

## Case Report

**Dermatographism in a horse, responsive to cetirizine treatment****A. J. van den Brom-Spiereburg\*** , **M. J. P. Theelen**  and  
**M. M. Sloet van Oldruitenborgh-Oosterbaan***Department of Equine Sciences, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands.**\*Corresponding author email: a.j.spierenburg@uu.nl***Keywords:** horse; dermatology; dermatographism; antihistamine**Summary**

**Dermatographism is a common condition in man that occurs when pressure is applied to the skin and mast cells are triggered to release histamine, causing local urticarial lesions. This case report concerns a 4-year-old Quarter Horse gelding that was presented with pressure induced urticaria. Moderate pressure on the skin induced nonpruritic urticaria-like swelling after approximately 3–5 min, which lasted for approximately 2–3 h. Initial treatment with cyproheptadine gave an incomplete response and unacceptable sedation as a side effect. On the second generation antihistamine cetirizine (0.2 mg/kg bwt twice daily), dermatographism was no longer present and no side effects occurred. Treatment was continued for 4 months, with at least three attempts to discontinue therapy resulting in recurrence of lesions within 24 h. Lesions resolved each time within 24 h of recommencing therapy. Dermatographism did not recur after the horse was moved to another location despite discontinuation of therapy. This report describes a case of equine dermatographism responsive to cetirizine.**

**Case Description**

A 4-year-old Quarter Horse gelding was presented to the Utrecht University Equine Clinic with the complaint of pressure-induced urticaria. Moderate pressure induced nonpruritic urticaria-like swellings of the skin after approximately 3–5 min which lasted for 2–3 h. This phenomenon was first noticed 3 months prior to admission and had worsened progressively. On presentation, grooming the horse with a hard brush was enough to induce a dermal reaction. The reaction was recognised all over the body, except for the distal limbs, and was initially most obvious on the croup. Riding the horse was no longer possible because the areas where pressure was applied on the abdomen not only became oedematous, but showed subsequent skin damage. No signs of general illness were observed. Elimination of concentrate and any other supplemental feedstuff during 6 weeks did not change the occurrence of lesions.

A blood sample was taken by the referring practitioner prior to admission for complete blood count and serum chemistry. Values outside the reference range were an increased potassium, most likely the result of transport, and a low percentage of beta-globulins and minimal increased percentage of albumin (both not considered clinically relevant) (blood results in **Supplementary Item 1**).

Physical examination on admittance revealed a respiratory rate of 16 breaths/min, pulse rate of 36 beats/min and

This work was previously presented by means of a poster presentation at the 7th ECEIM congress in Prague, Czech Republic on 6–8 November 2014 (Proceedings page 89).

temperature of 37.8°C. Mucous membranes were pink and moist, without lesions. Lymph nodes were also unremarkable. The coat was shiny and the horse was shedding (considered normal for the time of year).

When moderate pressure was applied by 'writing' on the skin with an index finger, linear lesions of pitting oedema emerged after 3–5 min, reaching a maximum size after 10 min (**Fig 1**). These lines were oedematous, nonpruritic and nonpainful and the hairs were raised. These urticarial lesions lasted for approximately 2–3 h. The response was more severe when the skin was stroked against the direction of hair growth, both on haired and clipped skin.

On clipped skin the reaction after stroking was less visible and also not easily palpable, possibly explained by the lack of raised hairs (**Fig 2**).

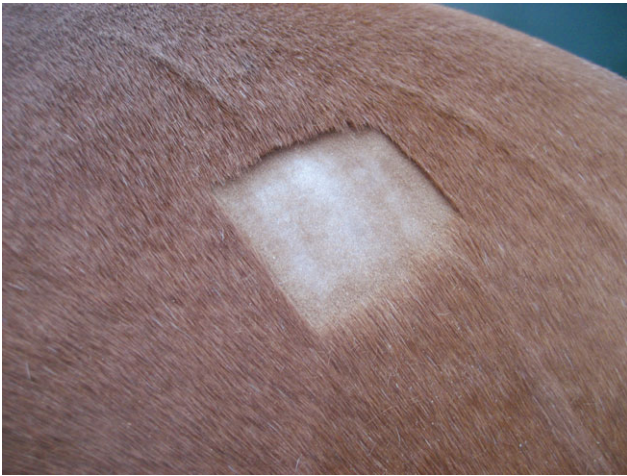
A diagnosis of dermatographism was made based on these clinical signs.

No biopsies were taken for histological evaluation as the clinical diagnosis was considered definitive.

Based on extrapolation from human literature (Newcomb and Nelson 1973), mast cell degranulation and release of histamine was suspected and the horse was treated with cyproheptadine (0.3 mg/kg bwt twice daily). On this dosage, after the first administration, the horse showed signs of sedation, thus the dosage was reduced to 0.2 mg/kg bwt twice daily. The treatment reduced clinical signs: evaluation approximately 3 h after the third 0.2 mg/kg bwt dosage revealed that the urticarial lesions induced were less pronounced. However, mild sedation persisted and ulceration



**Fig 1: Equine dermatographism: pressure-induced urticaria in a 4-year-old Quarter Horse gelding.**



**Fig 2:** The dermatographic response was much less evident on the clipped area than the haired skin.

of gingiva and tongue developed. Therapy was changed to cetirizine (0.2 mg/kg bwt twice daily [Sharpe and Shuster 1993; Olsén *et al.* 2008; Zuberbier *et al.* 2014]).

The effect of cetirizine was evaluated the day after the switch to cetirizine treatment (approximately 3 h after the third dosage). Dermatographism was no longer present and no side effects were noticed during the next 2 days in the hospital. Treatment was maintained over the next 4 months during which time only owner derived data are available. The owners tried to discontinue the therapy at least three times, but each time the dermatographism recurred after one day. Signs disappeared again within 24 h of resuming cetirizine treatment. The horse was maintained on cetirizine for approximately 4 months in total and was then moved to another property approximately 70 km from its previous stable. Clinical signs did not recur after discontinuation of therapy at the new location; the horse was sold 8 months after presentation to the clinic and lost to follow-up.

## Discussion

This case report describes dermatographism in a horse responsive to cetirizine therapy and incompletely responsive to cyproheptadine therapy. One previous case of dermatographism has been reported in an 8-year-old Thoroughbred gelding (Cornick and Brumbaugh 1989). These authors suspected the trigger factor to be treatment and stress related to carpal trauma, locally treated with a bandage and a poultice containing beech wood creosote, guaiacol and methyl salicylate. In that case pruritus was present. Treatment with corticosteroids and doxylamine succinate, a first generation antihistamine, was equivocal, although the itching resolved after administration of the antihistamine. The condition resolved after 5 weeks and in the following year the horse displayed no signs of recurrence.

An important difference between the present and previously reported case (Cornick and Brumbaugh 1989) is the absence of pruritus in the currently described case. In horses with urticarial reactions from other causes, pruritus is also variable (Scott and Miller 2011).

In the currently presented equine case, the dermatographic response was much more obvious when

stroking against the direction of hair growth. This may cause more trauma to the skin, thereby enhancing the dermatographic response. Another factor might be the fact that, in man, the concentration of mast cells is higher around the hair follicles (Weber *et al.* 2003). In horses there are no reports on the distribution of mast cells in skin.

Dermatographism (also called dermographism, dermatographia, dermatographic urticaria, or urticaria factitia) is a common condition in man that occurs when pressure is applied to the skin and wheals become evident minutes after stroking (Ebken *et al.* 1968; Mecoli *et al.* 2011). Dermatographism in man is divided into simple dermatographism and symptomatic dermatographism (Mecoli *et al.* 2011). Simple dermatographism is typically nonpruritic and has an estimated prevalence of 1.5–5% in the general population (Ebken *et al.* 1968) and even higher in children (Ebken *et al.* 1968 and Martorell *et al.* 2000) (Fig 3).

Symptomatic dermatographism is much less common, but can severely affect quality of life (Schoepke *et al.* 2015), because only mild pressure can result in pruritic wheals and a burning sensation in the involved area. The aetiology of both forms is unknown, but several triggering factors are described for symptomatic dermatographism. These include physical (systemic disease, drug reactions) as well as psychological (stressful events) triggers (Taşkapan and Harmanyeri 2006). Genetic predisposition to symptomatic dermatographism may exist (Jedele and Michels 1991; Schoepke *et al.* 2015). The pathophysiology of dermatographism is not entirely understood, although it is clear that mast cells, histamine and IgE play an important role (Newcomb and Nelson 1973; Garafalo and Kaplan 1981; Zuberbier *et al.* 2014). Sensitisation of mast cells by IgE is suspected because dermatographism was transferred to unaffected human skin by intracutaneous administration of serum from affected persons and this transfer was proven to be caused by the IgE fraction in this serum (Newcomb and Nelson 1973). Furthermore, anti-IgE medication (omalizumab) has been shown to be effective in a case of symptomatic dermatographism (Krause *et al.* 2010) and other forms of chronic urticaria (Zuberbier *et al.* 2014). Because dermatographism is IgE-mediated, an association with atopic dermatitis and other atopic conditions has been proposed (Taşkapan and Harmanyeri 2006; Wong and Wong 2016), yet this has not been fully elucidated. Martorell *et al.* (2000) found a significant difference in the prevalence of dermatographism (both simple and symptomatic) between the general paediatric population (24%) and children with atopic respiratory complaints (47%). In a recent abstract by Wong and Wong (2016), 62% of human patients with severe dermatographism also had atopic dermatitis.



**Fig 3:** Simple dermatographism in a human patient.

The horse in this case did not show signs of atopic dermatitis, nor respiratory complaints. However, an allergic component is likely because the condition seemed to resolve after moving to another property. The previously described case (Cornick and Brumbaugh 1989) spontaneously resolved and was suspected to be triggered by a physical environmental factor.

In man, simple dermatographism is usually left untreated. For symptomatic dermatographism, antihistamines are the drugs of choice, besides avoidance of the stimulus if known and feasible (Zuberbier *et al.* 2014). In man, much is known about H1-antagonists and first generation antihistamines are no longer recommended because they easily cross the blood-brain barrier, often causing significant sedation. Second generation antihistamines cross the blood-brain barrier to a much lesser extent and therefore sedative effects are less likely to occur (Zuberbier *et al.* 2014). Currently, second generation H1-antagonists, like cetirizine, are recommended for adults as well as children with chronic urticarial conditions like dermatographism (Sharpe and Shuster 1993; Zuberbier *et al.* 2014).

Given the extensive experience of clinicians in our hospital with the first generation antihistamine cyproheptadine as treatment for horses presenting with complaints of headshaking, cyproheptadine was chosen for initial treatment in this case. In horses, some reports are available on the use of cyproheptadine in cases of pituitary pars intermedia dysfunction (Donaldson *et al.* 2002) and headshaking (Madigan *et al.* 1995). No data is available on the pharmacokinetics and pharmacodynamics or side-effects of cyproheptadine in horses, although a sedative effect has been reported in horses (Madigan *et al.* 1995). The poor response to cyproheptadine in this case may be explained by the use of a relatively low dose because of the occurrence of side effects. The oral ulceration as seen in this horse is not a known side effect of H1-antagonists, so this was likely an incidental finding, possibly caused by a local hypersensitivity reaction or chemical burn.

The clinical use (Olsén *et al.* 2011; Lassaline-Utter *et al.* 2014) and pharmacokinetics and pharmacodynamics of cetirizine have been investigated in the horse (Olsén *et al.* 2007, 2008). After a histamine challenge, Olsén *et al.* (2008) concluded that at doses of 0.2–0.4 mg/kg bwt twice daily cetirizine reaches effective plasma concentrations with regard to wheal formation. In another study Olsén *et al.* (2007) found that the plasma concentration peaked within 1 h after oral administration and at the 0.2 mg/kg dose the terminal half-life was about 3.4 h.

Cetirizine has been used in clinical studies with variable results (Olsén *et al.* 2011; Lassaline-Utter *et al.* 2014). In these studies, cetirizine therapy was not associated with side effects, except for two out of 49 horses that showed a worsening of the symptoms of insect bite hypersensitivity during cetirizine treatment (Olsén *et al.* 2007, 2008, 2011; Lassaline-Utter *et al.* 2014).

An interesting finding was the resolution of dermatographism in this horse after moving to another location. This might be explained by the fact that the horse was young, so it might have been a juvenile problem, as is seen in man (Martorell *et al.* 2000). Another explanation might be that the horse was triggered by an unknown immune response in its original environment that was no longer present after moving to another location.

## Conclusion

This report describes a case of equine dermatographism responsive to the second generation H1-receptor antagonist cetirizine. After 4 months, the condition resolved after moving to a new environment.

## Authors' declaration of interests

No conflicts of interest have been declared.

## Ethical animal research

The case described was a client-owned horse and was admitted to our hospital with the presented symptoms. Care was taken to ensure its well being and no ethical local or national body was involved.

## Source of funding

No external funding.

## Authorship

All authors contributed to the patient consultation and made a diagnosis, participated in the creation and evaluation of a treatment plan. They also contributed to the writing and revision of the manuscript. All authors approved the final version of the manuscript.

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### Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

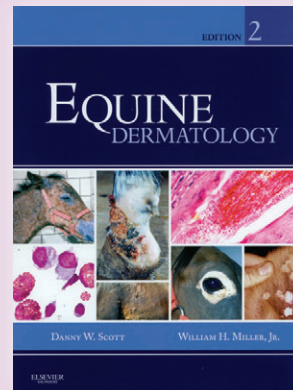
**Supplementary Item 1:** Blood results.

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