

# Tolerance Induction of Horse Allergy by Horse Contact with Curly Horses

## Toleranzinduktion durch Pferdekontakt zu ABCR Curly Horses bei einer Pferdeallergie

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### Bibliography

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### ABSTRACT

A horse allergic rider completed 60 riding lessons on Curly Horses within six months. This rider has become clinically tolerant to normal horse breeds within this time. This case may indicate that riding and brushing ABCR Curly Horses after 60 riding hours facilitates tolerance induction. Our data indicate that this could be a valid alternative to the common recommendation to strictly avoid horse riding.

### ZUSAMMENFASSUNG

Eine pferdeallergische Reiterin erhielt 60 Reitstunden auf „Curly Horses“ innerhalb von 6 Monaten. Die Reiterin tolerierte die Allergenexposition mit Pferden anderer Rassen innerhalb dieser Zeit. Dieser Fallbericht zeigt, dass Reiten und Bürsten von ABCR „Curly Horses“ nach 60 Reitstunden zu einer Toleranzinduktion führen kann. Diese Daten suggerieren, dass dieses Vorgehen eine realistische Alternative zu üblichen Empfehlungen sein kann, die im Fall einer Pferdeallergie raten, jeden Kontakt zu meiden.

## Introduction

In a pilot study of horse allergic riders, we were able to show that contact with ABCR Curly Horses is possible without significant allergic reactions [1]. We observed that the initially mild allergic reactions to Curly Horses in horse allergic riders decreased the longer they have been in contact with these horses [2]. This is in contrast to the recommendation to avoid contact to the allergen in case of an allergy to furry animals [3,4]. We aimed to investigate in a case study whether clinical tolerance induction to normal horse breeds is possible by using Curly Horses in a therapeutic approach.

This single case study was conducted in accordance with Good Clinical Practice guidelines and the provisions of the Declaration of Helsinki. The individual protocol was approved by an independent ethics committee (Ärztchamber Schleswig Holstein) [5]. Written informed consent was obtained from the patient before trials began.

## Case

The 50-year-old polysensitized female patient (► **Table 1**) volunteered to test whether contact with Curly Horses would enable her to ride normal horse breeds again without symptoms. She had given up riding 25 years ago because of a horse allergy, verified by clinical history, skin prick test and positive nasal provocation test.

Spirometry and rhinomanometry before starting the exposure and at 6 months follow-up were normal (► **Table 1**). The skin prick test showed a reaction of mean 4.0 mm to Curly Horses compared to 14 mm to other breeds: Histamine: 4 mm; sodium chloride 0,9%: 0 mm; normal horse (Bencard®): 16 mm (ps); German riding pony: 14 mm (ps); ABCR Curly horse mares ABCR P 2563: 1 mm, ABCR 3975: 6 mm, ABCR 4059: 10 mm, ABCR stallion ABCR 4056: 4 mm.

During the study period the patient had contact with one of the four Curly mares/gelding (ABC P 2563, 3975, 4059, ABC4056) outside the stable by riding (60 minutes) and, after 10 times of riding, by brushing (15 minutes) the horses 60 times. Serial PNIF (Clemens Clarke®) and peak flow/FEV1 meas-

## ABBREVIATIONS

<b>ABCR</b>	American Baskhir Curly Horse Registry
<b>FEV1</b>	forced expiratory volume in the 1 second
<b>PNIF</b>	peak nasal inspiratory flow
<b>Pred</b>	predicted
<b>Y</b>	year
<b>Ps</b>	Pseudopodia

► **Table 1** Clinical data, lung function results.

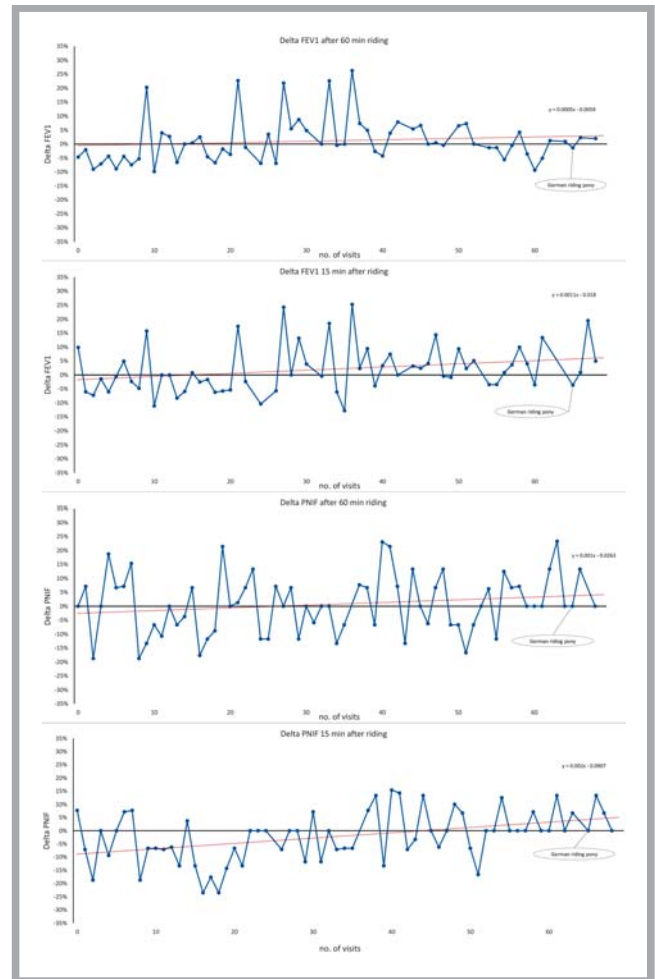
age/gender	50 y/female
duration of illness	rhinoconjunctivitis 44 y bronchial asthma 35 y, eczema 50 y
allergic symptoms during horse contact	rhinoconjunctivitis, bronchial asthma, eczema
further sensitizations	rye, grass, birch, beech pollen, alternaria, cladosporium, cat and dog
current therapy	nasal topic mometasone 100 µg/die <sup>1</sup> , budesonide 400 µg/die, montelukast 10 mg/die <sup>1</sup> , cetirizine as needed <sup>1</sup> , basic therapy (hydrating topical treatment)
lung function (% predicted)	19/03/2016: FEV1 110 %, PEF 116 % 17/09/2016: FEV1 88 %, PEF 107 %

<sup>1</sup> = not 7 days before nasal provocation testing.

urements (Microloop Care fusion®) before and during horse contact (riding and brushing) were documented every 30 minutes, and 15 minutes after the contacts. A documentation of concomitant symptoms (conjunctivitis, rhinitis, dyspnoea, urticaria) was carried out at any point of horse contact.

The initially positive nasal provocation test against normal horse (Allergopharma®) was negative after completion of 60 riding hours on Curly Horses (► **Table 2**). We found an increase of IgG horse (Thermofisher®) from 7 mg/l after 6 months to 14 mg/l and 9 months to 29 mg/l.

During the first week of Curly Horse contact (riding), there was a slight, non-significant decrease of PNIF of maximum -20% and FEV1 of maximum -10% lung function (► **Fig. 1**) during and after riding. After 10 hours of riding, the Curly



► **Fig. 1** FEV1 and PNIF reaction after during and after riding. Delta FEV1 and Delta PNIF is calculated as percentage change in relation to the base value taken before each riding hour.

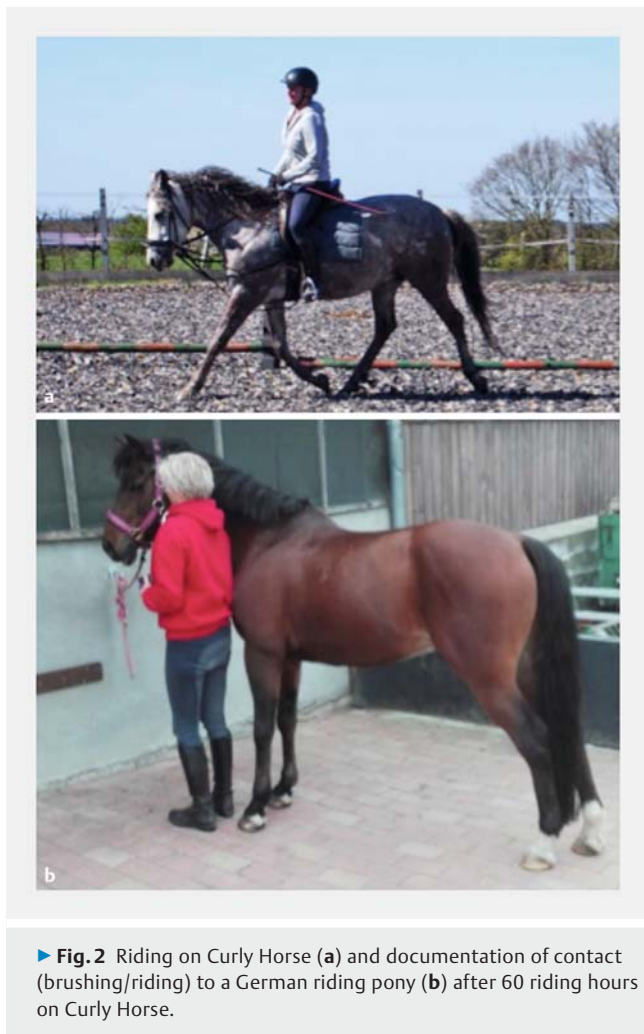
Horses were brushed without significantly affecting the patient's lung or nose function. During further riding and brushing contact, a continuous lowering of reaction can be derived from regression analysis in ► **Fig. 1**.

Exposure to a normal horse breed (North English fell pony and German riding pony) was symptom-free during both brushing and riding after 60 hours of riding on Curly Horses without

► **Table 2** Rhinomanometric and IgG measurement before and after 60 riding hours; nasal provocation test left nose.

date	rhinomanometric measurement	start	% pred.	nasal provocation horse	Δ %	IgG horse mg/l	IgE horse kU/l
19/03/2016	Flow in at V'150 (ml/s)	529	139	297	-56	7	18
19/03/2016	RAAR in 150 (kpa/s/l)	0,28	48	0,50	+77		
17/09/2016	Flow in at V'150 (ml/s)	539	142	524	-3	14	33
17/09/2016	RAAR in 150 (kpa/s/l)	0,28	47,9	0,29	+1		
29/12/2016						29	37

Legend: RAAR = inspiratory resistance at V'150 ml/s



► **Fig. 2** Riding on Curly Horse (a) and documentation of contact (brushing/riding) to a German riding pony (b) after 60 riding hours on Curly Horse.

changes in the patient's lung function or rhinomanometry (► **Fig. 1**, ► **Fig. 2**).

## Discussion

It is usually expected that continuous, natural exposure to an allergen increases the intensity of allergic symptoms over time, as is the case for "Baker's asthma" or fur animal allergy, and therefore avoidance of exposure is the common recommendation [3,4,6]. In contrast, in this case of a horse allergic rider using (ABCR) Curly Horse for riding may lead to induction of clinical tolerance.

Since 1971 it has been assumed that horse allergic riders show much less allergic reactions upon contact to Curly Horses than to horses of other breeds [7]. A positive single test for hypoallergenicity for Curly Horses [8] as well as an exclusion of hypoallergenicity by testing the allergen content of Curly horses [9] in another study have been presented. No further scientific work was available until 2013. In a pilot study of 10 horse allergic riders, a markedly reduced allergic reaction was observed upon contact with these horses [1], which was then confirmed in an increased number of affected riders [2].

In a self-generated survey on "Facebook groups: Curly Horses International+American Curly in Europe", 16 horse allergic Curly-holders/-rider informed us that their allergy to horses of other breeds decreased significantly or even disappeared after a longer contact period to Curly Horses.

We have observed that initial allergic reactions in horse-allergic riders were significantly reduced during the duration of the former study [2]. Thus, many of the riders tested here can easily brush and interact with Curly Horses, which includes having contact with saliva, without any allergic reactions to these horses after a period of > 10 riding and contact hours.

The first known desensitization study against horse allergy is a case report from 1921 [10], in which immunotherapy in a 34-year-old patient was achieved placing horse material on scarified skin. Further reports on immunotherapy in horse allergy are found in small numbers [11–15]. Our case shows the conversion of the nasal provocation test and an increase of IgG to horse allergens as signs of tolerance induction. This tolerance induction against normal horses could be achieved in six months after a horse allergic rider has been in contact with Curly Horses 60 times, which has been verified during an exposure test to normal horse breeds.

This observation supports the hypothesis that contact to Curly Horses is not only suitable for horse allergic patients, but can also lead to a clinical tolerance induction to normal horses, taking into account that this is an uncontrolled case report. This observation will be systematically examined in a controlled study, ongoing since 2014 [5]. The cause of the hypoallergenicity of Curly Horses used has not yet been clarified. However, hypoallergenicity can be inferred from the fact that a horse allergic patient can become immune tolerant to normal horse breeds through contact with Curly Horses. In contrast to the "Baker's asthma" [6], an avoidance of exposure in horse allergic patients using the examined ABCR Curly horses seems to be unnecessary, at least in this case.

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## Conflict of interest

No conflict of interest has been declared by the authors.

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