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# Skin prick test: the only predictive tool of anaphylaxis? A case report

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## KEY WORDS

*Skin prick test; specific immunoglobulin E antibodies; anaphylaxis; cow's milk; atopic dermatitis*

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## Summary

*Currently, in the literature there is a lack of definite predictive values parameters to identify patients with the risk to develop anaphylaxis. The controlled oral food challenge remains the gold standard for food allergy diagnosis. We report a case of a girl allergic to cow's milk with low levels of specific IgE and large skin prick test wheal sizes for cow's milk.*

*In some cases the high diameter of skin prick test wheal may be more reliable than specific IgE levels in predicting an anaphylactic reaction.*

## Introduction

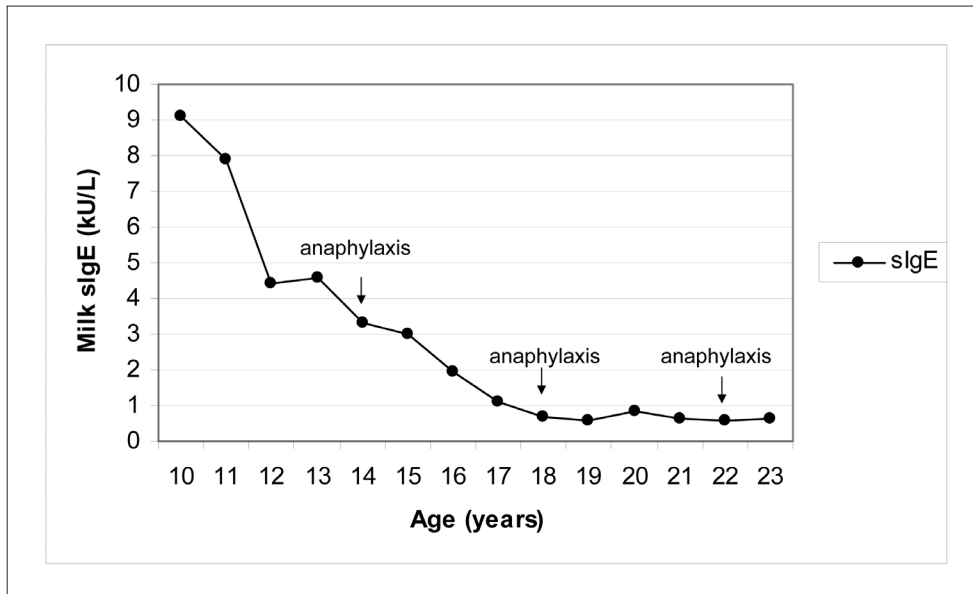
The diagnostic workup of suspected food allergy includes the patient's history, skin prick tests (SPTs), and the measurement of food specific immunoglobulin E antibodies (sIgE). Because none of these parameters can accurately predict food allergy, the gold standard for diagnosing is still the controlled oral food challenge (OFC). However, it is an expensive investigation, with risks of possible severe allergic symptoms for patients and one cannot always make the OFC even if appropriate. Moreover, in the literature there are no unique predictive values of food tolerance (1-4) and Mehl et al. (1), in a recent study, showed that the SPTs and sIgEs should not be used interchangeably.

## Case report

In this report we describe the case of a 25-year-old girl allergic to cow's milk (CM), with low levels of CM-sIgE but presenting large wheal sizes of CM-SPTs.

At the age of 2 months the child came to our Pediatric Allergology Outpatients clinic for severe atopic dermatitis (AD) with impetigo at typical sites. The family history was negative for allergy and she was exclusively breastfed.

At 10 months she underwent SPTs that showed a sensitization to hen's egg white (wheal diameter 6 mm), cereal mix (4 mm) and CM (8 mm). The sIgE were positive for egg (++++), CM (++++), wheat (++++), barley (++++), peanut (+---), hazelnut (+++-) and negative for inhalant allergens. The child was advised to continue maintaining a normal weaning, excluding from the diet CM, hen's egg, nuts and dairy products; in the case of lack of breast milk, soy milk or extensive CM protein hy-

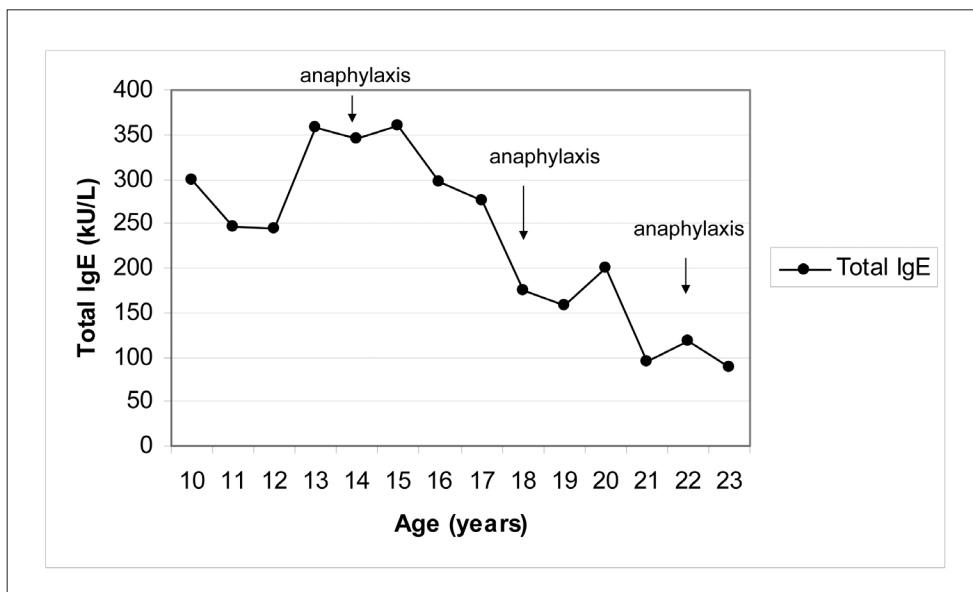


*Figure 1a* - Specific IgE levels for cow's milk

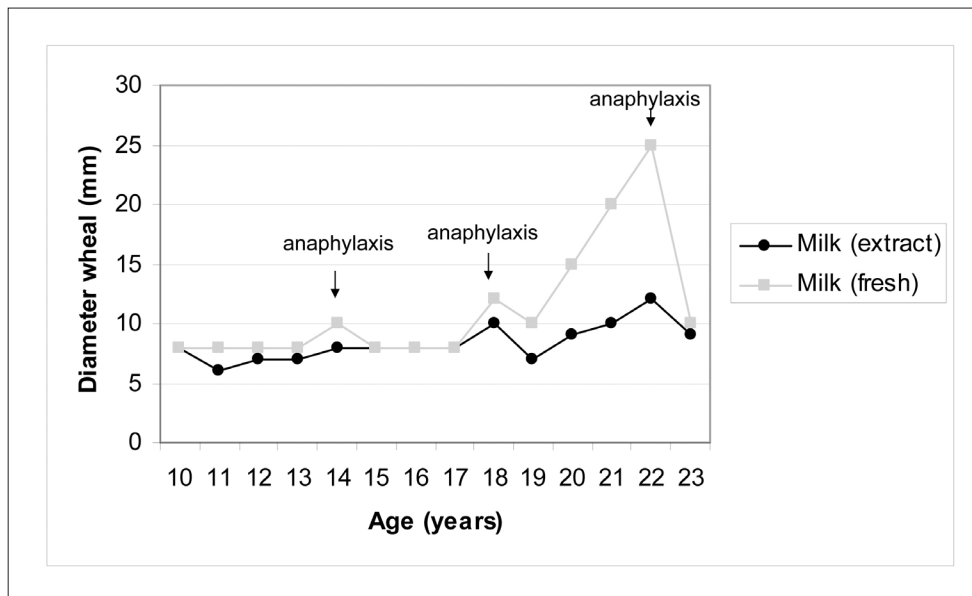
drollysate were permitted. The patient and her family refused the proposed OFC with CM. AD disappeared at the age of 4 years. At the age of 10 years asthma and allergic rhino-conjunctivitis with sensitization to grass pollen (sIgE for *Cynodon dactylon* 16 kU/L, for *Phleum pratense* 45 kU/L; total IgE 299 kU/L) appeared.

At the age of 14 years, soon after eating a lemon ice cream containing traces of CM, she presented an immediate reaction characterized by nausea, vomiting, abdominal pain and hypotension. As a consequence, epinephrine (Fastjekt) was prescribed.

At that time, the sIgE for CM were weakly positive (3.3 kU/L) while the wheal SPT for CM was large (10 mm) (**figures 1a and b, 2**). It is worthy of note that the patient had never eaten CM. At age of 18 years, immediately after taking a piece of bread containing CM, the girl presented an anaphylactic reaction (vomiting, abdominal pain, syncope). Even in this case epinephrine was administered in an emergency setting. The allergometric tests confirmed the data previously recorded: low values of CM-sIgE (0.67 kU/L) and a large wheal diameter of CM SPT (12 mm) (**figures 1a and b, 2**).



*Figure 1b* - Total IgE levels



*Figure 2 - Diameter wheal for cow's milk*

At the age of 22, while she was having a meal at a restaurant, despite clear previous recommendations concerning what she could eat, she was served a first course containing CM, of which she was unaware. After a few minutes, a further anaphylactic reaction intervened. On that occasion the patient administered epinephrine by herself with a good clinical response. At that time, the CM-sIgE were 0.57 kU/L and the diameter of the CM-SPT wheal was 25 mm (figures 1a and 2).

Over the years the patient has had a good growth height-weight, and even if she and her family were offered on several occasions to perform an OCT with CM, they always refused. Currently she is on a free CM, hen's egg, nuts and dairy products diet, and she is suffering from asthma and allergic rhinitis with a sensitization to grass pollen.

## Discussion

The limitation of our study is that in 1987 total serum IgE and sIgEs were measured with the IgE RIA and Phadebas RAST kits, respectively (Pharmacia Diagnostics, Uppsala, Sweden); in 2000, the determination of total serum IgE level was performed by PRIST (Pharmacia, Uppsala, Sweden), and the determination of sIgE was performed by Immuno-CAP™ (Pharmacia, Sweden). So it is not possible a comparison between the levels of specific and total IgE at baseline and follow-up.

In agreement with the data of literature (1,5,6), our case shows that the CM-SPT and the measurement of sIgE to CM cannot be used interchangeably (figures 1a and b, 2).

Mehl et al. (1) compared the sIgE levels (kU/L) with the mean wheal diameter size of SPTs for CM in children with CM allergy.

It was clearly shown that the correlation between the levels of sIgE and the SPT with the same food allergen is poor, and children with CM allergy (positive OFC) who had the lowest levels of sIgE presented a wheal of up to 15 mm, similarly to our patient who presented a diameter of the wheal of 25 mm for CM, whilst the specific CM IgE were 0.57 kU/L (figures 1a and 2).

In a recent study, Cianferoni et al. (7) showed that the mean size for CM-SPT was 8.15 mm in those who failed oral food challenge vs. 4.8 mm in those who passed. In a work (2) on a population of 139 Portuguese children with CM allergy, the higher sIgE level to CM (> 17.5 kU/L) during the follow-up period was associated with a reduced likelihood of acquiring CM tolerance. According to the study of Vazquez-Ortiz et al. (3) CM-sIgE > 50 kU/L resulted as an independent risk factor of reaction persistence. Also in the work of Vanto et al. (4) CM-sIgE level > 2 kU/L are useful prognostic indicators of the development of tolerance to milk in infants with CM allergy. On the contrary, our case suggests that even if a patient shows low CM-sIgE levels, he can have a severe systemic reaction to CM. Therefore, patients with low sIgE levels and high CM-SPT wheal diameter should be followed closely during the follow-up. For both SPTs (in vivo test) and sIgE (in vitro assay), there may be factors that influence the magnitude of the response, such as the number and/or density of IgE epitopes to a particular allergen or the affinity/avidity of sIgE antibodies. However, this influence may act differently for the two test systems. Furthermore, the presence of specific IgG antibodies may unequally affect the result of the two test systems (1). As has already been demonstrated in other studies, SPTs are better than sIgE with regard to specificity and negative predictive values (8-14).

We conclude that in some cases the positivity of SPTs to CM proteins may be more reliable than sIgE levels in predicting an anaphylactic reaction, especially in case of very high diameter of the CM-SPT wheal.

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