

# Head lice

**BACKGROUND** Head lice infestation is a very common problem in children and causes a high level of anxiety among parents and childcare workers.

**OBJECTIVE** In this article we attempt to clarify issues of diagnosis and treatment of head lice and offer recommendations for dealing with head lice.

**DISCUSSION** Head lice are a nuisance, but they do not transmit infectious diseases. Control includes detection with wet comb technique. Treatment is usually with a topical pediculicide, but regular mechanical removal with conditioner and a comb is an alternative. Treatment failure can be the result of inadequate application of the treating product, pediculicide resistance, or failure to re-treat at 7–10 days. Reinfestation (and therefore apparent treatment failure) is common.

Infestation with *Pediculus humanus capitis*, or head lice, is common, occurs worldwide and affects people of all ages and socioeconomic groups. It is more common between the ages of three and 10 years and occurs more frequently in females.<sup>1,2</sup> Infestation is usually asymptomatic and is not associated with severe disease. Head lice have three juvenile stages, first, second and third instar nymphs (Figure 1). The life cycle of the head louse is shown in Figure 2. The head louse effectively infests the human head and is distinct from body and pubic lice. The louse feeds on blood several times per day and lives close to the scalp in order to maintain its body temperature.<sup>1</sup> Transmission of lice occurs predominately through direct head-to-head contact. Lice cannot jump or fly, but can crawl. Pets are not vectors.<sup>3</sup>

## Diagnosis

Head lice eggs are small (the size of a pinhead) and oval (Figure 3). A live egg will 'pop' when squashed between the fingernails, nits are empty egg cases. Features of the stages of the head louse are listed in Table 1. Lice and nits may be found by following the steps listed in Table 2. Finding nits within 6 mm of the scalp is highly suggestive of active infestation. Hatched and dead eggs are evidence of recent infection, but are not an infection risk. If nits are only found more than 6 mm from the scalp, this indicates previous infestation. If lice or live eggs are

found, the child's hair should be treated.

## The myths

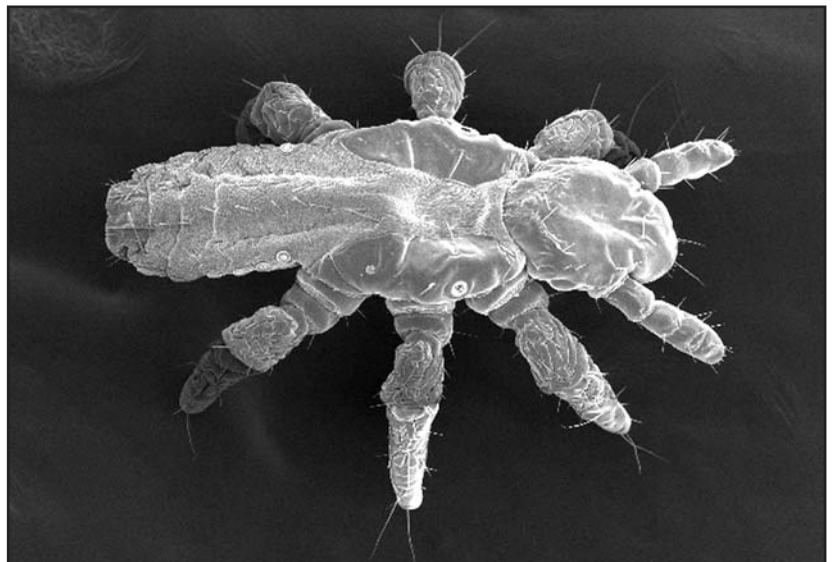
Myths abound relating to head lice.<sup>5</sup> These include:

- children with lice scratch or itch (50% don't)
- lice jump or fly from head to head
- lice live in carpets, beds, clothes and school buses
- one treatment is enough
- everyone in the family should be treated
- some products prevent head lice, and
- head lice are selective about their home.

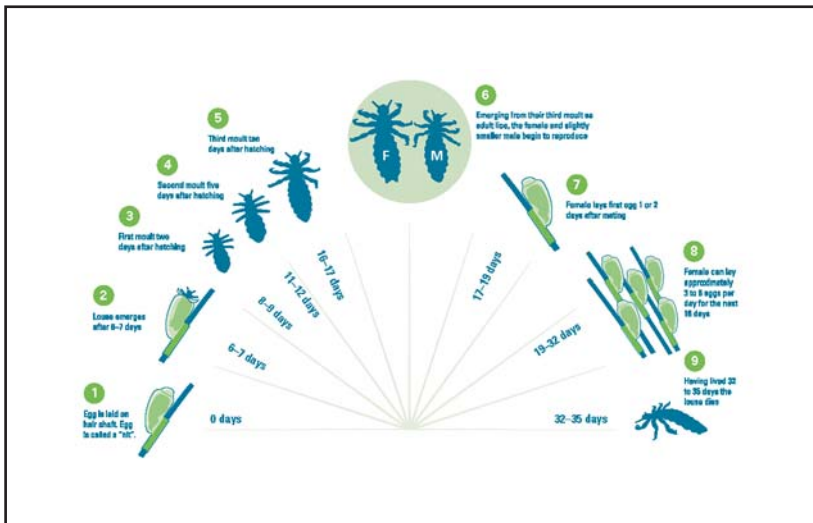
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**Figure 1. First instar nymph of head louse**



**Figure 2. Life cycle of the head louse**  
 Source: Department of Human Services, Victoria. About Head Lice  
<http://www.dhs.vic.gov.au/phd/headlice/about.htm>



**Figure 3. Live egg**  
 Source: <http://lancaster.unl.edu/enviro/pest/bug.htm>

## Treatment

There are three basic treatment options for head lice for which there is some scientific evidence of efficacy:

- topical pediculicides
- wet combing, and
- oral therapy.

## Topical pediculicides

There are over 20 head lice products that can be divided into four groups based on the active compound (Table 3):

- pyrethrins
- synthetic pyrethroids (permethrin and bioal-lethrin)
- organophosphates (malathion and maldison), and
- herbal products.

**Table 1. Features of head louse ‘stages’**

Live egg	Dead egg	Hatched egg
<ul style="list-style-type: none"> <li>• brown</li> <li>• have ‘lid’ on top</li> <li>• ‘pop’ when squashed</li> <li>• indicates active infection and infection risk</li> </ul>	<ul style="list-style-type: none"> <li>• brown</li> <li>• collapsed on sides</li> <li>• don’t ‘pop’ when squashed</li> <li>• dead eggs only indicates inactive infection and no infection risk</li> </ul>	<ul style="list-style-type: none"> <li>• pale colour</li> <li>• no ‘lid’ on top</li> <li>• don’t pop when squashed</li> <li>• hatched eggs only indicates inactive infection and no infection risk</li> </ul>

Effective pediculicides kill both lice and eggs. According to the instructions for each particular preparation, the pediculicide should be applied to dry or wet hair, left for the advised time, then rinsed thoroughly with warm water. No treatment kills 100% of eggs, therefore, it is essential that treatment is repeated 7–10 days after the first treatment to kill any nymphs that have hatched from remaining eggs.

If over-the-counter products containing pyrethroids do not work, it is unlikely that prescription strength (5%) permethrin will either.<sup>1</sup> For children 2–12 years of age, preparations containing permethrin or pyrethrins are safe. Herbal preparations may have a role, although there are mainly anecdotal reports of their effectiveness.

Head lice may survive very briefly outside the host, but washing sheets and clothing is not routinely recommended. All infected members of the patient’s family should be treated simultaneously.

## Wet combing

Pediculicides are not recommended for children under two years of age,<sup>1</sup> therefore, mechanical removal of lice with a fine tooth comb is an alternative. The procedure is done on wet hair with hair conditioner in the same manner as described in Table 2. This should be repeated daily until a few days after the last louse is found. This approach cured 38% of children in which treatment was carried out by parents.<sup>6</sup>

**Table 2. Steps to finding lice and nits<sup>4</sup>**

1. Comb hair conditioner on to dry, brushed (detangled) hair – this stuns the lice for 20 minutes and makes it difficult for them to grip the hair or crawl around
2. Comb sections of the hair with a fine toothed, head lice comb
3. Wipe the conditioner from the comb onto a tissue
4. Look on the tissue and on the comb for lice and eggs
5. Repeat the combing for every part of the head at least 4–5 times

**Table 3. Products commercially available to treat head lice in Australia**

Active insecticide group	Commercial product examples
<b>Pyrethrins</b>	Amcal Head Lice Foam Banlice Mouse Delva Formula PCT Lyban Foam Meditox Foam Pyrenel Pyrifoam Lotion
<b>Synthetic pyrethroids (bioallethrin, permethrin)</b>	Orange Medic Orange Medic Plus Paralice Pyrifoam Head Lice Treatment Quellada Creme Rinse Quellada Head Lice Treatment Cleensheen
<b>Organophosphates (maldison or malathion)</b>	Exolice Medicated Foam HL7 HLT Lice Rid KP24 Lotion KP24 Foam LX Medicated Foam
<b>Combinations of herbal/essential oils</b>	Herbs for Headlice Lice Attack NeutraLice Quit Nits All Natural Head Lice Treatment Sunspirit Aromatherapy Lice Scents to Kill!!! Wild Child All Natural Head Lice Treatment
<b>Combinations of herbal/essential oils with natural pyrethrins</b>	Lice Blaster

**If head lice are resistant to one product, look to see what the active ingredient is. Then choose another product from one of the other three groups.**

Source: Associate Professor Rick Spear. James Cook University Head Lice Information Sheet: <http://www.jcu.edu.au/school/phtm/PHTM/hlice/groups.htm>

### Oral therapy

A recent trial of oral trimethoprim-sulfamethoxazole (Bactrim) in addition to permethrin rinses, only increased the cure rate marginally (89–95%).<sup>7</sup> In Australia, cotrimoxazole is only recommended when resistant lice do not respond to other conventional treatments, presumably because of pediculicide resistance. Ivermectin has also been investigated for treatment of lice resistant to conventional pediculicides, but is not approved for treatment of head lice.<sup>8</sup>

### Alternative therapies

There are many ‘natural’ remedies available for the treatment of head lice, including herbal treatments containing tea tree and other oils, home remedies and electrocution by battery powered combs. There are few studies assessing the safety or efficacy of these therapies, although many anecdotal reports exist. Head shaving is only briefly effective and is often too traumatic for children.<sup>3</sup> Olive oil or other viscous substances applied thickly to the scalp and hair may suffocate the lice. There is no product available that prevents head lice, although tying back long hair can help prevent the spread of head lice.

### Treatment failure

There are four reasons for apparent treatment failure:

- inadequate application
- pediculicide resistance
- failure to re-treat, and
- re-infection.

### Pediculicide resistance

An indication of resistance is the presence of active or live lice on the tissue after combing. If some lice are active, infestation is resistant. If infestation recurs within one month after treatment, a different topical pediculicide can be used (Table 3).<sup>3</sup> Alternatively, one of the other treatment options may be considered.

### Exclusion from school

In Australia, exclusion from school is only recommended until appropriate treatment is commenced.<sup>9</sup> Contacts do not need to be excluded. Pediculosis is NOT a notifiable condition and head lice DO NOT transmit any infectious diseases. Conflict of interest: none declared.

**SUMMARY OF IMPORTANT POINTS**

- Infestation with head lice is common.
- Detection of lice or nits is important.
- Careful combing and treatment with a topical pediculicide are the mainstays of treatment.
- Treatment failure is often due to inadequate treatment or re-infestation.
- Children with head lice need only to be excluded from school or childcare until treatment has commenced.

**Resources**

Associate Professor Rick Spear. James Cook University Head Lice Information Sheet. Available at: <http://www.jcu.edu.au/school/phtm/PHTM/hlice/hlinfo1.htm>

Department of Human Services, Victoria. About Head Lice. Available at: <http://www.dhs.vic.gov.au/phd/headlice/about.htm>.

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