

## A 'louse-y' situation: Treating infestations despite OTC pyrethroid resistance

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**T**reatment of head louse infestation, or pediculosis, usually begins at the pharmacy counter. Affecting more school-aged children than all other communicable diseases combined (second only to the common cold), patients rely on pharmacists as resources for head lice education, prevention, and management.

A systematic review covering 30 years of literature published in the September issue of *Pediatric Dermatology* found that treatment success has dwindled. Review of 579 references from three major biomedical databases identified a clear reduction in the effectiveness of OTC permethrin- and pyrethrin-based shampoos from 96% to 100% in earlier studies to about 25% today.

### The human host

"Head lice are known as ectoparasites, meaning they make their homes on the skin and hair of the body," noted Mary Bridgeman, PharmD, BCPS, GCP, clinical associate professor for the Ernest Mario School of Pharmacy at Rutgers University, "and they feed exclusively on human blood."

- Head lice (*Pediculus humanus capitis*) complete their entire life cycles on the heads of their human host, making head-to-head contact with an infected person the greatest risk for transmission. Eggs adhere to hair close to the scalp and hatch in 7 to 10 days. The resulting nymph or instar, an immature louse, begins feeding within 1 minute of hatching. Reapplication of OTC products such as pyrethroids that are not ovicidal is necessary.
- Head lice irritate the host's scalp, cause poor sleep and social disruption, and result in lost school and caregiver work days. While not known to transmit disease, secondary bacterial infection can manifest from scratching.
- David R. Brown, ScD, a public health toxicologist for Environment and Human Health, Inc., and 30-year supporter of the National Pediculosis

Association, Inc., (NPA) added that "infestations are prevalent in schools and camp settings. Often [lice] are carried home, infesting adults and other siblings. [Head lice are] seen in nearly every school district in the



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United States." Pediculosis outbreaks tend to peak in July and September in the United States, coinciding with the back-to-school period.

### Resistant head lice

Reduced effectiveness of permethrin and pyrethroids, as Ellen Koch, MD, and colleagues point out in the aforementioned review, is largely due to widespread use and the resulting development of resistance in lice. Bridgeman explained that "it's believed a genetic mutation is responsible for the emergence of pyrethroid-resistant head lice [that] essentially renders the head louse nervous system desensitized to the effects of pyrethrin and pyrethroids."

Ex vivo studies have confirmed clinical anecdotes and genetic evidence of resistance, finding that head lice collected in the United States are much less

susceptible to pyrethroids than those collected outside the country. In one study, lice from the heads of Ohio children survived a 15-minute emersion in marked formulations.

Factors contributing to this rise in resistance include overuse and improper use of OTC products, insufficient contact time with agents to the scalp, use of environmental pesticides that foster mutations linked to nerve insensitivity and resistance to pyrethroids in other insects, and increased use of noneffective home remedies.

### Clinical practice pearls

Despite current treatment barriers, pharmacists may use several practice modalities to help mitigate resistance, educate the community, and provide effective treatment for pediculosis.

"Current guidelines and evidence suggests that over-the-counter treatment options can still be tried as first-line treatment for managing head lice," said Bridgeman. "Prescription-strength products can be considered for symptoms persisting after repeated treatment."

As pyrethroids become less effective, and with available evidence attesting to

the safety of currently marketed prescription medications, a rise in prescriptions for other pediculicides might be expected. Brown advised pharmacists to "be aware of the drugs and chemicals being used by the patient and the patient's status, such as pregnancy." He said to "choose the agent carefully and limit the exposure," keeping in mind repeated treatments and toxicity.

"Importantly, the newer pediculicides should be used judiciously, as eventual mutation to these products is also likely to occur," said Bridgeman. "As pharmacists, we can help to provide education to nurses, teachers, and child care providers."

For more information, visit the NPA website ([www.headlice.org/downloads/pharmguide.htm](http://www.headlice.org/downloads/pharmguide.htm)).

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