

Latex content in adult vaccines

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ABSTRACT Introduction: Hypersensitivity reactions to natural rubber latex are well-characterized occupational concerns for health care personnel. Health care providers are at increased risk for exposure and possibly transmission of vaccine preventable diseases. Therefore, many health care facilities require providers to be vaccinated against these diseases to maintain employment. Mandatory vaccination for these health care providers presents potential challenges and safety concerns. Materials and Methods: Using a commercial Latex Allergen ELISA Assay kit for Hev b 1, we evaluated the latex content of HAVRIX, ENGERIX-B, TWINRIX, and BOOSTRIX all manufactured by GlaxoSmithKline. Results: These data demonstrate undetectable Hev b 1 content among all of the vaccines tested. This study provides the first known data regarding natural rubber latex content in adult vaccines. Conclusions: Our study revealed undetectable levels of Hev b 1 natural rubber latex content in the tested adult vaccines. These data provide evidence for prospective studies into the safety of vaccinating latex allergic patients.

INTRODUCTION

Hypersensitivity reactions to natural rubber latex are well-characterized occupational concerns for health care personnel. The prevalence of latex allergy among health care providers is reported to be as high as 9.7%.¹ The symptoms range from mild local cutaneous reactions to generalized urticaria, angioedema, allergic rhinitis, respiratory symptoms, and even life-threatening or fatal anaphylaxis. Health care providers are also at increased risk for exposure and possibly transmission of vaccine preventable diseases. Therefore, many health care facilities require providers to be vaccinated against these diseases to maintain employment. Specifically, hepatitis B and Tdap vaccinations are recommended by the Center for Disease Control for health care workers. There are currently four adult hepatitis B vaccine formulas marketed in the U.S., these include ENGERIX-B, TWINRIX, RECOMBIVAX HB, and HEPLISAV-B.² Unfortunately, RECOMBIVAX HB is not currently commercially available through at least 2019. HEPLISAV-B does not contain natural rubber latex in its tip caps on the prefilled syringe, but the cost for this vaccination series remains higher.³ All available Tdap vaccines formulas contain natural rubber latex tip caps on their prefilled syringes.⁴ The U.S. Food and Drug Administration requires manufacturers to label medical devices containing natural rubber latex, but does not mandate quantifying the content.⁵ According to the Advisory Committee on Immunization Practices and the *Adverse reactions to vaccines practice parameter 2012 update*, if a person has a history of a severe anaphylactic allergy to latex, then vaccines supplied in vials or syringes should be

avoided if possible.^{2,6} Mandatory vaccination for these health care providers presents potential challenges and safety concerns.

There has long been concern that natural rubber pharmaceutical vial closure may leach latex allergen into medications, potentially causing life-threatening reactions. One case report proposes that a severe reaction may have resulted from latex contamination from the rubber stopper of an injectable methylprednisolone suspension.⁷ Primeau et al. revealed latex allergen content in saline that came in contact with natural rubber stoppers as detected by RAST inhibition analysis and intradermal skin testing of latex allergic patients.⁸ There is only one report in the literature that describes a case of anaphylaxis following Hepatitis B (ENERGIX B) vaccination. The authors suggest that vaccine contamination happened when the needle was passed through the natural rubber latex vial stopper when the vaccine was drawn. On re-vaccination, where the vaccine was drawn using a glass syringe from a vial with the stopper removed, there was no reaction.⁹ Despite concern for potential natural rubber latex contamination of solutions, there have been no previous studies enumerating the latex content of adult vaccines.

MATERIALS AND METHODS

The goal of our pilot study was to quantify the natural rubber latex content in adult vaccines containing latex tip caps on their prefilled syringes, and paying particular attention to those recommended for health care professionals. Using a commercial Latex Allergen ELISA Assay kit for Hev b 1 (FITkit b1 manufactured by Icosagen AS), we evaluated the latex content of HAVRIX, ENGERIX-B, TWINRIX, and BOOSTRIX, all manufactured by GlaxoSmithKline. Vaccines were tested undiluted and at 1:10 dilutions. These data were compared with the standard curve and kit positive control 169 ng/ml (reference range 139–173 ng/ml). The limit of detection of the FITkit assay is ≤ 2.0 ng/ml.

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TABLE I. Latex content in FDA-approved adult vaccines whose packaging contains natural rubber latex

Vaccine	Number of lots tested	Latex content (ng /mL)	Lot number
HAVRIX (GlaxoSmithKline)	2	<2.0 Limit of detection	4H37Y PZ353
ENGERIX-B (GlaxoSmithKline)	2	<2.0 Limit of detection	9X9ZT FT42N
TWINRIX (GlaxoSmithKline)	1	<2.0 Limit of detection	53A15
BOOSTRIX (GlaxoSmithKline)	2	<2.0 Limit of detection	XJ5L2 4P9CL

RESULTS

Results are presented in Table I. These data demonstrate undetectable Hev b 1 content among all of the vaccines tested. This study provides the first known data quantifying natural rubber latex content in adult vaccines. There are two main limitations to our study that should be addressed. First, not all adult vaccines with natural rubber latex caps were tested due to vaccine access, supply, and financial limitations. However, results were consistent and reproducible among the individual vaccines and lots, which were tested. Another limitation is that we did not test all of the known natural rubber latex allergens. Using a commercially available ELISA Assay, a European study found that Hev b 1 was the most frequently detectable single allergen found in different household products (pacifiers, baby bottle nipples, condoms, household gloves and Band-Aids).¹⁰ Based on this study, we decided to evaluate Hev b 1 alone as an initial screen for natural rubber latex content. We plan to expand our study to test for Hev b 5 and Hev b 6.02, which are considered major allergens found in health care workers, keeping in mind that ultimately the only relevant “major allergen” is the one to which any one particular person is sensitized.

CONCLUSIONS

In conclusion, our study revealed undetectable levels of the natural rubber latex allergen Hev b 1 in the tested adult vaccines. It would be premature to claim that these vaccines are currently safe to use in latex allergic patients. We suspect that since Hev b 1 was undetectable, other known natural rubber latex allergens would also be undetectable. These data provide evidence for further laboratory research and

prospective human trials into the safety of vaccinating latex allergic patients.

CONFLICT OF INTEREST

The authors have declared that they have no conflict of interest.

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