Appendix F. INFORMATION AND WORLD HEALTH ORGANIZATION GUIDANCE FOR CYANOBACTERIA

Activities at the local, state, national and international level demonstrate an increasing interest in health concerns related to blue-green algae (cyanobacteria) and harmful algal blooms. In response, we're providing information and links to other sites that will be helpful to the public and to local, regional, and state public health and environmental health officials.

What is the concern about blue-green algae?

When some blue-green algae blooms occur in water bodies, exposure to algae and their toxins can pose risks to humans, pets, livestock and wildlife. Exposure may occur by ingestion, dermal contact, and aspiration or inhalation.

Risks to people may occur when recreating in water in which a blue-green algae bloom is present, or from the use of drinking water that uses a surface water source in which a blue-green algae bloom is present.

What are the possible health effects related to blue-green algae?

Exposure to blue-green algae can cause rashes, skin and eye irritation, allergic reactions, gastrointestinal upset, and other effects. At high levels, exposure can result in serious illness or death.

Depending on the particular cyanobacterium, and the amount to which one is exposed, blue-green algae have the potential to cause a variety of adverse health effects, including liver toxicity (*e.g., Microcystis aeruginosa*) and neurotoxicity (*e.g., Anabaena circinalis*). Microcystin toxins may also promote tumor growth.

Destruction of cells may release the toxins into surrounding waters, so care must be taken in dealing with blue-green algae blooms.

Are these effects just theoretical?

No. Several dog deaths have been reported following the dogs' exposure to blue-green algae in Humboldt County water bodies—see CDHS' Cyanobacteria website .

Worldwide animal poisonings and adverse human health effects have been reported (see references below, especially this from the World Health Organization (WHO)).

What is the best way to minimize risks from blue green algae in recreational water?

Avoid body contact with blue-green algal blooms. This includes swimming, wading, water-skiing.

Children especially should avoid contact. Their small body weight means their exposures to blue green algae will be higher than adults, given the same volume of water intake.

Local health and environmental agencies are encouraged to and generally do post recreational areas with signs and brochures to inform the public of the presence of blue-green algae blooms. Some examples of information from various states are presented below.

What about fish caught in water experiencing a blue-green algae bloom?

If one is going to consume fish, it's best to remove the internal organs, which would likely contain more of the algae/toxin.

There have been some reports of blue-green algae toxin in fish tissues, but anadromous fish that are migrating into a water body with a bloom may not have had an opportunity to concentrate much of the toxin.

What about pets?

Keep pets out of water with blue-green algae blooms.

Dog deaths have been reported, some apparently related to ingestion associated with licking algae from their fur after wading/swimming in water with blue-green algae blooms.

What is the regulatory status of blue-green algae in recreational water?

There aren't any state or federal standards for blue-green algae in recreational water.

CDHS, in its guidance for freshwater beaches, recommends posting beaches when there is (1) visual presence of a cyanobacteria bloom, or (2) more than either 20,000 cyanobacterial cells per milliliter, or 10 micrograms chlorophyll-a per liter with dominance of cyanobacteria

The WHO guidelines for recreation summarized in the following table:

Guidelines for Algae and Cyanobacteria in Fresh Water (from *WHO Guidelines for Safe Recreational Water Environments*, Table 8.3, Guidelines for Safe Practice in Managing Recreational Waters, page 150)				
Probability of adverse health effects	Guidance level or situation	How guidance level derived	Health Risks	Typical Actions
Relatively low	20,000 cyanobacterial cells/ml *or* 10 µg/ chlorophyll-a/liter with dominance of cyanobacteria	From human bathing epidemiological study	Short-term adverse health outcomes, e.g., skin irritations, gastrointestinal illness	Post on-site risk advisory signs Inform relevant authorities
Moderate	100,000 cyanobacterial cells/ml *or* 50 µg chlorophyll-a/liter with dominance of cyanobacteria	From provisional drinking-water guideline value for microcystin-LR [= 1 µg/L] and data concerning other cyanotoxins	Potential for long-term illness with some cyanobacterial species Short-term adverse health outcomes, e.g., skin irritations, gastrointestinal illness	Watch for scums or conditions conducive to scums Discourage swimming and further investigate hazard Post on-site risk advisory signs Inform relevant authorities
High	Cyanobacterial scum formation in areas where whole-body contact and/or risk of ingestion/aspiration occur	Inference from oral animal lethal poisonings Actual human illness case histories	Potential for acute poisoning Potential for long-term illness with some cyanobacterial species Short-term	Immediate action to control contact with scums; possible prohibition of swimming and other water

			adverse health outcomes, e.g., skin irriations, gastrointestinal illness	contact activities Public health follow-up investigation Inform public and relevant authorities
*Actual action taken should be determined in light of extent of use and public health assessment of hazard.				

More information is available from CDHS' Cyanobacteria website .

REFERENCES

- WHO, 1999. Toxic cyanobacteria in water: A Guide to their Public Health Consequences, Monitoring and Management. World Health Organization, Geneva
- WHO, 2003. Guidelines for Safe Recreational Water Environments, Vol. 1, Coastal and Fresh Water, World Health Organization, Geneva.
- WHO, 2004. Microcystin LR, from Chemical Fact Sheets, Guidelines for Drinking Water, World Health Organization, Geneva.

OTHER REFERENCES FOR BEACHES GUIDANCE

See http://www.cdph.ca.gov/HealthInfo/environhealth/water/Pages/Beaches.aspx

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