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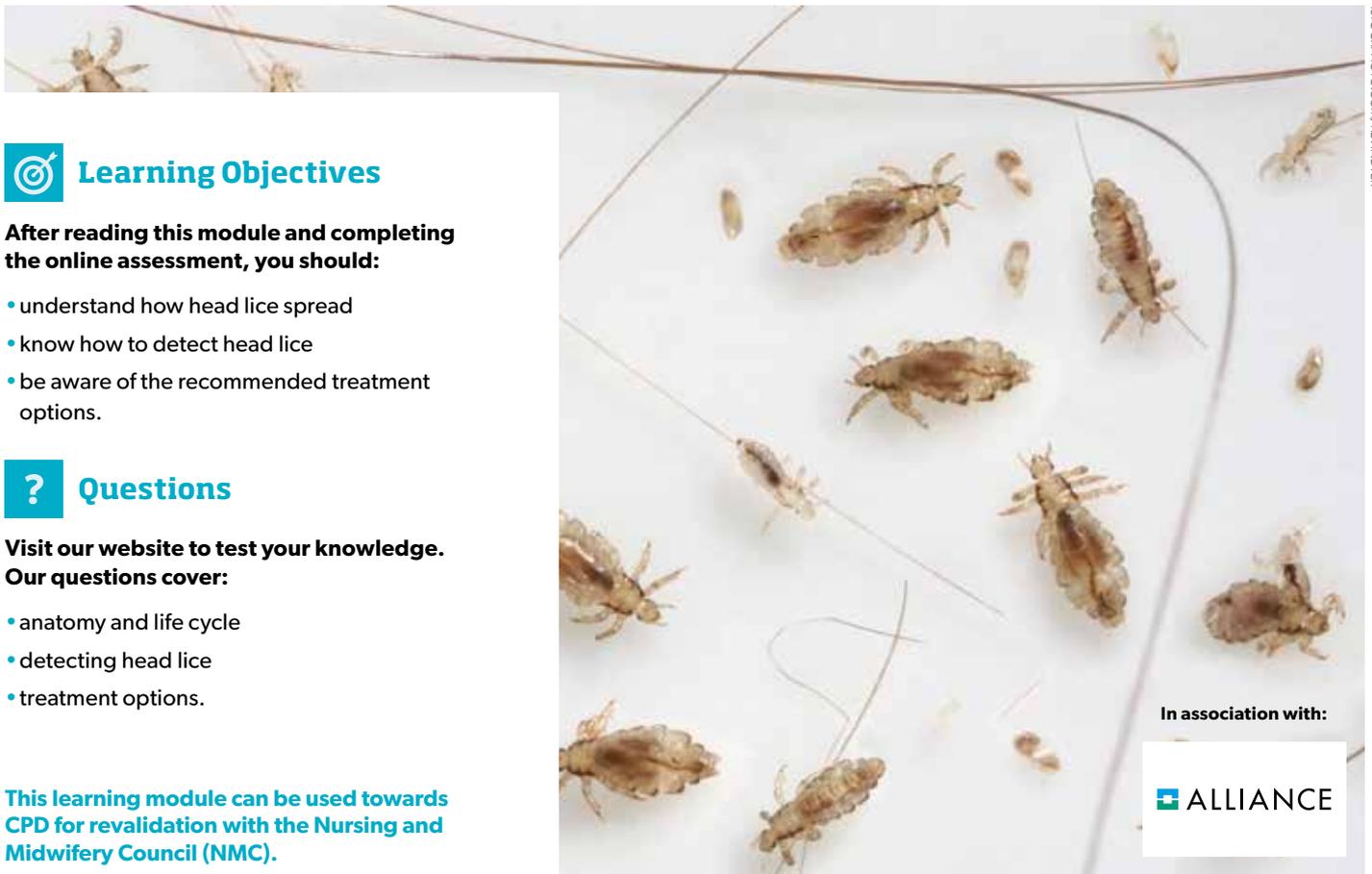
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CLINICAL REVIEW:

# Head lice: Supporting families with evidence-based treatment advice

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**Learning Objectives**

After reading this module and completing the online assessment, you should:

- understand how head lice spread
- know how to detect head lice
- be aware of the recommended treatment options.

**Questions**

Visit our website to test your knowledge. Our questions cover:

- anatomy and life cycle
- detecting head lice
- treatment options.

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## Head lice

Head louse infestation (*pediculosis capitis*) is an old and extremely common problem. Despite the availability of effective treatments, it continues to affect millions of people of all ages worldwide. With transmission occurring almost exclusively through direct head-to-head contact, children of primary school age (4-11 years) tend to be most frequently affected, with a peak incidence occurring at 7-8 years.<sup>1</sup>

National Institute for Health and Care Excellence (NICE) guidance (last updated 2016) provides robust evidence-based advice about detecting and treating head lice.<sup>1</sup> This module will help develop and strengthen your understanding of the guidance, so that you can be confident that you are offering parents the up-to-date information and practical treatment advice they need.

### The impact of infestation

Infestations vary from just a few lice to more than a thousand in severe cases, but a typical infestation is about 30 lice per head.<sup>1</sup> They can be difficult to spot and many people who unknowingly have lice remain asymptomatic. Itching is the most common symptom and increases with duration of infestation and number of head lice. However, itching may not develop for several weeks or months and may continue for weeks after the head lice are gone. Head lice don't cause any significant physical health problems. However, the feeling of lice moving through the hair can be a nuisance, and without treatment, head lice can persist for long periods. This may lead to complications including:

- a pruritic rash on the back of the neck and behind the ears, caused by a hypersensitivity reaction to louse saliva/faeces
- excoriation and secondary bacterial infection (e.g. impetigo, furunculosis) due to scratching
- loss of sleep due to continuous itching.

Persistently disturbed sleep may lead to concentration problems, tiredness and poor performance in school. As people mistakenly believe that the condition stems from poor hygiene, head lice can cause considerable anxiety, distress and stigma for affected individuals and their families.

### The role of healthcare professionals

The school nursing service stopped screening children for head lice some decades ago. Parents are best placed



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to inspect their children's hair for lice. However, every generation of parents needs instruction, encouragement and support from healthcare professionals to help them become proactive and proficient in detecting and treating head lice. Ideally, healthcare professionals should provide parents with information about head lice before their children start school and at regular intervals throughout the primary school years.

### Debunking common myths

- Anyone who has hair can catch head lice – they don't care if hair is dirty or clean.
- Head lice can crawl quickly along a hair – but they can't burrow under skin, jump, swim or fly.
- Head lice spread by direct head-to-head contact – transmission via clothes and pillows is extremely unlikely.
- Pets can't spread head lice – they only live on humans.
- A 'nit' is an empty egg case – finding 'nits' doesn't necessarily mean you have head lice.

### Anatomy

The head louse (*Pediculus humanus capitis*) is an obligate parasite. It is a highly-specialised, haematophagic (blood-sucking) insect, which completes its entire life-cycle on the human head.

The adult louse is a six-legged, wingless insect not much bigger than a sesame seed (about 3 mm long). Its abdomen has seven segments. The first six have a tiny opening (spiracle) on each side, leading to a network of tubes that facilitate gaseous exchange. The spiracles also provide a route for water transpiration.

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#### HEALTH PROFESSIONAL ACADEMY TEAM

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The louse generally stays close to its host's scalp. It uses its piercing mouthparts to inject saliva and extract a blood meal several times a day. It is usually grey, but may take on a reddish-brown hue after feeding. Each leg ends in a pincer-like claw which enables it to grip the hair. African-Americans appear less likely to be infested with head lice than other ethnic groups.<sup>2</sup> It may be that the louse is less able to grasp their hair, which is wider and oval in cross-section rather than circular.

### Life cycle

The entire life cycle from an egg being laid to the death of the adult louse is completed in 30 days. Following mating, the adult female can lay 6 to 8 oval-shaped eggs (ova) a day – about 50-150 eggs during her lifetime. She attaches each egg near to the base of a hair by means of a 'glue' secreted from her abdomen. The glue rapidly hardens to form a sheath which covers the hair shaft and most of the egg, except for its cap (the operculum). Each egg is about 0.8 mm long and translucent. After 7-10 days (depending on environmental conditions) an immature louse (nymph) emerges from the egg. The nymph is about the size of a pin-head and pearly white. The nymph sheds its exoskeleton (moults) three times before becoming a sexually mature adult, 7-10 days after hatching. The empty egg case (or 'nit') turns white, but (unlike dandruff and other debris which may be mistaken for head lice eggs) will remain firmly attached to the growing hair even after vigorous brushing.

### Transmission

Transmission requires direct head-to-head contact. Head lice can't jump, fly or swim, but they can crawl rapidly along hairs from one head to another. Children tend to be most affected because they often have head-to-head contact with other children in class and during play. The trend to take 'selfie' photos with heads together also provides an opportunity for lice to spread.

Lice can't survive long once detached from the head. Deprived of blood meals, lice become too dehydrated to feed within 8-12 hours and die within 1-2 days. Lice are extremely unlikely to spread by sharing hats, combs, or pillows. However, head lice caught in combs and brushes, or clinging to stray hairs in them, could be returned to the head at the next stroke.<sup>1</sup>

### Detection

Healthcare professionals should encourage parents to examine their children regularly so that head lice can be identified and treated early. Itching shouldn't be assumed to indicate an active infestation. Itching may be caused by

skin conditions, such as eczema or psoriasis, or prompted by hearing that there are lice in the community. As it's difficult to distinguish between viable eggs and empty shells, the presence of eggs can't be assumed to indicate an active infestation either. A live louse must be found to confirm an active infestation.

Systematic combing using a fine-toothed detection comb is the most reliable way to confirm the diagnosis. The detection comb should be made of plastic and have teeth 0.2-0.3 mm apart.<sup>1</sup> Combing may be done on wet or dry hair, but wet combing (see Box 1) is more reliable as wet lice remain immobile and are easily removed at the same time. Good lighting and a magnifying glass can help.

If a live head louse is found, all household members and close contacts should be checked. Treatment should only be given if an active head louse infestation is confirmed and then all affected household members should be treated simultaneously. Parents should let their child's school know so that families with children in the same class and other close contacts can be reminded to check regularly for head lice. However, it is unnecessary for children who have head lice to be kept away from school or nursery.<sup>3</sup>

#### Box 1: Wet combing detection procedure

Instructions should be provided with detection combs, but generally the procedure is as follows:

- After washing hair, apply ample conditioner and leave it in.
- Untangle hair using an ordinary comb.
- Once the comb moves freely, switch to a detection comb.
- Slot the detection comb into the hair at the roots.
- Draw the comb through to the tips of the hair, maintaining contact with the scalp as long as possible.
- Check the comb for lice after every stroke, and remove them by wiping or rinsing the comb.
- Work through the hair in sections until all hair has been combed thoroughly.
- Rinse out conditioner.
- Repeat the combing procedure to check for lice that may have been missed the first time.

### Treatment options

There are many head lice treatments available. However, NICE only recommends the treatments detailed overleaf for which there is evidence of safety and efficacy.<sup>1</sup> NICE believes that the data available doesn't show any one of these options to be clearly superior. Parents should be assisted to choose a treatment according to their individual needs and preferences after considering the advantages and disadvantages of each, what if anything they have already tried, and the cost. However, NICE only recommends wet combing or 4% dimeticone lotion first-line for pregnant or breastfeeding women, children aged 6 months to 2 years, and those with asthma or eczema. Chemical insecticides should only be used with medical supervision in children younger than 6 months, and alcohol-based preparations should not be used in very young children or in people with asthma or scalp



dermatitis. Whichever of the recommended treatments is chosen, you should ensure parents check the product's suitability for their child (or whoever needs treating) and remind them to follow all the instructions carefully.



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### Wet combing

Systematic combing of wet hair (using the procedure in Box 1) with a detection comb can be used to physically remove lice. The comb must be carefully cleaned of lice after every stroke. The recommended method involves four combing sessions over 2 weeks (on days 1, 5, 9 and 13). Each session should take about 10 minutes on short hair, but can take up to 30 minutes on long or curly hair.

#### Pros

- No contraindications – suitable for all ages, including those with asthma or sensitive skin
- Comb can be used again and again
- One of the recommended options for pregnant or breastfeeding women

#### Cons

- Time-consuming – especially for parents needing to treat several family members at the same time
- Children may be uncooperative
- Ineffective if an unsuitable comb or method is used
- Clinical trials report cure rates of only 38% and 52% at 14/15 days<sup>1</sup>

### Chemical insecticides

Currently, malathion 0.5% aqueous liquid is the only chemical insecticide recommended for treating head lice in the UK. Phenothrin and carbaryl are no longer available, and there is evidence of substantial resistance to permethrin. However, resistance to malathion has already been reported. Malathion works by blocking cholinesterase, leading to an excess of acetylcholine, causing paralysis and death. The treatment has to be massaged into the dry hair and scalp, left to dry naturally for 12 hours (or overnight) then washed off with shampoo. It needs to be applied twice, 7 days apart to kill any lice hatching in the intervening period. Dead lice and nits can then be removed with a fine-toothed nit comb.

#### Pros

- A review of safety data reported no evidence of serious systemic adverse reactions
- Suitable for all ages and those with asthma or skin conditions
- Can be used by pregnant or breastfeeding women (though wet combing or 4% dimeticone should be used first-line)

#### Cons

- Skin irritation, hypersensitivity reactions and chemical burns have been reported
- Requires two 12-hour treatments, 7 days apart
- Unpleasant odour
- Cure rates of only 33% and 75% reported in clinical trials of two applications given 7 days apart<sup>1</sup>
- Lice can develop resistance over time

### Physical insecticides

These treatments have a physical mode of action, so resistance is unlikely to develop. They need to be applied to all areas of the scalp and hair, left on for the recommended treatment time (which varies from 10 minutes to at least 8 hours for some products) and then washed off. Dead lice and nits can then be removed with a fine-toothed nit comb. Recommended formulations include:

- dimeticone 4% lotion, gel or spray
- dimeticone 92% spray
- dimeticone >95% lotion
- isopropyl myristate and cyclomethicone solution
- isopropyl myristate and isopropyl alcohol aerosol (mousse).

Dimeticone immobilises head lice by coating them with an oily substance. This occludes the spiracles, depriving the louse of oxygen and preventing water transpiration, which leads to internal water accumulation and death. Isopropyl myristate destroys lice by dissolving the waxy coating on their exoskeleton, leading to uncontrollable dehydration and death.

The Medicines and Healthcare Products Regulatory Agency (MHRA) issued advice concerning risk of serious burns if treated hair is exposed to sources of ignition.<sup>4</sup> Parents should be advised on the safe and correct use of treatments and if appropriate, advised not to smoke around treated hair and to keep it away from open flames or other sources of ignition, including in the morning after overnight application until hair is washed.

### Dimeticone 4% lotion

#### Pros

- Well-established safety profile
- Suitable for adults and children over 6 months, including those with asthma
- One of the recommended options for pregnant or breastfeeding women
- No odour
- Cure rate of 70% achieved in UK clinical trials<sup>1</sup>

#### Cons

- Limited ovicidal activity
- Requires two overnight applications, 7 days apart
- Minor adverse events, including skin irritation have occurred
- Not licensed for children under 6 months except under medical supervision
- Treated hair burns readily on ignition
- Spills are a slip hazard
- Greasy residue can be difficult to wash off

Dimeticone 92% spray has better ovicidal activity. Using this formulation, a cure rate of 97% was reported in one clinical trial.<sup>1</sup> However there is a lack of safety data on its

use in pregnant or breastfeeding women and in children younger than 2 years. Safety data for these groups is also lacking for dimeticone >95% lotion, and there are no published clinical trials on its use.

### Isopropyl myristate and cyclomethicone solution

#### Pros

- 10-minute treatment time
- Cure rates of 52% and 82% reported in clinical trials<sup>1</sup>
- No odour
- Suitable for adults and children over 2 years and those with asthma

#### Cons

- Lack of safety data in pregnant or breastfeeding women and children younger than 2 years
- Lack of trial data for use by people with skin conditions
- Skin irritation has been reported
- Ovicidal activity unknown
- Greasy residue can be difficult to wash off

### Isopropyl myristate and isopropyl alcohol aerosol

#### Pros

- 15-minute treatment time
- Single application – no need to repeat
- Easy to apply mousse
- Suitable for adults and children over 2 years

#### Cons

- Lack of safety data in pregnant or breastfeeding women and children younger than 2 years
- Lack of trial data for use by people with skin conditions
- Contains alcohol, so not recommended for those with asthma
- No published clinical trials

#### Box 2: General treatment advice for parents

- Only treat if live lice are definitely seen.
- Treat all affected household cases simultaneously.
- Choose one of the effective treatments NICE recommends.
- Check the product is suitable and follow the treatment instructions carefully.
- If using flammable treatments (e.g. dimeticone 4% lotion) keep hair away from naked flames, cigarettes, and other sources of ignition during treatment.
- You don't need to treat clothing or bedding in any special way, as lice die quickly once detached from the head.
- You don't need to keep children who have head lice away from school or nursery.<sup>3</sup>
- See NHS Choices at [www.nhs.uk/conditions/head-lice-and-nits/](http://www.nhs.uk/conditions/head-lice-and-nits/) and Community Hygiene Concern at [www.chc.org](http://www.chc.org) for further information.

### Checking treatment success

After treatment, parents should be encouraged to carry out detection combing to confirm treatment success. This should be done on day 17 if wet combing. Opinions differ as to when the hair should be checked after using an insecticide treatment. If there is no advice given with the

product, you can suggest detection combing is done either:

- 2-3 days after completing a course of treatment and again 7 days later, or
- on days 5, 9 and 12/13 after the first treatment application.

If live lice are again detected, you should:

- check that parents followed the treatment instructions correctly (e.g. entire course completed, applied correctly, applied for correct time, and sufficient product used)
- reiterate appropriate treatment advice (see Box 2)
- advise that household members, close family, and friends (adults and children) are assessed to identify possible sources of reinfestation
- advise parents to repeat the same treatment or switch to one of the other recommended treatments, as appropriate (if malathion has been used, consider the possibility of resistance)
- ensure all affected contacts are treated simultaneously.

### Common questions

#### Q: Can I prevent head lice?

A: Anyone who has close head-to-head contact with a person carrying live head lice is at risk. Regular detection combing helps to ensure that head lice can be detected and treated promptly.

#### Q: Do head lice prefer clean hair?

A: There is no evidence that head lice have a preference for either clean or dirty hair.

#### Q: Do head lice always make your head itch?

A: Some people don't feel itchy at all. In others, itching generally increases with duration of infestation and number of head lice, but itching might not develop for several weeks or months and can continue for weeks after the lice are gone.

#### Q: What do I do if lice persist despite treatment?

A: Firstly, check that live lice have definitely been found. If so, repeat the same treatment or switch to a different treatment, as appropriate, making sure that treatment instructions are followed carefully and that affected contacts are treated simultaneously. If malathion has been used, consider the possibility of resistance.

#### Q: Is insecticide resistance common?

A: Lice are extremely unlikely to develop resistance to physical insecticides, such as dimeticone and isopropyl myristate. However, resistance to chemical insecticides can develop over time. Malathion 0.5% aqueous liquid is the only chemical insecticide still recommended for treating head lice in the UK, but this is already affected by resistance.

#### Q: What treatment can I offer pregnant women?

A: In the first instance, pregnant women should try either wet combing or dimeticone 4% lotion. If these treatments fail to clear the head lice, malathion 0.5% aqueous solution, may be tried, if suitable.



## Summary

- Head lice can affect anyone, but are particularly common in primary school children.
- Although head lice are of little clinical concern, they do cause a great deal of distress.
- Parents should carry out detection combing regularly.
- Head lice treatments should only be used if live lice are definitely seen.
- Though there are many head lice treatments available, NICE only recommends a limited number of treatments for which there is evidence of safety and efficacy.
- Recommended treatment options include wet combing, malathion 0.5% aqueous solution, dimeticone 4% lotion, gel or spray, dimeticone 92% spray, dimeticone >95% lotion, isopropyl myristate and cyclomethicone solution, or isopropyl myristate and isopropyl alcohol aerosol.
- NICE believes that the available data doesn't show any one of these options to be clearly superior.
- There are various pros and cons to consider when choosing one of the recommended treatment options.
- NICE recommends wet combing or 4% dimeticone lotion first-line for pregnant or breastfeeding women, children aged 6 months to 2 years, and those with asthma or eczema.
- Treatment has the best chance of success if applied correctly and all affected contacts are treated simultaneously.



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4. MHRA (2018) *Head lice eradication products: Risk of serious burns if treated hair is exposed to open flames or other sources of ignition, e.g. cigarettes*. Available at: <https://www.gov.uk/drug-safety-update/head-lice-eradication-products-risk-of-serious-burns-if-treated-hair-is-exposed-to-open-flames-or-other-sources-of-ignition-eg-cigarettes>

# Vamousse Head Lice Treatment: Proven to kill 100% of lice and eggs within 15 minutes in scientific tests

Vamousse Head Lice Treatment is a foaming mousse intended for the treatment of head lice and head lice eggs in human hair.



## A persistent nuisance

Head lice infestation affects millions of people every year.<sup>1</sup> Transmission occurs through direct head-to-head contact, with children of primary school age (4-11 years) the most frequently affected.<sup>2</sup> The primary symptom of an infestation is an itchy scalp, though not everyone experiences this.

## The Vamousse formula

Vamousse Head Lice Treatment works thanks to a unique formula. It contains the ingredients isopropyl alcohol, isopropyl myristate and geraniol, a combination that, in the appropriate ratio, has been shown to achieve 100% mortality within 15 minutes of contact.

Because Vamousse is pesticide free, it is suitable for adults and children aged 2 years and older. Vamousse is also non-greasy.

## How to apply Vamousse

With its modern mousse format, Vamousse has been designed for quick and easy application to dry hair.

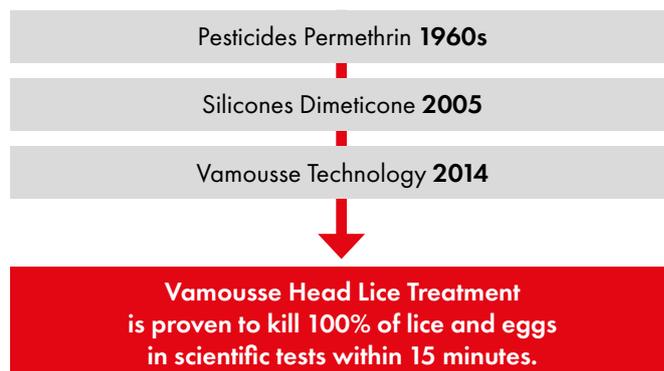
After separating the hair into 4 sections, Vamousse is applied directly to the scalp and massaged towards the end of the hair until the hair is saturated. Be sure to pay attention to the nape of the neck and behind the ears, then leave for 15 minutes.

While the hair is still wet with Vamousse, use the comb included to fully remove all the dead lice and nits (the empty egg cases). Finally, shampoo and rinse as normal.

## How Vamousse works

Dimeticone-based products cover the lice with a silicon-based product that prevents them from excreting water, killing them through osmotic stress.<sup>3</sup>

However, the unique Vamousse formula dissolves the lice's protective exoskeleton, meaning lice and eggs die quickly by dehydration.<sup>4</sup>



## Essential information

Treatment has the best chance of success if applied correctly and all affected contacts are treated simultaneously.

<sup>1</sup> Elston, DM. Principles and Practice of Pediatric Infectious Diseases. 5th Ed. Elsevier, 2018. Chapter 257: Ectoparasites (Lice and Scabies; p.1294-1298.e1.)  
<sup>2</sup> British Association of Dermatologists, Patient Information Leaflet on Head Lice  
<sup>3</sup> The mode of Dimeticone, I. Burgess, BMC Pharmacology, 2009, 9:3  
<sup>4</sup> Alliance Pharmaceuticals data on file

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**And they're gone.**