Allergic contact dermatitis to cocamidopropyl betaine in Colombia

To the Editor,

Shampoos, soaps and intimate hygiene products have been considered infrequent causes of allergic contact dermatitis (ACD) because they are preparations eliminated with water and their permanence on the skin is very brief. Allergens usually contained have a low sensitising capacity due to their low concentration and brief contact. An exception to this rule is cocamidopropyl betaine (CAPB), a non-ionic tensioactive agent that has been a relatively frequent cause of ACD to shampoos and other products that are eliminated with water in Europe and the US in the last 20 years.¹ Currently, the advantages of synthetic detergent based products have gradually resulted in their greater popularity over common soaps. Recent studies in the US, Australia and Israel, suggest that CAPB allergy persists as a clinical problem, and that such compounds should be included among extracts used in standardised cutaneous patch tests.² Detergents in general contain tensioactive agents which are believed to decrease water’s superficial tension. On the other hand, surfactants are classified by their ionic properties in water as anionic, cationic, non-ionic or amphoteric.³ Amphoteric surfactants, of which betaine is the classical example, contain elements with both positive and negative charges within a same molecular structure, producing less irritant effects than those anionic tensioactive agents. CAPB is the main non-ionic tensioactive agent that contains ammonia and was originally introduced in personal hygiene products by Johnson & Johnson® in 1967 with the “no more tears” characteristic, mainly in children’s shampoo ingredients. CAPB is composed of a combination of fatty acids obtained from coconut oil with 3-dimethylamine propylamine (DMAPA).

The initial substance obtained is cocamidopropyl dimethylamine, which is an amidooamine derivative (AA). The AA is then processed with sodium monochloroacetate, obtaining the final product: CABP (Fig. 1). The purpose of CABP addition to personal hygiene products is as a foam booster, thickener and softener.³ Since the beginning of the 1980s, a series of reports have appeared, indicating the CABP may act as a contact allergen. The sensitisation prevalence to this substance is currently unknown in our country, however, a high frequency of sensitisation is known to present in hairdressers and those people who use shampoos, liquid soaps, hair dyes, contact lens solutions, shower gels and skin cleansers, given the presence of this component in these products.²,⁴ It must be highlighted that various studies have demonstrated that the true sensitising agents could be intermediate products in the synthesis of CABP such as DMAP and AA, more than CAPB itself. During many years this issue has been highly controversial and numerous North American studies⁵-⁷ have demonstrated that AA was the cause of DCA while numerous European studies⁸-⁹ show that DMAPA

Figure 1  Erythematous scaly plaques in cheek.
is the true sensitising substance. In our milieu, in which we probably have an under-registration of sensitisation to this substance, the purpose of the present study is to describe the role of CABP as a cause of ACD.

A 61-year-old patient presented with a six month history of pruriginous lesions on the cheeks and chin (Fig. 2), without occupational related risk factors and no history of atopia. Topical steroids had been used with clinical response, but presented with frequent relapses consisting of desquamative erythematous lesions at the sites previously described. An epicutaneous test (patch test) was applied on the upper back with the American standard series (Troulab® Patch Test Allergens) and improved quality chamber (Finn Chambers® for Patch Testing), showing a ++ positive reaction the D1 to CABP, balsam of Peru, balsam of Tolu and mixed fragrances, which persisted until D2 reading. The interview following the tests allowed for identification of a daily use of shaving shampoo containing CABP. Avoidance of this product during the skin care regimen resulted in resolution of the skin lesions and associated symptoms. The patient was finally diagnosed with an ACD to CABP present in the commercial CABP (shampoo).

To date, this is the first Colombian case report to describe ACD produced by sensitisation to CABP in a patient who routinely used liquid soap during shaving. Sensitisation to CABP clinically presents as a recurrent chronic dermatitis that involves the head (scalp, face and eyelids) and neck. International case reports exist which describe occupational ACD in hairdressers and health care personnel who present with forearm and hand involvement. However, more diffuse presentations may present when liquid soaps, shampoos and shower gels are used, as in our case. With respect to CABP sensitisation, various studies have used allergenic extracts in the intermediate product of CABP synthesis patch test in patients allergic to this substance. Of these, DMAPA has been concluded to possibly have a significant role in CABP allergy. In our country, these intermediate substances are not available, which limits the determination of these elements (DMAPA or AA) as causative agents in the clinical manifestations in our case. Given the current conditions of contact dermatitis knowledge in our environment, as is the absence of prevalence studies, this study provides a better understanding of this type of pathologies and specifically with respect to CABP.

Finally, in light of international literature, even though it is important to perform this type of studies, which aid the scientific population in the understanding of allergic cutaneous pathology, we must stress the need for more research studies that provide information regarding the frequency and prevalence of contact allergens in our population with the purpose of intervening with public health measures that impact not only in the health-disease process of our patients, but also in the health-related quality of life.

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New pets, new allergies

To the Editor,

During recent years some exotic animals have been
introduced as laboratory animals1 or pets in domestic envi-
ronments, increasing the risk of exposure to many unknown
potential allergens which could cause respiratory allergy
symptoms in the owners.1

In the case of hamster, there are various species with the
same generic name but belonging to different rodent genus
coming from different regions of the world without evidence
of a clear cross reactivity among their allergens.2–4

Now in Spain it is possible to find different types of
hamsters as pets, the most common is the golden or
Syrian hamster (Mesocricetus auratus), there are dwarfs
hamsters: Chinese hamster (Cricetus griseus), Siberian or
Russian hamster (Phodopus sungourus), Roborowski (Phodo-
pus roborowski), and apparently the cross reactivity found
among their epithelium allergens is very low.2

We present three cases with different sensitisations:

First case: A 41-year-old woman with well-controlled
pollinosis asthma who began to suffer from daily asthmatic
episodes and bad response to treatment with inhaled corticosteroids and B2, after buying a Russian hamster (Phodopus sungourus) (RH) for her child.

Skin prick test (SPT) with extract from RH epithelium 
was positive (8x7 mm), however it was negative against Syrian hamster (SH) epithelium. Histamine control: 4 x 5 mm. Serum specific IgE level was very high against RH epithelium: 1.4 kU/L and urine: 2.6 kU/L, and very low against SH allergicen sources (epithelium: 0.7 kU/L, urine: 0.5 kU/L).

SDS-PAGE-Immunoblotting showed an intense IgE binding band of ca. 21 kDa. After buying a RH hamster, the patient reported a decrease in asthma symptoms in the owners.

Second case: A 40-year-old woman with asthma with sen-
sitisation to grass and olive pollen who developed perennial asthma when introducing a new pet (RH) to home. Skin prick test with RH epithelium was positive (6 x 5 mm) and negative for SH epithelium. Histamine control (4 x 4 mm)

SDS-PAGE-Immunoblotting showed IgE binding band of ca. 21 kDa in RH epithelium extract, and 18-21 kDa in RH urine extract.

Patients’ symptoms improved after the hamsters were removed from their house and now they are well controlled using treatment only for spring symptoms, all of them improved the spirometric values (FEV1 and the FEV1%FVC), and the asthma was controlled only with the animal removal.

In the last years two main allergens have been described in rat (Rattus norvegicus): Rat n 1A (20-21 kDa) and Rat n 1B (16-17 kDa), as well as in mouse (Mus musculus) Mus m 1 (19 kDa), Mus m 2 (16 kDa), all of them are lipocalins.

There are reports on allergy to Syrian Hamster (Mesocricetus auratus) in patients who work in laborato-
ries with animals, and in pet owners. All these publications described an allergen between 15 to 21 kDa, a range of size similar to that of the lipocalins, however the identity of these hamster allergens has not been assessed.

Torres JA et al. described the presence of several Russian hamster (Phodopus sungourus) allergens with molecular mass between 18 – 23 kDa in various allergicen sources from RH (epithelium, faeces and urine).

There is a case report of anaphylaxis after hamster bites (Lim et al. and Nitsuma et al.), where a specific IgE-binding component of 21 kDa was detected in the hamster saliva.

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