

Consumer Safety of Enzyme Detergents

To the Editor.—Confused and incomplete reports in the lay press have stemmed from recent publications regarding the occurrence of irritant dermatitis and allergic respiratory symptoms among workers involved in the manufacture of enzyme-containing detergents—symptoms attributable to enzyme dust encountered in the factory environment.¹⁻⁴ Indications are that this problem is purely industrial and that it is controllable in the factory by improved hygiene and dust-control measures. This letter presents a summary of our data showing that the factory problem in no way extends to the consumer areas as has been implied in some press reports. A substantial body of laboratory and clinical evidence and market experience demonstrates that no problem with the finished enzyme product exists in consumer use.

It is natural for physicians to ask if what has happened in the factory is to be expected among those who use enzyme-containing products in the home. The question of consumer safety was investigated intensively by our company before these products were put on the market, and work has continued since their introduction.

Results of toxicologic studies, controlled clinical evaluations, follow-up of consumer comments, and usage experience by millions of housewives, all indicate that the enzyme-containing detergents are as safe and mild for consumer use as the comparable nonenzyme products.

Currently 70% to 75% of the laundry detergents sold in the United States contain enzymes. Depending on the brand and type, these products contain up to about 0.1% active enzyme. They have been on the market in the United States for approximately three years and for up to six years in Europe. During that time they have achieved wide acceptance among consumers for their improved stain removing and cleaning ability.

The enzymes are prepared by fermentation with the widely distributed nonpathogenic soil organism, *Bacillus subtilis*. The major producers process their enzyme materials to remove the bacteria and spores remaining at the end of the fermentation. In addition, rigid control of microbiological quality assures absence of all pathogens. Our washing

products have always had less than 100 viable organisms per gram, a level comparable to that of most any product exposed to airborne contamination and below that of many commonly used food materials.

A detailed report of investigations relevant to the oral toxicity, cutaneous sensitization potential, and skin and eye irritant effects of enzyme and enzyme products has recently been published.⁵ Animal studies showed that the enzyme products are essentially equivalent to the base detergent insofar as oral toxicity and emetic action are concerned. Likewise, the addition of enzymes at the current product levels was demonstrated to have little or no effect on irritancy in the eye with either intact or abraded corneas.

Considerable attention has been paid to the effect of enzyme products on the skin. Extensive, repeat insult patch testing (involving more than 1,500 human subjects) failed to disclose any evidence of cutaneous contact-type sensitization. Under conditions of exaggerated exposure, as for example, under the 24-hour occlusive patch test with solutions at several times normal concentrations, primary irritation of the skin due to proteolytic enzyme activity can be demonstrated. In actual household use, however, no adverse effects of any sort on the skin have been found in extensive consumer clinical mildness testing. In these tests the condition of the skin of the hands before and after regular dishwashing use of the products for a number of weeks was evaluated quantitatively by dermatologists and other expert observers. In 22 of these clinical mildness tests in this country and abroad, a total of over 11,500 typical housewives, having the range of skin types and skin conditions representative of this group of people, used the products for periods from 2 to 12 weeks.

There is no detectable enzyme activity remaining on fabric laundered in enzyme-containing detergent. Diapers laundered in enzyme washing products created no adverse effect on the skin of the diaper region of the 360 babies taking part in these studies. Likewise, no adverse effect of enzyme was observed when unrinsed garments were worn in contact with the skin by adult males performing hard, physical work under hot, humid environmental conditions.

Elaborate measurements of the amount of enzyme dust encountered by the consumer using products in

the home indicate that the average household exposure is far below the factory level—only about 1/50,000 that which industrial experience suggests is without effect in the factory environment. Industrial laundresses who perform household washing operations at 10 to 15 times the frequency of home usage have used enzyme products for upward of two years with no evidence of any allergic problem.

It is important to note that the incidence of consumer complaints involving enzyme detergents is not significantly different from that of comparable nonenzyme products recently introduced. All skin and health-related complaints have been followed up, with the help of a physician when feasible. In almost all skin complaints the enzyme product was exonerated. In the occasional instance in which equivocal or positive results were obtained, the effects were mild, being limited to itching or slight, transient irritations. In only three cases have there been respiratory complaints attributed to the products, and in all three cases physician observation failed to reveal any causal connection with enzyme detergent.

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A Spectral Event

In the land of ecchymosis
Where the bluish tinge prevails
And with time the changing color
Like fall foliage
Phases fade
Shade
Hue
Heme
Decay
From capillary leakage
The
Vascular way.

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