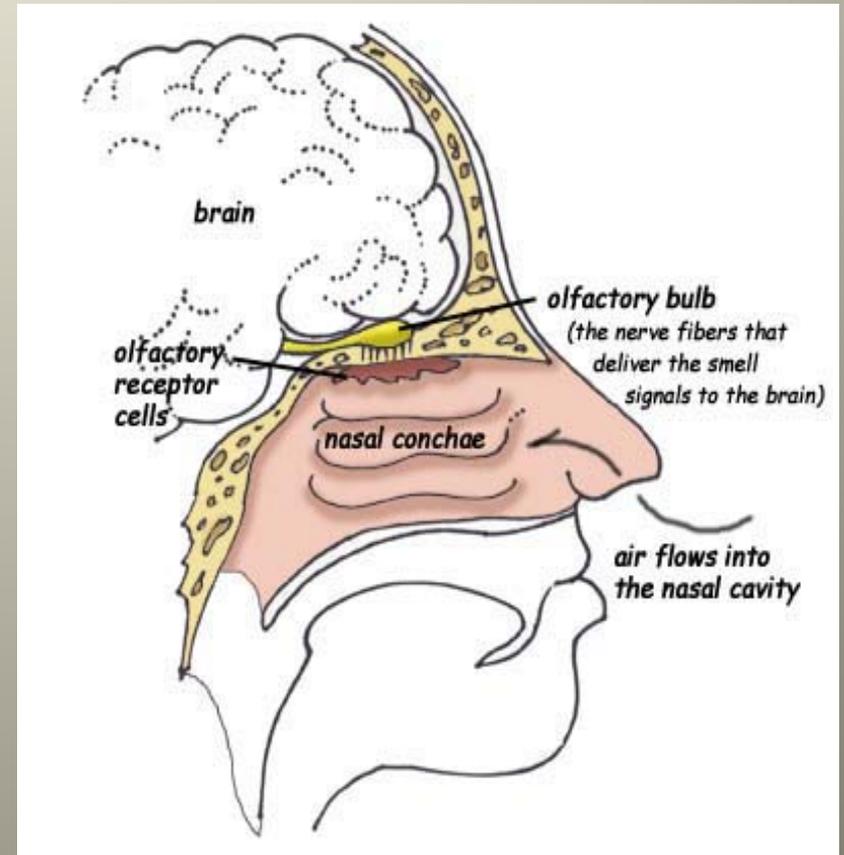


THE SENSE OF SMELL



SENSE OF SMELL

- Some materials can be detected with your nose while they are below a life threatening threshold[PEL, TLV, REL]; others cannot be detected until a life threatening threshold has been exceeded. Detecting chemicals with your nose is the least desirable method and should be avoided, **BUT** it can also be the first warning that something is wrong.



Objectives

Terminal Objective:

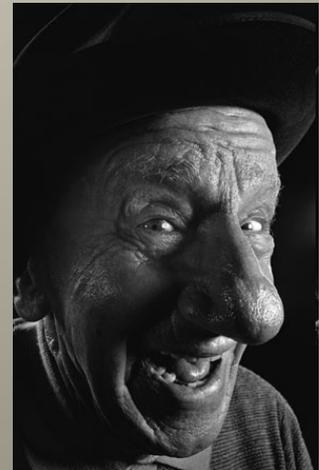
Why the sense of smell is **not** a good way to determine chemical exposure.

Enabling Objectives:

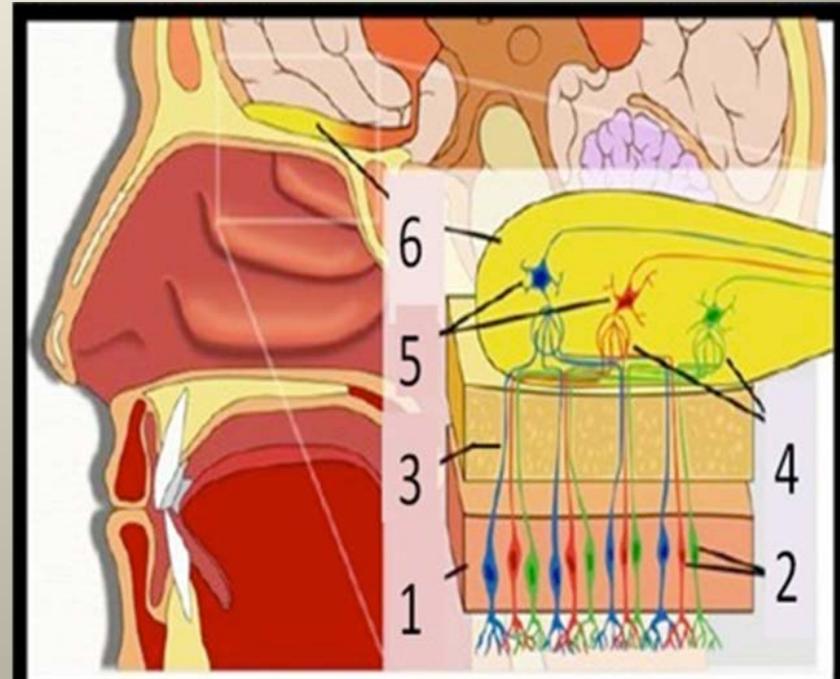
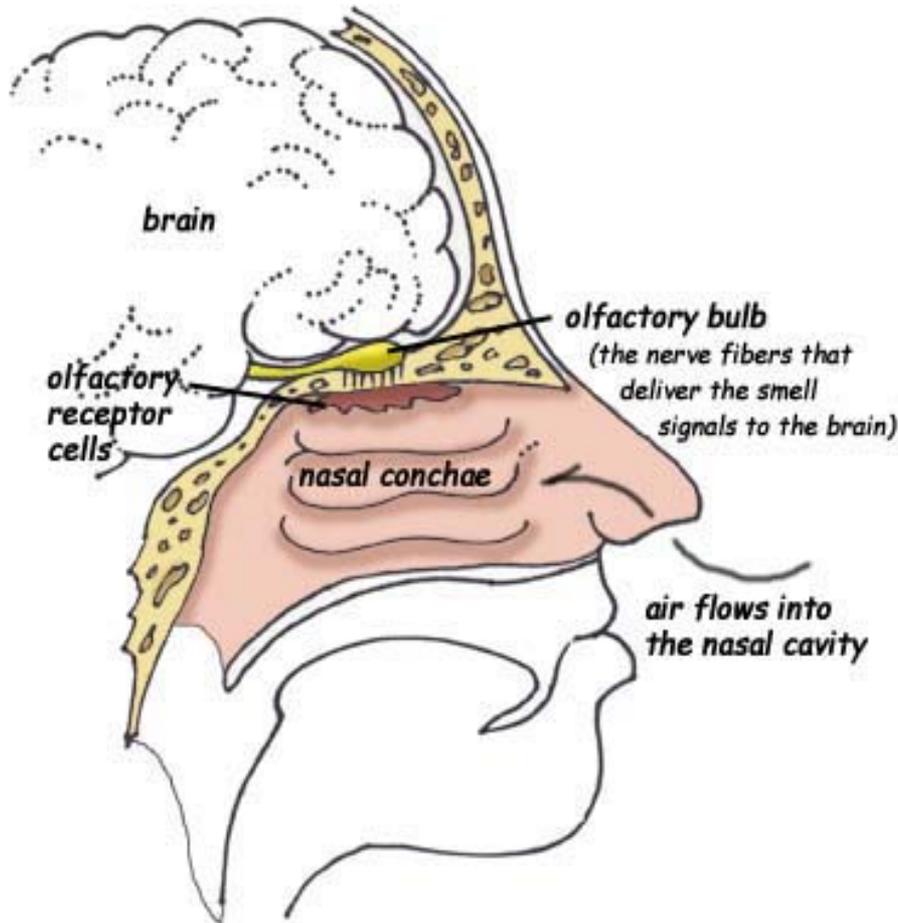
- Recognize the basic anatomy of the nose and how it works
- Recognize the meaning of olfactory fatigue and its effect
- Recognize the difference between odor threshold and PEL and TLV

Sense of Smell

Bears are thought to have the best sense of smell of any animal on earth. For example, the average dog's sense of smell is 100 times better than a human's. A blood hound's is 300 times better. A bear's sense of smell is 7 times better than a blood hound's or 2,100 times better than a human's.



The Olfactory System



The Olfactory System

1: Nasal Epithelium

2: Receptor Cells

3: Bone

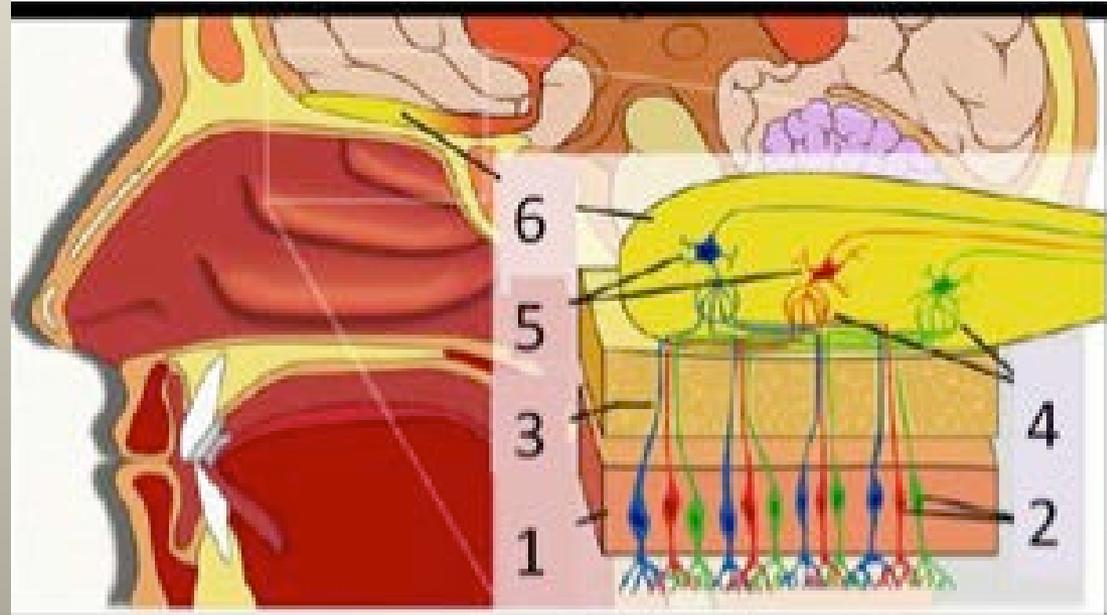
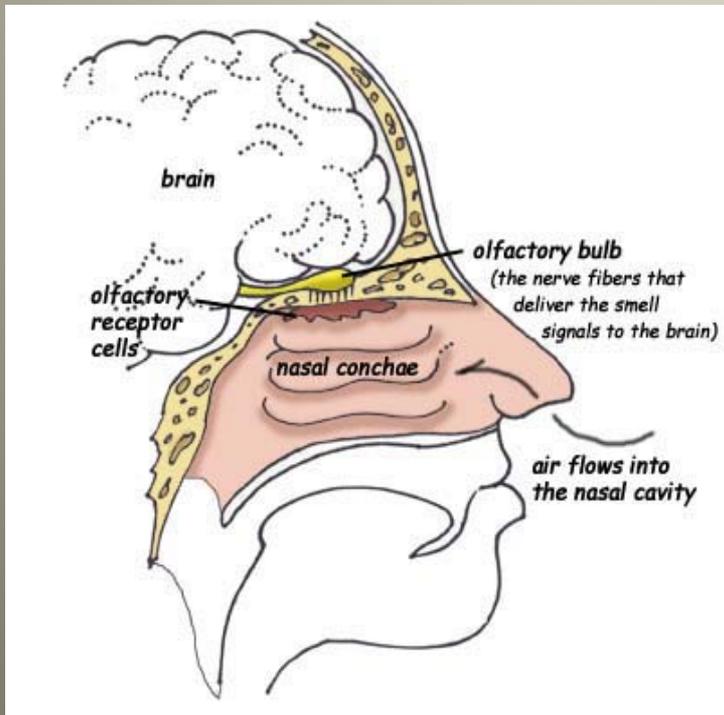
4: Glomerulus

5: Mitral Cells

6: Olfactory Bulb

Nasal Epithelium

- The **Nasal Epithelium** is a specialized tissue inside the nasal cavity that is involved in smell.

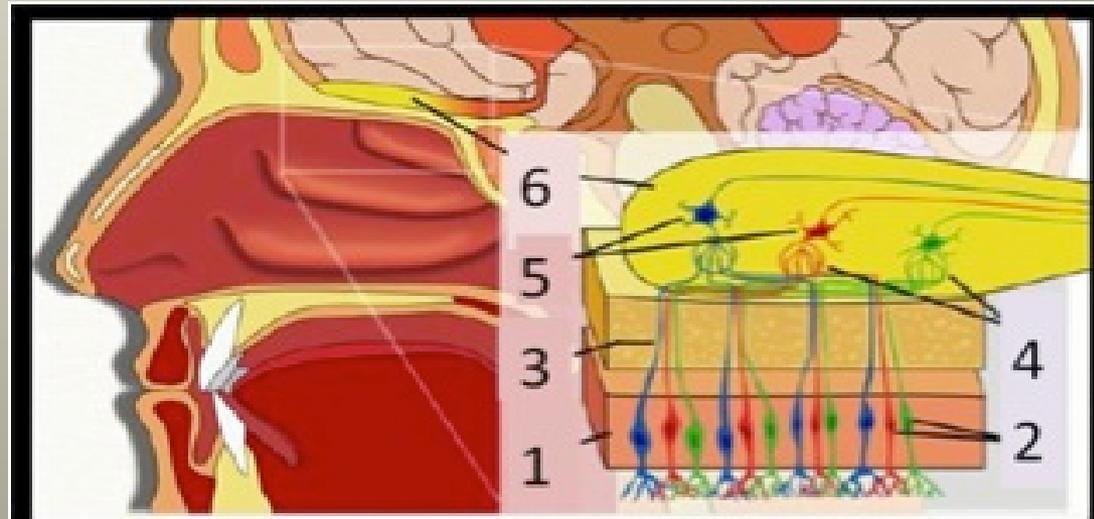
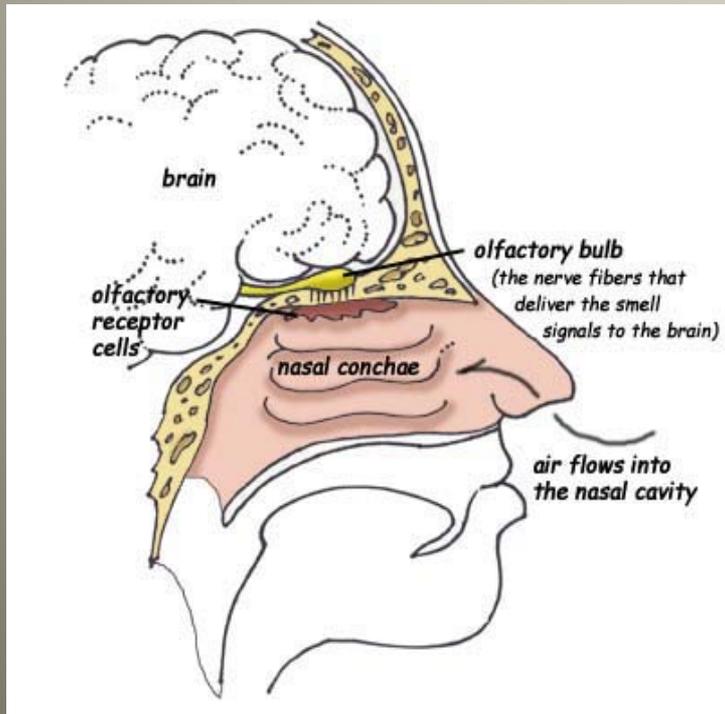


The Olfactory System

- | | |
|---------------------|-------------------|
| 1: Nasal Epithelium | 4: Glomerulus |
| 2: Receptor Cells | 5: Mitral Cells |
| 3: Bone | 6: Olfactory Bulb |

Olfactory Receptor Cells

The **Receptor Cells** are contained within the Nasal Epithelium and are attached to the Glomerulus [plural Glomeruli] within the Olfactory Bulb. Receptor Cells can renew themselves on average every 30 days.



The Olfactory System

1: Nasal Epithelium

2: Receptor Cells ←

3: Bone

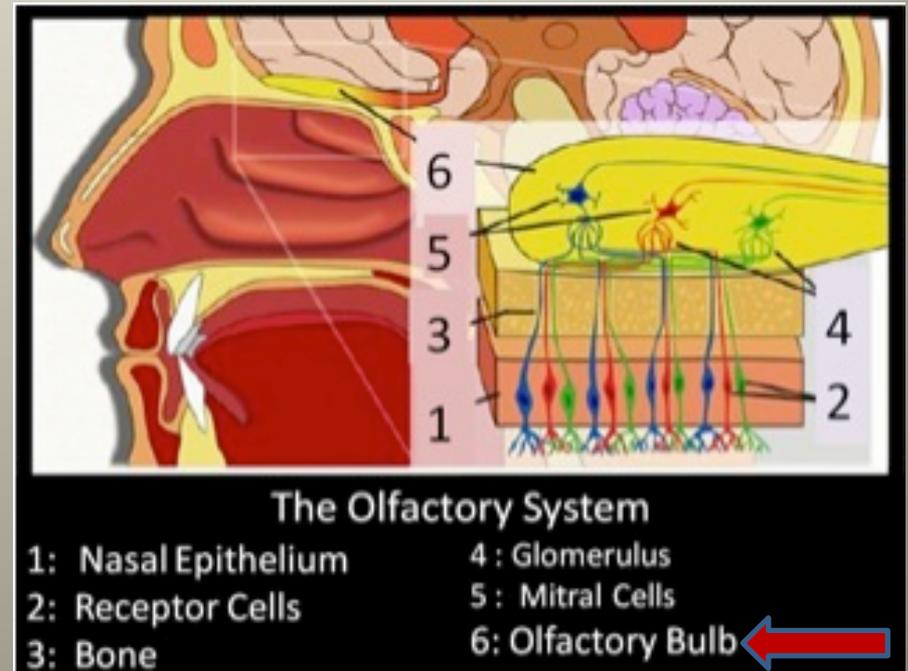
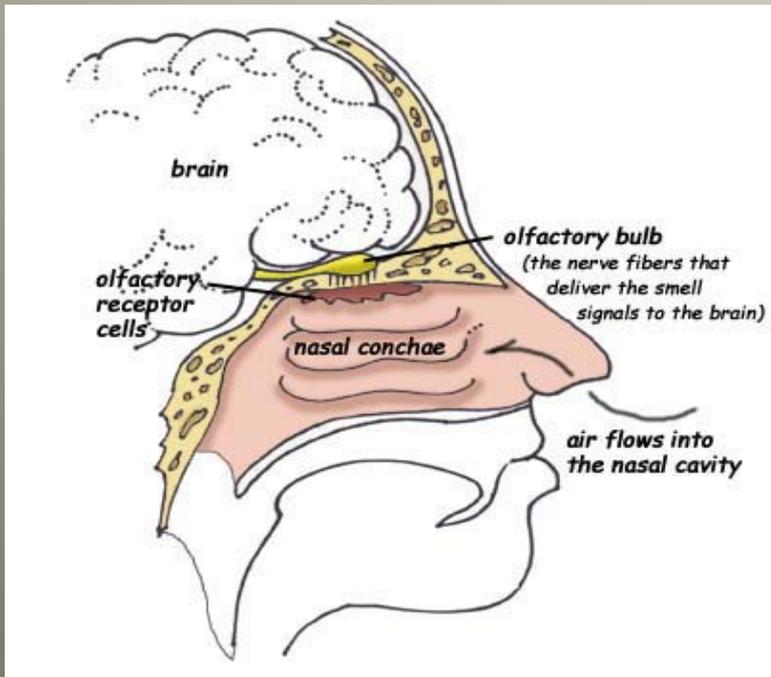
4: Glomerulus

5: Mitral Cells

6: Olfactory Bulb

Olfactory Bulb

- In most vertebrates, the **olfactory bulb** is the most forward part of the brain. In humans, however, the olfactory bulb is on the bottom side of the brain.



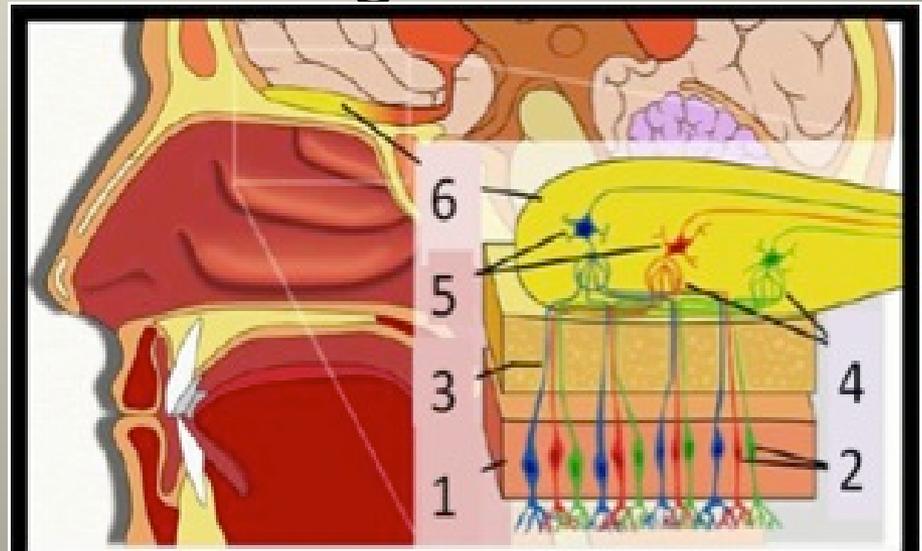
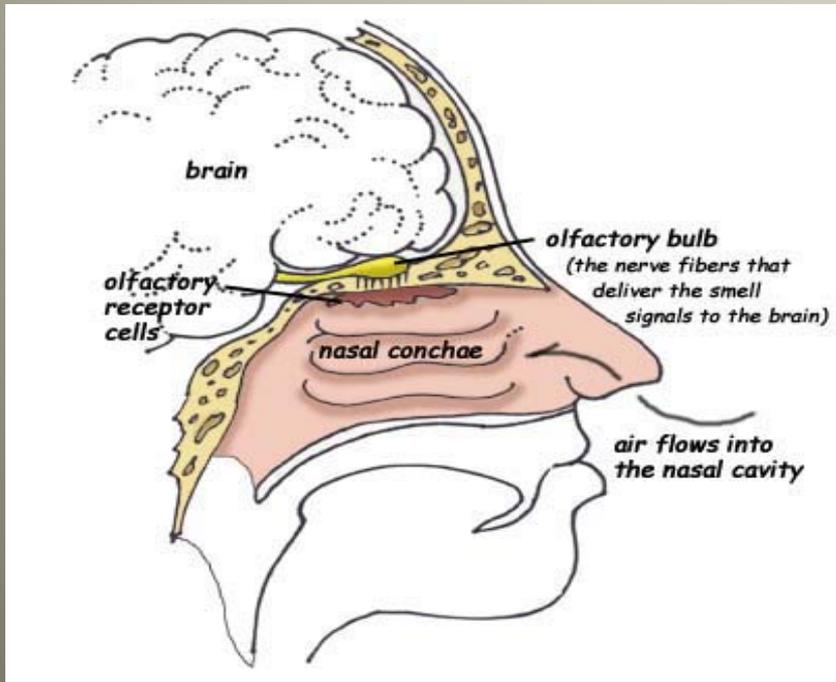
The Olfactory Bulb—cont.

- Transmits smell information to the brain and is thus necessary for a proper sense of smell.
- Four General Categories:
 - Enhancing discrimination between odors
 - Enhancing sensitivity of odor detection
 - Filtering out background odors
 - Permitting higher brain areas involved in arousal and attention to modify detection or the discrimination of odors

Olfactory Bulb contains the Glomeruli and Receptor Cells

Glomerulus

- The **glomerulus** (plural **glomeruli**) is a structure in the olfactory bulb. Each odor activates a different pattern of glomeruli.



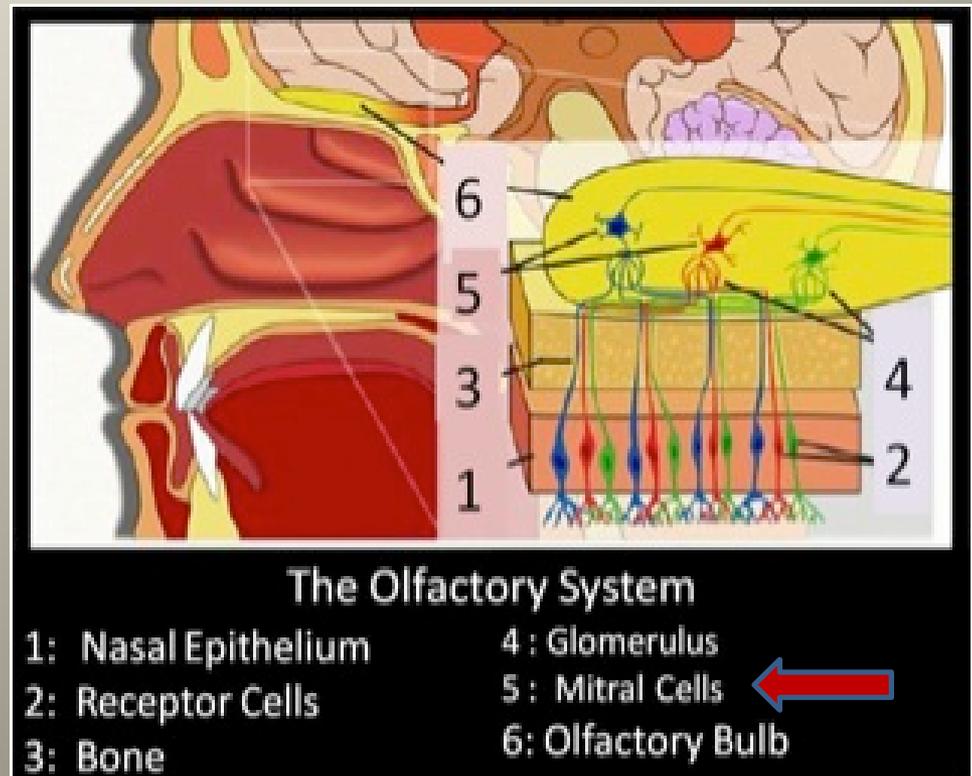
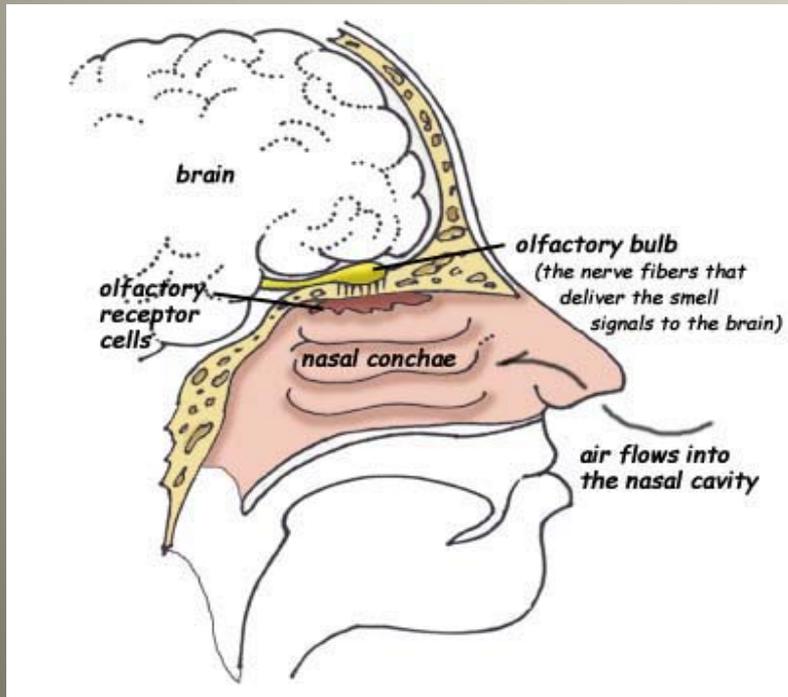
The Olfactory System

- 1: Nasal Epithelium
- 2: Receptor Cells
- 3: Bone

- 4: Glomerulus
- 5: Mitral Cells
- 6: Olfactory Bulb

Mitral Cells

- **Mitral cells** are neurons and extend outward from the Glomeruli to various parts of the brain.



Mitral Cells

- Molecules must dissolve in watery mucous in order to bind to and stimulate the Mitral Cells
- Mitral Cells transmit messages to brain areas where we:
 - Perceive odors
 - Perceive tastes
 - Where we remember people, places, events
 - Associate smells and taste sensations

Detriments to Smell

The following items can hurt or eliminate a person's ability to smell or detect odors:

- **Medical Conditions**—Head trauma, stroke, subdural hematoma, tumors, hemorrhage, infections, seizures and nerve damage, Parkinson's and Alzheimer's diseases
- **Physical Changes**—Stuffy nose, colds, allergies, mouth breathing, dentures
- **Aging and Genetics**—Bone deformities, cleft palate, loss of receptors
- **Toxic Damage**—Acids, solvents, insecticides, chemicals

Olfactory Fatigue

- Olfactory fatigue can commonly be defined as adaptation to constant stimulation of our sensory system for smell.
- The stimulus/odor causes a receptor cell to produce an electrical signal. After that signal is produced, the receptor cell soon stops the flow of ions, thus preventing any further signals and causing us not to “smell” any longer.

- IN LAYMANS TERMS?

The temporary normal inability to distinguish a particular odor after a prolonged exposure to that airborne compound.

- ***Can we think of any examples?***

Odor Threshold

- **Odor Threshold—The minimum concentration of a substance at which a majority or at least 50% of test subjects can detect and identify the substance's characteristic odor.**

Brief Overview

- Sense of smell-brief overview ([hyperlink removed-unaccessible](#))

EXPOSURE LIMITS

- **OSHA Occupational Safety Health Administration PEL [Permissible Exposure Limit]**
Only limit enforceable by law
- **ACGIH American Conference Governmental Industrial Hygienists TLV[Threshold Limit Value]**
- **NIOSH National Institute Occupational Safety Health REL[Recommended Exposure Limit]**

Sense of Smell

- EXERCISE #1

Exercise #2

- EXERCISE #2
- New Jersey Fact Sheets / Right To Know[RTK]
- <http://web.doh.state.nj.us/rtkhsfs/indexfs.aspx?lan=english>
- Search Engine: New Jersey Fact Sheets



STATE OF NEW JERSEY

DEPARTMENT OF HEALTH AND SENIOR SERVICES

CHRIS CHRISTIE, GOVERNOR • KIM GUADAGNO, LT. GOVERNOR
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Substance List

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Right to Know Hazardous Substance Fact Sheets

The Fact Sheets are prepared for substances on the [New Jersey Right to Know Hazardous Substance List](#). More than 1,600 Fact Sheets have been completed and more than 900 have been translated into Spanish. The Fact Sheets are prepared on pure substances and contain information on health hazards, exposure limits, personal protective equipment, proper handling, first aid, and emergency procedures for fires and spills.

Fact Sheets Links

- [Search for a Fact Sheet](#)
- [Quick Listings](#) (A-Z, new, revised, in Spanish, etc.)
- [Sign Up to Receive Updates](#)
- [Order Fact Sheets on CD](#)

Emergency Responders
Quick Reference

List Fact Sheets:

- [Alphabetical Listing](#)
- [New and Revised](#)
- [Carcinogens](#)
- [Available in Spanish](#)





STATE OF NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES



Right to Know Program

- Workplace Health & Safety Home
- RTK Home
- RTK Survey
- RTK Hazardous Substance List
- Fact Sheets Home
- RTK en español
- Frequently Asked Questions
- RTK County Lead Agencies
- Download Forms
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[español](#)

Right to Know Hazardous Substance Fact Sheets

Search for a Fact Sheet

Search By

- DOT No
- CAS No
- Chemical Name
- RTK Substance No

(4 digits - eg: 0001)

Search



Right to Know Hazardous Substance Fact Sheet

**Emergency
Responders
Quick Reference**

Common Name: CARBON TETRACHLORIDE

Synonyms: Tetrachlorocarbon; Perchloromethane; Carbon Tet

CAS No: 56-23-5

Molecular Formula: CCl₄

RTK Substance No: 0347

Description: Colorless liquid with an Ether-like odor

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 0 - Reactivity DOT#: UN 1848 ERG Guide #: 151 Hazard Class: 6.1 (Poisonous)	Extinguish fire using an agent suitable for type of surrounding fire. Carbon Tetrachloride itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, or when in contact with hot surfaces, including Phosgene and Hydrogen Chloride. Use water spray to keep fire-exposed containers cool.	Carbon Tetrachloride reacts with CHEMICALLY-ACTIVE METALS (such as SODIUM, POTASSIUM and MAGNESIUM); ZINC; ALUMINUM; POWDERED BERYLLIUM; FLUORINE; DIMETHYLFORMAMIDE; CALCIUM DISILICIDE; CALCIUM HYPOCHLORITE; and mixtures of ETHYLENE and BENZOYL PEROXIDE to cause fires and explosions. Carbon Tetrachloride is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 270 meters (900 feet)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers. DO NOT wash into sewer.

Carbon Tetrachloride is harmful to aquatic organisms and is hazardous to the environment and ozone layer.

PHYSICAL PROPERTIES

Odor Threshold:	>10 ppm
Flash Point:	Non-combustible
Vapor Density:	5.3 (air = 1)
Vapor Pressure:	91 mm Hg at 68°F (20°C)
Specific Gravity:	1.59 (water = 1)
Water Solubility:	Very slightly soluble
Boiling Point:	168°F (76°C)
Ionization Potential:	11.47 eV
Molecular Weight:	153.8

EXPOSURE LIMITS

OSHA:	10 ppm, 8-hr TWA; 25 ppm, 15-min Ceiling; and 200 ppm, as a 5-min maximum Peak in any 4-hr work period
NIOSH:	2 ppm, 60-min STEL
ACGIH:	5 ppm, 8-hr TWA; 10 ppm, 15-min STEL
IDLH:	200 ppm

PROTECTIVE EQUIPMENT

Gloves:	Silver Shield®/4H®, Viton, Viton/Butyl and Nitrile (>8-hr breakthrough)
Coveralls:	DuPont Tychem® BR and LV, Responder® and TK; ONESuit® TEC; and Kappler Zytron® 300, 400 and 500 (>8-hr breakthrough)
Respirator:	>2 ppm - Supplied air

HEALTH EFFECTS

Eyes:	Severe irritation, burns
Skin:	Severe irritation, burns, rash with blisters
Inhalation:	Headache, nausea, vomiting, diarrhea, dizziness, lightheadedness and passing out
Chronic:	Carcinogen (liver) in animals. Limited evidence that it may damage the developing fetus and male reproductive glands (testes)

FIRST AID AND DECONTAMINATION

Remove the person from exposure.
 Flush eyes with large amounts of water for at least 15 minutes.
 Remove contact lenses if worn. Seek medical attention immediately.
 Quickly remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.
 Begin artificial respiration if breathing has stopped and CPR if necessary.
 Transfer to a medical facility.



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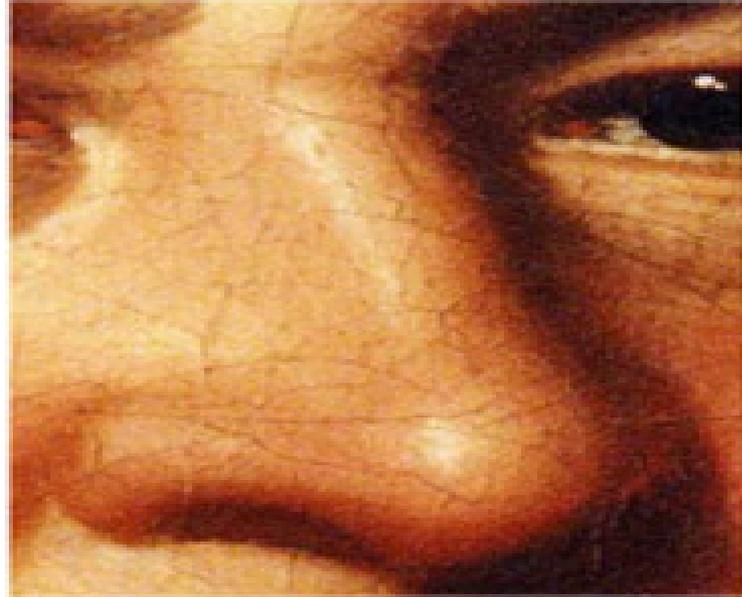
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SENSE OF SMELL

Can we
always
trust our
nose?



**TRUST YOUR
NOSE**

THE SENSE OF SMELL

- QUESTIONS?
- DISCUSSIONS?