygen in your body, ozone makes sure the red blood cells are over oxygenated and carrying as much oxygen as they possibly can to be delivered to the immune system, organs, wounds, areas that need healing, cancer



# 1) Improves Blood Flow and Oxygen

From blood cells and the immune system having this level of energy



To THIS level of energy!!!!



## 2) Activates the Immune System

From your immune system looking this

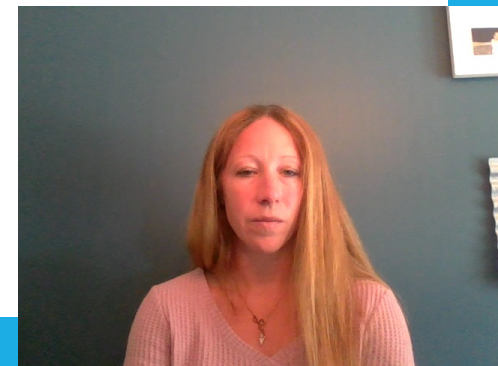


To your immune system acting like this!!!!

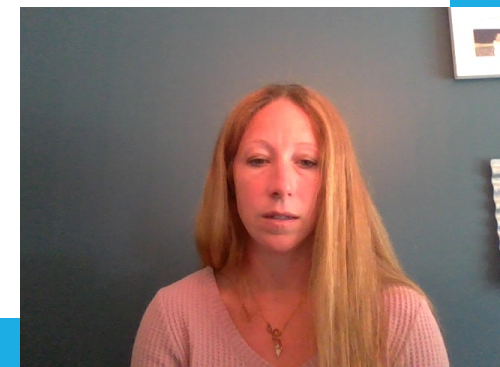
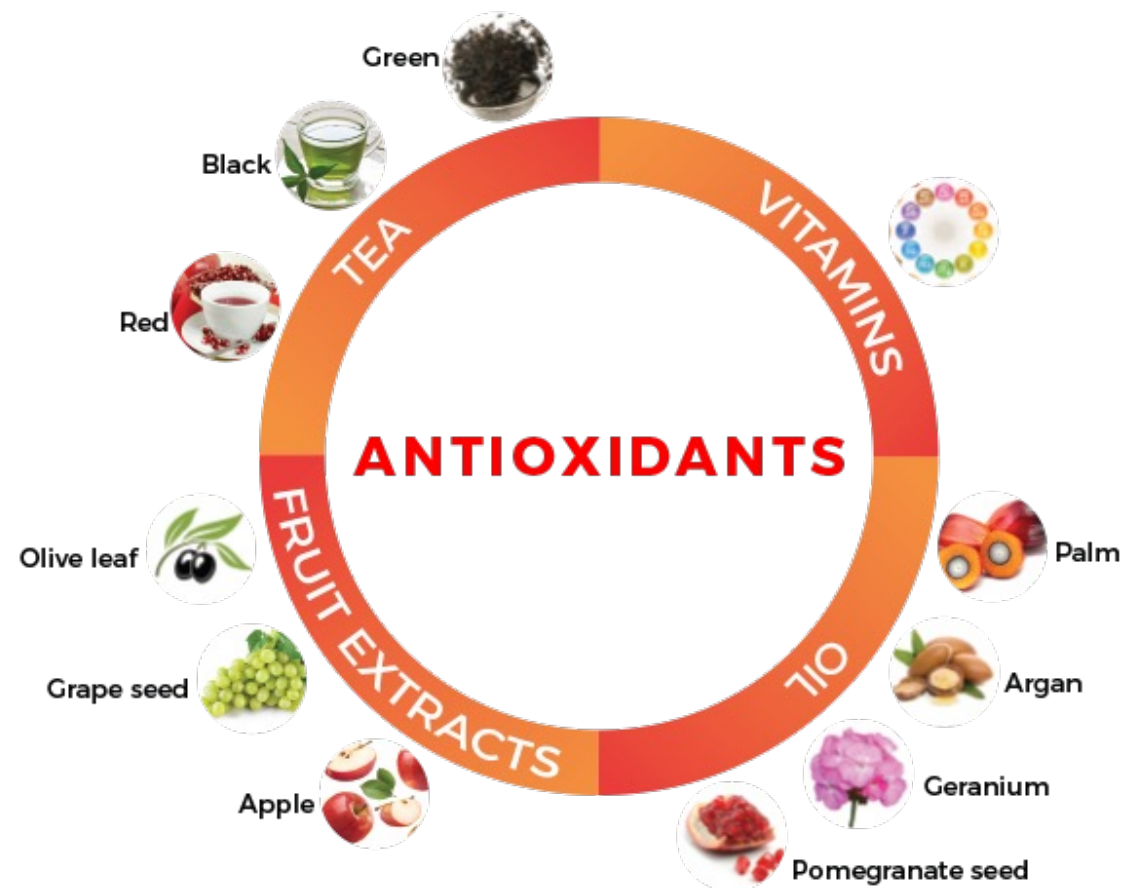




### 3) Germicidal Activity



## 4) Increase Antioxidant Capacity





# Ozone Balances the Immune System

- Thus helping with diseases such as:
  - Allergies
  - Auto-immune diseases
  - Arthritis
  - Wounds
  - Cancer
  - Infections
  - Modulating inflammation



# How can ozone possibly do everything you say it can do?

- Because it's OXYGEN
- Oxygen is the very center of every aspect of health
- The basic reason our pets' bodies get weak and frail and that they age is the same reason they develop disease
  - It's the body's inability to adequately extract energy from oxygen
  - The entire body and all it's organs begin to slow down and lose function
- Ozone is not your usual form of oxygen
  - It is SUPERCHARGED oxygen
  - And that means it can do things in the body that regular oxygen can not do
- Ozone therapy increases the delivery of oxygen to the cells
- Ozone therapy increases oxygen utilization
- Ozone therapy stimulates cytokine function which are the molecules our immune system uses to control and eliminate infections and cancers



# Continued

- Ozone therapy increases nitric oxide production which is critical for heart and circulatory health, blood pressure, and immune function
- Ozone therapy stimulates detoxification
- Ozone therapy stimulates antioxidant enzymes
  - All medical scientists agree that the cause of every chronic degenerative disease from cancer to heart disease and even normal aging is the damage caused by excess of dangerous molecules called free radicals; Antioxidants protect us from free radical damage.
  - **Research shows that ozone therapy increases antioxidant enzymes as much as 300%**
- Ozone therapy is directly toxic to all microbes including: bacteria, fungi and viruses
  - **A microbe has NEVER been found to be resistant to ozone**



# Continued

- Because of all its physiological and biochemical effects, ozone therapy can be beneficial in virtually every medical case even as preventative care



# Preconditioning

- Preconditioning is using ozone therapy as a PREVENTATIVE for disease
- Because we have discussed all the many benefits of ozone therapy, it can be used as PREVENTATIVE care by:
  - improving circulation
  - boosting the immune system
  - preventing our pets from becoming sick
  - even slow aging





# Ozone Summary

- Remember, ozone is not a cure. It is an amazing tool we can use to help boost our pet's immune system to speed healing and even prevent disease
- Ozone is basically like oxygen on steroids, it helps super charge the immune system which
  - Helps speed healing
  - Helps reduce pain and inflammation
  - Helps the body fight cancer
  - Can be useful in helping with any disease process
  - Helps rid the body of harmful free radicals, toxins



# Resources

- [www.aaot.us](http://www.aaot.us)

