Managing the Risk of Occupational Allergy in the Enzyme Detergent Industry

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Introduction:

Enzyme proteins have long been recognized to have a potential to cause occupational allergy. Consequently, as users of enzymes in formulated products, detergent manufacturers have chosen to implement a number of control measures to ensure that the hazard does not translate into health effects in the workforce. To that end the American Cleaning Institute (ACI) and the International Association for Soaps, Detergents and Maintenance Products (AISE), have developed best practice risk management guidelines focusing on occupational hygiene and medical monitoring as part of an effective exposure control strategy. The need for businesses to recognize the utility of the available guidance is reinforced by reports where failure to follow good industrial hygiene practices can give rise to incidences of occupational allergy. An overview has been provided of how the industry guidelines are actually implemented in practice and the resulting experience of workplace exposures and health impacts.

Methods:

Both medical surveillance and air monitoring practices associated with the implementation of the ACI and AISE industry guidelines at approximately 100 manufacturing facilities have been evaluated with respect to the prevalence of allergic antibody (sensitization) and occupational respiratory allergy. Data was generated from 4 participating companies, from factories that were globally distributed, and from a period of 5 years.

Results:

The data in Tables 1 and 2 show that using the approaches described for the limitation of exposure, for good occupational hygiene, and for active health monitoring, the respiratory allergenic hazard/risk associated with enzyme proteins can be successfully managed to ensure the safety of the workforce. Over the 5 year period evaluated, clinical symptoms occurred at a rate of generally 0.1% or less. Also, while up to approximately 10 air monitoring measurements were made per day, only less than 2 per month showed an airborne level above the action standard.

Discussion:

Exposure to enzymes presents a genuine risk to health. In the occupational setting, this risk can readily be expressed if exposure is not tightly controlled. Consequently, monitoring of airborne exposure against stringent limits coupled with regular surveillance of the health of the potentially exposed workforce is required to deliver assurance of a safe working environment. In the 5 years of experience reviewed, results from air monitoring and health surveillance show success in both areas at a level of greater than 99%. At the most telling level, symptoms of allergy are avoided in >99.9% (and it is worth remembering that this figure still exaggerates the true extent of symptoms – see Table 1).

Enzyme Guidelines:

ACI

http://www.cleaninginstitute.org/science/enzyme_safety.aspx

A.I.S.E.

http://www.aise.eu/our-activities/standards-and-industry-guidelines/safe-handling-of-enzymes.aspx

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Table 1. Overview of health surveillance experience

Year	No. of factories	No. of workers	Uptake[1] (%)	Incidence[2] (%)	Prevalence[3] (%)	Symptoms[4] (%)
2006	107	22100	96.0	0.99	8.6	0.11
2007	109	23668	95.6	0.76	8.1	0.08
2008	114	23976	94.4	1.04	7.8	0.26
2009	106	22686	97.0	0.82	7.3	0.05
2010	106	24773	94.9	0.97	8.5	0.05

[1] Percentage of the workforce that participated in surveillance programs.
[2] Percentage of new cases of sensitization during the calendar year.
[3] Percentage of total cases of sensitization in the exposed workforce.
[4] Percentage of cases exhibiting any evidence of rhinitis, conjunctivitis, impaired lung function, asthma; not necessarily linked to an occupational causation.

Table 2. Overview of air monitoring experience

Year	No. of factories	No. of readings	No. above action standard	Incidence[1] (%)
2006	82	288318	1592	0.55
2007	83	276193	1344	0.49
2008	89	267147	2546	0.95
2009	90	306986	2400	0.78
2010	95	344853	1715	0.50
Mean	88	296681	1919	0.65

[1] Proportion of readings above the action standard (i.e., 60 ng/m^3 or lower; typical occupational action standards for enzymes are 6 to 15 ng/m^3)

Conclusions:

1) Respiratory allergenic risk associated with exposure to bacterial and fungal enzymes in detergent factories can be successfully managed to ensure the safety of the workforce.

2) The effective implementation by enzyme detergent manufacturers of industry guidelines for occupational hygiene controls and health monitoring strategies, as developed by ACI and AISE, reinforces the view that adoption of these approaches would be beneficial in other industries working with enzymes.

A·I·S·E
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International Association for Soaps, Detergents and Maintenance Products
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