

Purchasing for Pollution Prevention

Lindane-Free Scabies Prevention and Treatment

Scabies are caused by a parasite, *sarcoptes scabiei* var. *hominis*, also known as the itch mite. The disease is transmitted through direct contact with an infected person, or from contact with infested bedding or clothing. Scabies are most common among children and people living in institutional settings or crowded conditions. Scabies infestations frequently break out in nursing homes. Though scabies, once contracted, must be treated with a pesticidal lotion, their transmission can be prevented and controlled by following early detection and prevention procedures. Most facilities can use less toxic scabicide treatments in conjunction with prevention methods to successfully prevent widespread scabies infestations.

Why avoid lindane treatment?

- Overuse of lindane can seriously affect the nervous system, causing seizures or convulsions.¹
- FDA cautions that lindane products should only be used in cases where individuals are resistant to or cannot tolerate other treatments, and that patients weighing under 110 pounds may be at particular risk for neurological side effects such as seizures.²
- EPA considers lindane a pollutant of concern in the Great Lakes (as well as in Lake Champlain, Chesapeake Bay, and other large water bodies) due to its persistence in the environment, potential to bioaccumulate, and toxicity to humans and the environment.³
- Lindane concentrations sufficient to produce negative ecosystem effects have been found in the Lake Erie basin,⁴ and levels exceeding water quality standards have been found in freshwater bodies in Ohio.⁵ The US Geological Survey found lindane in 6% of the streams it tested in the US.⁶
- Lindane used to kill scabies and lice is normally rinsed directly into the drain. This use has been banned in California because water treatment facility operators there determined that lindane lotions and shampoos were the primary source of their excess lindane load.⁷ (See INFORM's fact sheet "[What's Wrong with Lindane?](#)" for more information on the health risks and environmental impacts of this pesticide.)

How can scabies be prevented or limited without the use of lindane?

Rigorous prevention and screening methods, combined with lindane-free prescription treatments, can effectively control scabies outbreaks and treat sufferers.

Prevention

- Scabies are transmitted through direct, prolonged skin contact, and through contact with the bedding or clothing of a scabies-infested person. Preventive measures are aimed at reducing or eliminating such contact.
- Confirmed scabies sufferers should be kept out of contact with others until 24 hours after treatment with a scabicide.
- Health care workers should wear gloves when making contact with people suspected to have scabies.
- Prevent sharing of personal items such as clothing, towels, and bedding.
- Wash all potentially exposed linens and clothing in hot water (130° F or higher), and dry at high heat for 10 to 20 minutes.
- Nonwashable blankets, cushions, and other articles can be placed in plastic bags for 7 days, dry cleaned, or tumbled in a hot dryer for 20 minutes.
- Sanitize the personal space of infested individuals. In correctional facilities, terminal cleaning of cells is important for controlling scabies transmission to new occupants.
- Educate clients or institutional populations about preventing scabies transmission.⁸

Screening and Proper Diagnosis

Transmission can be avoided through early detection.

- Scabies should be diagnosed by health care personnel prior to any treatment. Avoid using scabies treatments unless the individual has a confirmed case of scabies as determined by microscopic analysis of mites, feces, or egg casings.
- Allergic reactions, eczema, poison ivy, and other skin conditions that cause acute itching can be confused with scabies.
- A health care provider should take a scraping of the affected area with a scalpel and examine the material under a microscope for visible scabies mites.
- If a scabies infestation is diagnosed, all persons who have been in close contact with the affected individual should be screened regularly to identify new scabies cases early.

Treatment

Even when employing the best preventive measures, there will be times when infestations will occur and will require use of a scabicide. However, scabicides are not intended to repel mites, and their prophylactic use exposes individuals to unnecessary pesticide risks.

- Treat only affected individuals and follow product dosing instructions strictly to avoid overexposure.
- Apply a thin layer of lotion as directed.
- Leave lotion on only as long as directed — extending treatment intervals unnecessarily may lead to overexposure.
- Isolate the patient to the extent possible from unaffected persons until 24 hours after completion of treatment with scabicide.
- During and after treatment, make sure the patient has access to clean clothing and bedding.
- Continue to clean bedding and clothing with hot water and sanitize the living space until rescreening confirms that treatment was successful.
- Rescreen affected persons for continuing infestation after 7 days, two weeks, and one month to ensure treatment was successful.⁹
- Do not re-treat unless new evidence of active scabies is found. Note: Itching and redness may continue for some weeks after treatment; unless live scabies mites are detected, this does not indicate a failure of treatment.¹⁰

What lindane-free pesticides are available for scabies treatment?

All scabies medications require a prescription.

- **5% permethrin lotion** (Elimite) is considered the most effective treatment by numerous authors and organizations, including the Centers for Disease Control and the American Social Health Association.¹¹
- **Crotamiton** (Eurax), a prescription treatment containing a synthetic chloroformate salt, has a less successful rate of cure, though it can help lessen itching as well as killing mites.
- **Benzyl benzoate** was for years the treatment of choice for scabies, but recent trials indicate it has only a 50% treatment efficacy rate.¹²
- **Ivermectin** (Stromectin) is a prescription antiparasitic drug taken orally. One study demonstrated ivermectin to be as effective as lindane.¹³ However, use for scabies treatment is off-label.¹⁴

What is the relative efficacy of lindane-free treatments?

The results of studies of the comparative efficacy of various treatments have varied, and more research is needed. The Cochrane Database of Systematic Reviews has found permethrin to be more effective than crotamiton, and has found no difference in the cure rates of crotamiton and lindane. However, a review of comparisons of permethrin and lindane yielded inconsistent results.

EFFICACY RATES OF SELECTED STUDIES REVIEWED IN 2002¹⁵

Active Ingredients	Efficacy Rate
Topical permethrin	98%
Oral ivermectin (two sequential doses)	95%
Combination of benzyl benzoate and ivermectin	100%
Oral ivermectin (single dose)	63%-70%
Topical benzyl benzoate	47.4%
Lindane	96%

What is the comparative cost of lindane versus alternatives?

All non-lindane scabicides are more expensive than lindane-containing products. One alternative, crotamiton, is only 10% more expensive per dose than lindane. And permethrin, given its higher rate of treatment success, may require less usage, thus reducing the cost differential compared to lindane treatments. The table compares the retail price of the various treatments for scabies, according to Internet pharmacy sites.

COMPARATIVE COSTS OF VARIOUS TREATMENTS FOR SCABIES

Active Ingredient	Brand Name(s)	Vendor	Product Cost*	Cost per Dose
1% lindane	Generic (formerly Kwell)	anymed.com	\$6.86	\$6.86
10% crotamiton	Eurax	drugstore.com	\$15.13	\$7.57
5% permethrin	Elimite	anymed.com	\$30.69	\$15.35

* Price information is from two consumer websites: www.anymed.com and www.drugstore.com. Prices will be different for institutional purchasers.

Can alternatives successfully treat crusted (Norwegian) scabies?

- Immune-compromised and elderly individuals are prone to a more resistant version of scabies known as Norwegian, or crusted, scabies.
- In this variant, mite tunnels are often almost completely covered over with scabs, under which hundreds, or even thousands, of mites may be present, and lotions may not be able to penetrate scabs sufficiently to kill the mites.
- One study reported success with a combination of oral ivermectin and topical benzyl benzoate.¹⁶
- Clinicians need to use their professional judgment to determine the safest, most effective treatment for crusted scabies.

- Crotamitin can increase skin irritation¹⁹ and has, in rare cases, been associated with convulsions and death.²⁰
- Ivermectin has not been fully evaluated for side effects, but these can include exacerbation of existing asthma and light-headedness.²¹

† All pesticides pose some risk to human health and the environment, and users should carefully evaluate the risks and benefits of any chemical treatment. For further information, see INFORM's fact sheet "[Lindane Alternatives: Health and Environmental Effects.](#)"

What risks are associated with lindane-free alternatives?†

Because lindane is a nervous system toxin that both persists in the environment and concentrates in the food chain, it is the least environmentally preferable choice for treatment, but all scabies treatments involve some level of risk.

- Permethrin has been associated with diarrhea and rash, and in rare cases, convulsions and death.¹⁷
- Benzyl benzoate has also been associated with rash and diarrhea, as well as aplastic anemia.¹⁸

Notes

- ¹ US Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Alpha-, Beta-, Gamma-, and Delta-Hexachlorocyclohexane," 1999, <http://www.atsdr.cdc.gov/toxprofiles/tp43.html>.
- ² US Food and Drug Administration, "Lindane Shampoo and Lindane Lotion: Questions and Answers," 2003, <http://www.fda.gov/cder/drug/infopage/lindane/lindaneQA.htm>; US Food and Drug Administration, "FDA Public Health Advisory: Safety of Topical Lindane Products for the Treatment of Scabies and Lice," <http://www.fda.gov/cder/drug/infopage/lindane/lindanePHA.htm>.
- ³ US EPA, Technology Transfer Network Air Toxics Website, "Lindane (Gamma-Hexachlorocyclohexane)," <http://www.epa.gov/ttn/atw/hlthef/lindane.html>.
- ⁴ US EPA Region 5 and Environment Canada, *Lake Erie Lakewide Management Plan (LaMP) 2000*, <http://www.epa.gov/glnpo/lakeerie/lamp2000/>.
- ⁵ US EPA Region 5, *Pollutant Load Analysis to Assess Sources of Sediment and Water Column Toxicity in Little Beaver Creek, Ohio*, draft final report, March 2000, <http://www.epa.state.oh.us/dsw/tmdl/ULMRAppF.pdf>.
- ⁶ Kolpin, D. W., *et al.*, "Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams, 1999-2000: A National Reconnaissance," *Environmental Science and Technology*, 2002, Volume 36, Number 6, 1202-1211, <http://pubs.acs.org/cgi-bin/jtextd?esthag/36/6/html/es011055j.html>.
- ⁷ Los Angeles County Sanitation District, "Lindane Reduction Project Underway," <http://www.lacsd.org/iw/news.htm>.
- ⁸ Kentucky Health Dept., "Guidelines for Scabies Prevention and Control," 2002, <http://chs.ky.gov/publichealth/Reports-Data%20Files/Epi-reports/Scabies-GUIDELINES.pdf>.
- ⁹ *Ibid.*
- ¹⁰ Wendel, K., and A. Rompalo, "Scabies And Pediculosis Pubis: An Update Of Treatment Regimens And General Review," *Clinical Infectious Diseases*, 2002, Number 35, Supplement 2, S146-S151.
- ¹¹ Centers for Disease Control, "Sexually Transmitted Diseases Treatment Guidelines 2002," <http://www.cdc.gov/STD/treatment/8-2002TG.htm>; American Social Health Association, "Information to Live By: Scabies," 2001, <http://www.ashastd.org/stdfaqs/scabies.html>.
- ¹² National Health Service (UK) Centre for Reviews and Dissemination, "Treating head lice and scabies," *Effectiveness Matters*, 1999, Volume 4, Number 1, <http://www.york.ac.uk/inst/crd/em41.htm>.
- ¹³ Chouela, *et al.*, "Equivalent Therapeutic Efficacy of Ivermectin and Lindane in the Treatment of Human Scabies," *Archives of Dermatology*, 1999, Volume 135, Number 6, 651-654.
- ¹⁴ For more information on ivermectin's lack of FDA approval, see <http://www.headlice.org/faq/treatments/ivermectin.htm>.
- ¹⁵ Wendel, K., and A. Rompalo, "Scabies And Pediculosis Pubis: An Update Of Treatment Regimens And General Review," *Clinical Infectious Diseases*, 2002, Number 35, Supplement 2, S146-S151.
- ¹⁶ *Ibid.*
- ¹⁷ *Ibid.*
- ¹⁸ *Ibid.*
- ¹⁹ MedlinePlus Drug Information, "Crotamiton," <http://www.nlm.nih.gov/medlineplus/druginfo/uspdi/202170.html>.
- ²⁰ Wendel, K., and A. Rompalo, "Scabies And Pediculosis Pubis: An Update Of Treatment Regimens And General Review," *Clinical Infectious Diseases*, 2002, Number 35, Supplement 2, S146-S151.
- ²¹ MedlinePlus Drug Information, "Ivermectin," <http://www.nlm.nih.gov/medlineplus/druginfo/uspdi/202311.html>.