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Assessment of the Exposure and Effects of Antibacterial Substances such as Paraben and Triclosan on Allergy in Infants

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The prevalence of allergic diseases such as bronchial asthma, atopic dermatitis, nasal allergies (pollinosis) and food allergies has been increasing over time in many countries. The ‘hygiene hypothesis’ is thought to explain one reason for the increase in allergic diseases, reflecting a modern western lifestyle and lack of exposure to microorganisms, resulting in the increased incidence of allergies. Recently, this hygiene hypothesis has been considered from the perspective of exposure to antimicrobial agents and preservatives such as parabens and triclosan. It currently remains unclear whether parabens and triclosan, which are included in many daily consumer products such as cosmetics, shampoos and personal care products that act as preservative antimicrobial agents, induces or aggravate allergies. The U.S. Food and Drug Administration (FDA) in September 2016 issued a rule banning the use of triclosan in hand and body washes. Therefore, the aim of the present study was to examine the relationship between the exposure to parabens and the prevalence of allergic diseases in Japanese children and adults and to develop methods of preventing allergic diseases.

This population-based cross-sectional study performed in the town of Shika, Japan for 2,005 participants aged 40 years and older has indicated that the prevalences of nasal allergies, atopic conjunctivitis and total allergies are significantly higher in women using parabens than in those not using them (Shimizu et al., 2018). The epidemiology for 236 children aged 0-3 years who received health examinations in Shika showed that the prevalence of atopic dermatitis was significantly higher in children exposed to parabens, which was assessed using urine samples (Fig. 1). A significant association between the incidence of atopic dermatitis and exposure to parabens was confirmed by a cohort study using 61 babies aged 4 months with a term of 14 months. The clinical study, which was conducted in the National Center for Child Health and Development in Tokyo, showed that the concentrations of parabens in the urine of pregnant mothers who subsequently gave birth to a baby with the symptom of stridor were significantly higher compared to those without the symptom (Mitsui-Iwama et al., 2019). A study examining the validity of measuring the concentration of urine parabens demonstrated that urine parabens showed circadian changes, suggesting that careful consideration of the circadian rhythm of urine parabens is important in evaluating the levels of urine parabens. Mouse experiments showed a possible

relationship between paraben-induced aggravation of airway hyper-responsiveness (Hirota et al., 2018; Fig. 2) and perturbation of the gut microbiome in aeroallergen-sensitized mice, suggesting that parabens might play an adjuvant role in the induction or aggravation of allergic response in susceptible individuals.

In conclusion, the present results demonstrated a causal relationship between allergies and exposure to parabens, suggesting that avoiding the use of parabens could help prevent the development of allergic diseases.

- Children showing higher concentration of urinary parabens (more than 100pmol/Cr, N=61)
- Children showing lower concentration of urinary parabens (less than 100pmol/Cr, N=175)

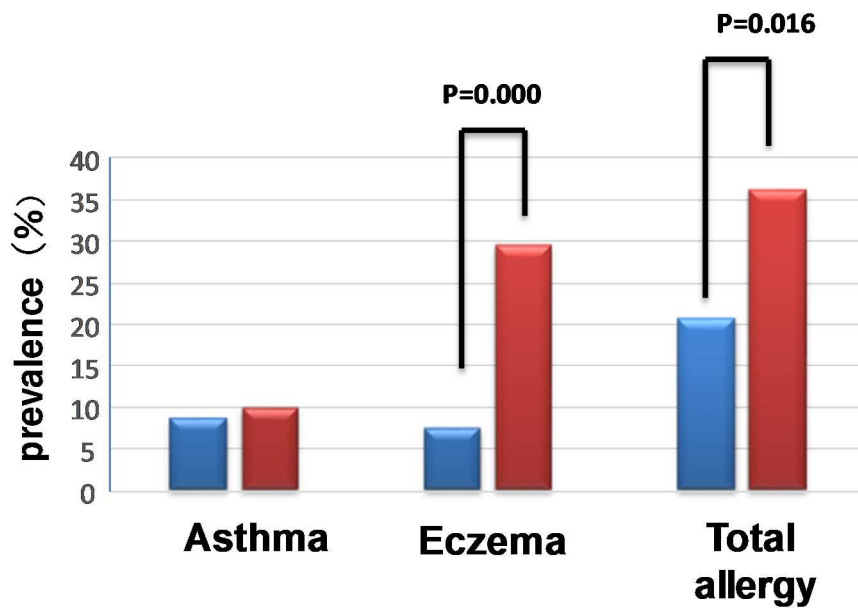


Fig. 1 Comparison of allergic prevalence between children showing higher and lower concentrations of urinary parabens.

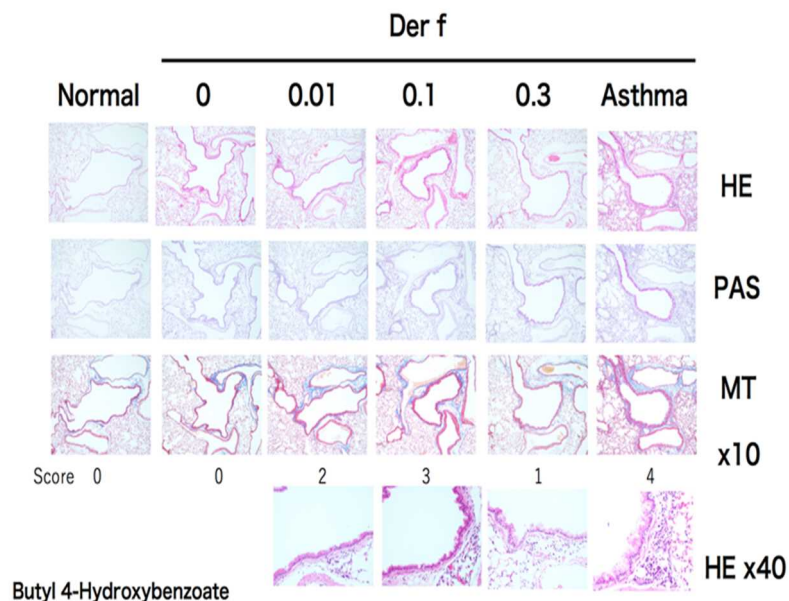


Fig.2 Paraben-induced histopathological changes in the lungs of Der f-sensitized mice.

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