
Health Issues

Objectives

- Learn whether pool water can be harmful to a swimmer's eyes, ears, hair, skin, teeth, or general health
- Become aware of several health related issues that should be of concern to those who spend their days working or recreating in pools
- Know the causes of dermatological problems which often arise in a water environment
- Be cognizant of methods of preventing disease transmission through pool water
- Understand ways to protect yourself from the effects of pool chemicals while in pools

Effect of Pool Water on:

- Eyes
- Hair
- General Health
- Ears
- Teeth
- Skin
- Swim Suits

Eyes

- Is it safe to wear contact lenses while in the pool?
- Why do my eyes burn after being in a pool?
- Why do I see halos around lights after swimming?

Is it safe to wear contact lenses while in the pool?

Loss of lenses

- Osmotic pressure of pool water forces out the saltier water content of soft or disposable contact lenses. Lenses tend to shrink and fit the cornea more tightly. Adherence becomes stronger with increased length of exposure to pool water.
- Wearing hard contact lenses while swimming is not recommended. Loss of hard lenses is common in both chlorinated and salt water.
- Loss of soft lenses is common in salt water, but uncommon in chlorinated fresh water, and extremely unlikely if you splash pool water into your eyes before entering the pool.

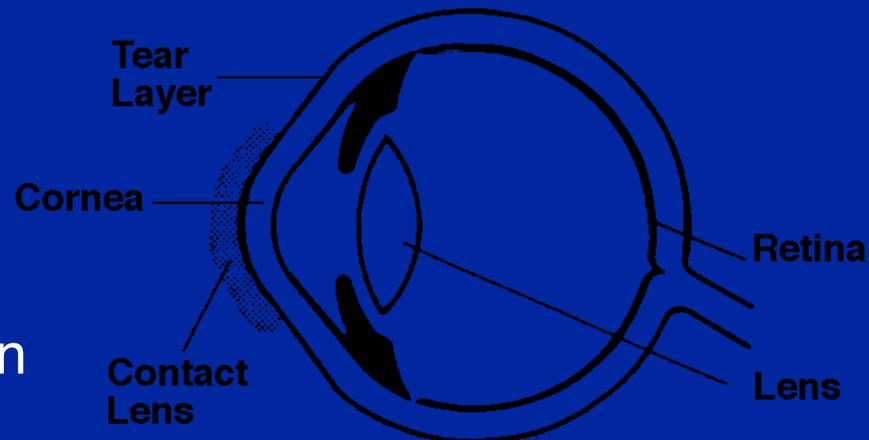
Is it safe to wear contact lenses while in the pool?

Damage to lenses

- No damage to the lenses themselves.

Vision change

- No change in vision.
- Less blinking while in the pool, but normal blinking returns within 30 minutes of leaving the pool.



Is it safe to wear contact lenses while in the pool?

Infection or eye injury

- Eye infection is possible if lenses become contaminated from absorption of contaminated water
- Corneal abrasions may result from rubbing irritated eyes if suspended debris gets under the lenses
- Corneal damage may occur if lenses are removed too soon after leaving the pool. Because of the firm adherence of lenses to the cornea due to the hypotonicity caused by the pool water:
 - Wait at least 30 minutes after leaving the pool to remove lenses.
 - Use saline solution eye drops or artificial tears before trying to remove lenses.

Why do my eyes burn after being in a pool?

- Eye irritation is a major cause of bather discomfort and source of complaints about pools
- Often incorrectly attributed to too much chlorine in the water
- Prevention
 - Swim in properly maintained, sanitized, and balanced pools
 - Use eye drops containing antihistamines after leaving the pool
 - Wear goggles while swimming
 - Outdoors, wear good polarized goggles to filter out destructive rays of the sun while swimming, or sunglasses and a hat while working

Why do my eyes burn after being in a pool?

Most likely causes of eye irritation

- Chloramines
- Unbalanced water
- Excessive debris or turbid water coming into contact with the cornea
- Friction of water against the cornea and disruption of the tear film
- Sun
 - Eye burn from sun reflection off the water
 - Prolonged ultraviolet light exposure causes inflammation of the cornea and can lead to development of cataracts
- Air pollution -- windblown debris, smog, pollen

Why do I see halos around lights after swimming?

- Since pool water is less salty than tears (hypotonic), pool water moves by osmotic pressure into the eye.
- The clear part of the front of the eye becomes swollen and fills with water. This accumulation of fluids in the eye is called corneal edema.
- Some cells are lost off the surface of the cornea causing: blurred vision and photophobia.
- 2/3 of swimmers typically see rainbows or halos around lights within 15 minutes of entering a pool.
- This light sensitivity usually disappears within 30 minutes of leaving the pool.
- To lessen the effects of corneal edema, wear goggles while swimming in pools and fresh water lakes.

Hair

- Will chlorine damage or bleach my hair?
- Can I do anything to protect my hair while I'm in the pool?
- Does chlorine cause hair to turn green?

Can swimming in chlorinated pools damage or bleach my hair?

- Swimming in chlorinated pools can severely damage hair, and damage can be cumulative. The longer or more frequently you swim, the more damage.
- Chlorine is a bleach, and it will cause hair pigment to lighten.
- Color treated hair may fade.
- Darker hair may become less shiny.
- Permed hair which is already porous and protein damaged as a result of chemical treatment will tend to absorb chlorine, becoming further damaged and over processed.

Can swimming in chlorinated pools damage or bleach my hair?

- Chlorine bonds with hair protein and causes the cuticle, the protective scaly outer protein layer that covers the inner cortex and central medulla of each visible hair shaft to be eaten away, resulting in dry, brittle, straw-like, damaged hair.
- Chlorine will make the hair shaft weak and easily damaged by brushing or combing, and hair breakage and split ends may result.
- Some long distance and competitive swimmers have even reported losing their hair in patches.

Can swimming in chlorinated pools damage or bleach my hair?

To protect hair from damage caused by chlorinated pools:

- Rinse your hair with fresh water immediately after getting out of the pool.
- Don't allow chlorine to dry on your hair.
- Wash your hair when you're finished swimming with a shampoo which is designed to repair damage caused by swimming in chlorinated pools. Look for a shampoo which: is pH balanced, contains sodium thiosulfate to dissolve chlorine, and which will replacing protein eroded by chlorine exposure.
- Don't brush your hair when it's wet. Let it dry naturally, then brush only with a wide toothed comb to lessen the chance of breakage.

Can I do anything to protect my hair while I'm in the pool?

To protect hair from damage:

- Try to limit the use of blow dryers, electric curlers and curling irons -- they further dry out already dry hair.
- Damaged hair can be partially repaired by conditioning while you swim by applying a protective conditioner to your hair and covering it with a latex or silicone bathing cap.
 - Heat generated during exercise will provide a heat conditioning treatment.
 - Wearing a conditioner while swimming will also prevent chlorine from being absorbed into, and damaging your hair, in the first place.

Does chlorine turn hair green?

- Too much chlorine in the water does not cause blond, gray or white haired swimmers' hair to turn green.
- Exposure to hard metals dissolved in the water, particularly copper, iron, or manganese is to blame.
- When absorbed by the hair shaft and oxidized by chlorine, metals commonly found in pools tend to leave behind a greenish residue on hair.
- Metals are introduced into pool water through source water used to fill the pool, as algaecides or sanitizers, from ionizers, as a result of electrolysis, from water moving through recirculation pipes at excessive velocities, and from maintenance of aggressive (acidic) water conditions in the pool.

Does chlorine turn hair green?

- You can help reduce the build-up of metals and remove some oxidized metals from your hair by using shampoos which containing the chelating agent EDTA (ethylenediamene tetracetic acid).
- Washing your hair in warm water containing dissolved aspirin, will have a similar result.
- Shampoos specially formulated for use by swimmers which contain vitamin C or sodium thiosulfate are recommended.
- Also, monitor the amount of dissolved metals in the water, and add sequestering or chelating agents to the pool to neutralize or remove metals from the water before they have a chance to be absorbed by your hair.

General Health

- Is it dangerous to swim immediately after eating?
- Can you get sick from swallowing pool water?
- Can you catch AIDS from being in a pool with someone who has the disease?

Is it dangerous to swim immediately after eating?

- “Old wives” tale perpetuated by well meaning, but incorrectly informed parents
- Not one recorded case of anyone experiencing stomach cramps and drowning while swimming immediately after eating
- Consumption of low fat, high carbohydrate foods can be nutritionally beneficial to elite competitive swimmers
- Long distance swimmers eat while in the water swimming their endurance events
- Not eating at all, or eating particular foods immediately before swimming will neither harm nor enhance the swimming ability of most typical recreational swimmers

Is it dangerous to swim immediately after eating?

- Engaging in intense exercise immediately after eating a heavy meal is not beneficial to proper digestion
 - You shouldn't try to run a marathon immediately after consuming a Thanksgiving feast, nor should you compete in a long distance competitive swimming event
 - It wouldn't hurt to go for a short walk around the block after a moderate meal, and neither would it be dangerous to swim a few laps
 - Just use common sense to decide when it's appropriate to swim after eating



Can you get sick from swallowing pool water?

- Yes, but unfortunately, you can't tell if pool water is safe just by looking at it. Only results of testing for the presence or absence of pathogenic organisms can tell us for sure whether water is safe to drink in quantities or over a long period of time.
- In most cases though, if you're swimming in a properly designed, maintained and chemically treated pool, the water is potable and should be safe to drink.
- Pools in California are designated as reservoirs in emergencies, after earthquakes, wildfires, or other natural disasters.
- Interestingly, when tested, the quality of water in many pools is actually better than that found in public water supplies or bottled drinking waters.

Can you get AIDS from being in a pool with an HIV infected person?

- You can't catch AIDS (acquired immune deficiency syndrome) or any STD while in a pool or spa unless while in the pool with an infected person you:
 - Engage in sex or some other high risk behavior
 - Come in to direct contact with blood, vomit or other bodily fluids
- The HIV virus does not transmit through water, even in the absence of normal bactericide levels
- For the most up to date information on AIDS, or for information on other diseases which can transmit through water, contact the Centers for Disease Control and Prevention at (404) 639-2317

Ears

- How can I avoid getting “swimmer’s ear?”

How can I avoid swimmer's ear?

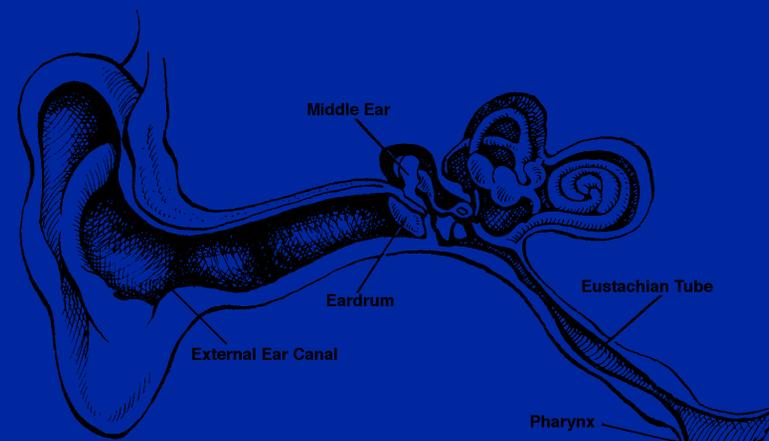
- Laceration of the skin encourages bacterial and fungal growth.
- *Pseudomonas aeruginosa*, *proteus vulgaris*, staph and strep infections are most common.
- Some people, particularly children and individuals with allergies, are prone to ear infections.
- Symptoms may not appear for several hours or even 1 or 2 days after exposure.
- Symptoms:
 - Mild to moderate pain, low grade fevers, itching, discharge from the ear, throbbing, swollen ear canal, partial hearing loss

How can I avoid swimmer's ear?

- Prevention:
 - Keep water from entering or remaining in ears
 - Wear a bathing cap pulled down over your ears
 - Use earplugs
 - Dry ears thoroughly with a towel or hair dryer
 - Jump up and down and shake your head to dislodge trapped water
- To relieve pain:
 - Apply dry heat
 - Use antibacterial eardrops (A combination of alcohol to reduce moisture and boric acid or vinegar to return the ear canal to an acidic state and slow bacterial growth and the spread of infection)

How can I avoid swimmer's ear?

- Swimmer's ear (otitis externa) is an inflammatory disease of the auricle or skin of the outer ear.
- Likelihood of an infection is based on four factors: temperature, length of exposure, amount of moisture retained in the ear canal, and the presence of bacteria in the water.
- Chlorine changes the ear canal lining from slightly acidic to alkaline.
- Wax and the protective lipid film coating are washed out of the ear by water.

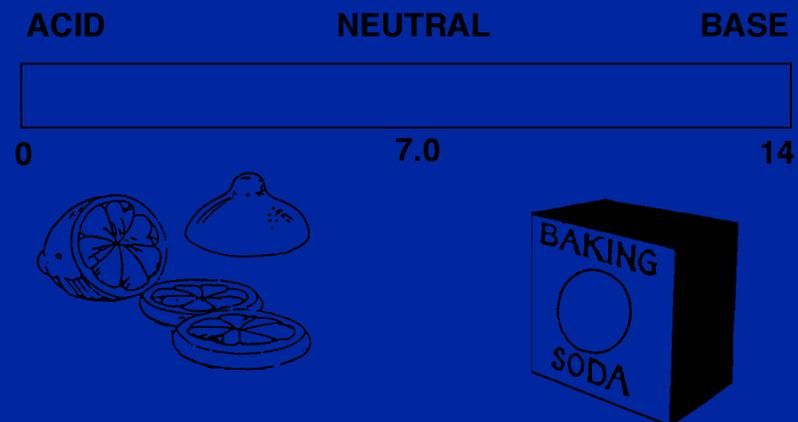


Teeth

- What causes swimmers to suddenly lose tooth enamel?
- What is “swimmer’s calculus”?

What causes swimmers to suddenly lose tooth enamel?

- Swimming in extremely acidic pool water will cause erosion of dental enamel especially in children
- Symptoms:
 - Gritty, rough, yellow, transparent looking teeth
 - Pain while chewing



What causes swimmers to suddenly lose tooth enamel?

- Hydrochloric acid formed in the chlorination process, acidic source water, acid rain, bather wastes, and acidic pool chemicals must be neutralized.
- A slightly alkaline pH of 7.2 - 7.8 should be maintained since pH (hydrogen ion concentration) significantly influences the rate of demineralization and number of mineral acid erosion sites on teeth.

What is “swimmer’s calculus”?

- Journal of the ADA reported (October 1995) that in a study of young swimmers, 58% who swam more than 6 hours per week developed “swimmer’s calculus”
- Brown stains on teeth
- Staining caused by pool chemicals combining with saliva
- No oral health problems associated with the stains
- Stains can be removed by having teeth cleaned by a dental professional
- ADA recommends more frequent cleanings for swimmers or aquatic professionals who spend a lot of time in pool water

Skin

- Why does my skin itch after swimming, especially in the Winter?
- Why do so many swimmers and people who work in the water develop skin rashes?
- Why do my fingers wrinkle after being in the water for a long time?

What causes itchy skin?

- **Dry skin**, eczema, red, itchy, chapped, flaking, blistering skin can be caused by exposure to water and chlorine
- During Winter months, skin loses additional moisture to cold outdoor air and heated indoor air
- Skin cells become stiff and dry
- Painful skin cracks develop
- Sensitivity to chemicals, clothing, ingredients in soaps and detergents
- Treatment:
 - Prevent moisture loss and replace lipids

Is there anything that will prevent or stop the itching?

- Limit length of time spent in water
- Prior to entering the water, apply Bag Balm, Udder Cream or other similar lanolin based veterinary antiseptics that provide a coating over the skin that will help prevent moisture loss
- Use mild soaps that won't further dry the skin
- Pat rather than vigorously rubbing your skin dry after showering
- Apply Dermasil, Curel or other over the counter creams that replace lipids, or creams containing the drugs doxepin or alpha-hydroxy
- Steroids or topical medications may be required

What causes the rashes and itchy skin?

- **Contact dermatitis and halogen hypersensitivities**
(Ex. Erythema multiforme)
- Treatment:
 - Avoidance of the particular halogen
 - Swim in pools sanitized and oxidized by non halogen products
 - UV light - hydrogen peroxide
 - Polyhexametamethylene biquanide (PHMB)
 - Reduce required halogen levels needed in order to maintain ORP by installing ozone generators

What causes the rashes and itchy skin?

- **Bacterial infections** (Ex. *Pseudomonas aeruginosa*)
- Treatment:
 - Stay out of the contaminated water
 - Institute maintenance procedures to rid the pool of the bacteria
 - Find the reason for the bacterial outbreak

What causes the rashes and itchy skin?

- **Marine life larvae** (Ex. jellyfish) trapped in swimsuit fabric while swimming in the ocean
- Showering while wearing the suit or immediately getting into a pool may causes the larvae to discharge venom
- Treatment:
 - Remove and wash swim suits immediately after leaving the ocean
 - Apply antihistamines or corticosteroid creams

Why does my skin wrinkle after being in the pool for a long time?

- Keratin, a protein manufactured in the epidermis (the outermost layer of the skin) which normally blocks moisture, dirt and bacteria from being absorbed, cannot protect the skin from protracted exposure to water.
- Epidermal skin cells absorb pool water due to osmotic pressure and the lack of protective keratin.
- The cells swell, enlarge and wrinkle.
- When the water evaporates after you leave the pool and dry off, epidermal cells return to their normal size and unpucker within a few minutes.

Swim Suits

- Do high levels of chlorine cause bathing suits to disintegrate?

Do high levels of chlorine cause bathing suits to disintegrate?

- Chlorine is a bleach commonly used to whiten and brighten clothes.
- After many washings, colors do begin to fade and clothing fibers do start to disintegrate. Clothing materials exposed to any amount of bleach, however small, will eventually fade.
- However, good quality swim suits (as compared to "lay around on the beach and get a tan" suits) are now manufactured from chlorine resistant materials which hold up better in chemically treated pools.
- Lycra is Dupont's trademark for its Spandex fiber, and Antron its trademark nylon fiber.

Do high levels of chlorine cause bathing suits to disintegrate?

- Lycra, a polyurethane (polyester) based elastomer, is always blended with other fibers. Lycra is what allows the bathing suit to stretch.
- Competition swim suits are made of Lycra 128, recreational suits of Lycra 146.
- Lycra 128 has a higher resistance to chemicals, has long, strong, flexible fiber strands that resist breaking when exposed to chlorine, and is resistant to body oils that break fibers. (More sweat, more body oils and fats at higher temperatures).
- Some suits are made of Antron rather than Lycra. They're shiny, durable, resist fading from repeated washings and exposure to sunlight, and dry quickly.

Do high levels of chlorine cause bathing suits to disintegrate?

- Weights and quality of threads, elastics, and fabric weights used in swim suits also influence the life expectancy of a suit.
- Interestingly though, clothes washed in typical washing machines are exposed to much higher levels of chlorine than are bathing suits worn by bathers in swimming pools. Most commercial pools maintain free chlorine levels of between 1.0 and 10.0 parts per million (ppm).



Do high levels of chlorine cause bathing suits to disintegrate?

My Frigidaire washing machine holds approximately 10 gallons of water. I normally add 1/4 cup (2 ounces) of 5% chlorine bleach to the wash load. This is the equivalent of adding 1 ounce of 10% sodium hypochlorite. The dosage required to introduce 1 ppm of 10% sodium hypochlorite to 10,000 gallons of pool water is 12 fluid ounces. Therefore, adding one ounce of sodium hypochlorite or the equivalent 2 ounces of Clorox to my wash water raises the chlorine level to approximately 83 ppm.

(12 ounces)	(1 ppm)	(10,000 gallons) =
(1 ounce)	(.0833 ppm)	(10,000 gallons) =
(1 ounce)	(83.3 ppm)	(10 gallons)