Polyhexamethylene biguanide (PHMB; CAS no. 28757-43-3) is a preservative used as a biocide in industrial products (e.g. swimming pool disinfectants), medical devices (e.g. wound cleansers), contact lens solutions, and cosmetics such as wet wipes, deodorants, and facial cleansers. It is considered to be a rare contact allergen, with a sensitization rate of $\sim$0.5% in an unselected population (1, 2). Moreover, sensitization does not seem to be associated with cosmetic exposure (2). Here, we report a case of allergic contact dermatitis following the use of wet wipes containing PHMB.

**Case Report**

A 42-year-old non-atopic male presented with a chronic, recurrent and itchy dermatitis in the anogenital region. He frequently used wet wipes for intimate hygiene (Fresh®; NV Copimex, Halle, Belgium), along with topical pharmaceutical products [Scheriproct® haemorrhoidal ointment (Intendis GmbH, Berlin, Germany); and Inotyol® ointment (NV Urgo, Brussels, Belgium)]. Patch tests were performed on the upper back with a baseline series, cosmetic and pharmaceutical series.
local anaesthetics, and his own products, including the wet wipes ‘as is’. PHMB was tested at different concentrations (20%, 2% and 0.2% aq.). Readings were performed according to International Contact Dermatitis Research Group guidelines. At D2 and D4, respectively, + and ++ reactions were seen to PHMB 20% (with a papulovesicular reaction, extending outside the test chamber; Figs. 1 and 2); and + and + reactions to PHMB 2%. No reactions were observed to PHMB 0.2%. The haemorrhoidal ointment, a piece of moist toilet paper (Fig. 3), wool alcohol mix 30% pet., castor oil (as is), Amerchol® 50% pet. and methychloroisothiazolinone (MCI)/methylisothiazolinone (MI) 0.01% aq. also gave positive reactions. There was no reaction to chlorhexidine 0.5% aq. Besides the positive reaction to MCI/MI 100 ppm, which was most probably attributable to the use of MCI/MI-containing or MI-containing wipes in the past, all positive tests were considered to be of current relevance for the patient’s skin problem: Castor oil was an ingredient of the haemorrhoidal cream, wool alcohols were present in Inotyol® ointment, and PHMB, mentioned as polyaminopropyl biguanide (PAPB) on the label, was an ingredient of the wipes. His skin condition healed with the use of topical corticosteroids, and did not recur following avoidance of the allergens.

Discussion and Conclusion

PHMB, which is a poly-biguanide and therefore analogous to PAPB, is a widely used antimicrobial agent that is allowed in concentrations up to 0.3% in cosmetics. A study in 2007 indicated that the risk factors associated with PHMB sensitization were mainly (i) male sex, (ii) occupational exposure, (iii) hand dermatitis, and (iv) leg dermatitis (2). The patch test concentrations for PHMB mentioned in the literature (1, 2) are 2.5% and 5%, which are considered to be non-irritating and to have a low sensitizing potential. However, in our patient, in whom 20% aq. was accidentally tested, we could not observe a toxic or irritant reaction. In contrast, the reactions showed a crescendo pattern from D2 to D4, and a decrescendo pattern from the higher concentration (20% aq.: ++) to the lower concentration (2% aq.: +). Moreover, the morphology of the patch test with PHMB 20% aq. was compatible with an allergic contact response. Avoidance of this allergen also led to clearance of the dermatitis.
As the presently advised test concentrations of 2.5% aq. and 5% aq. mostly produce 1+ reactions, which are sometimes difficult to differentiate from irritant or false-positive reactions, higher concentrations might be required in selected cases.

In patients sensitized to PHMB, (partial) cross-reactivity to other biguanides, such as chlorhexidine and hexamidine, should be considered. Conversely, regarding type I reactions to PHMB, Kautz et al. (3) mentioned that chlorhexidine-allergic patients could be at risk for PHMB allergy, given that the specific IgE antibodies show a higher avidity for PHMB, although this is not always the case. Moreover, as chlorhexidine-induced eczema may precede the development of chlorhexidine-induced anaphylaxis by years (4), the same could apply to PHMB-sensitized subjects, and this has also been described in the literature (3, 5). In our case, there was no simultaneous reaction to the patch test with chlorhexidine. Given the history of our patient, who presented with a clear, delayed type of hypersensitivity, no specific IgE or prick tests for chlorhexidine or PHMB were performed.

In conclusion, we report here a patient sensitized to PHMB through the use of wet wipes, showing that sensitization to this substance should not only be considered in an occupational context. Validation of the best patch test concentration of PHMB seems to be desirable. In patients with an established allergy to PHMB, possible cross-reactions to structurally related biguanides need to be considered.

References