Detergent Enzyme Hygiene and Medical Surveillance – What We Have Learned over the past 40 years

Donald Bruce Kirchner, MD, MPH
The Procter & Gamble Company
Cincinnati, Ohio, USA

HISTORY OF ENZYMES IN DETERGENTS

1931
* Otto Rohm uses pancreatic enzyme for laundry presoak
* "Burnus" first enzymatic detergent

1963
* "Biotex" first successful detergent containing bacterial protease Alcalase

1963–1970
* Rapid growth of enzyme detergent

LATE 1960’s
* Enzymes were introduced in the detergent industry
* Dust products and high exposure
* Development of allergic symptoms among exposed people
* Public relation issues

HISTORY OF DETERGENTS

1970's & 1980's
* Development of industrial hygiene practices and dust control measures
* Less dusty material
* Enzymes were withdrawn from all U.S. Detergents
* Enzyme containing detergents continued to be manufactured in Europe safely.
* In 1985, enzymes were reintroduced in U.S. detergents
**HISTORY OF ENZYMES IN DETERGENTS**

**LATE 1980 to Now**

* Multiple enzyme classes are used in the detergent industry.
* Less dust and much lower exposure – sound industrial hygiene practices are implemented in our plants.
* <3% of sensitizations to the existing enzymes - no asthma.
* No public relations issues

**WHAT ENZYMES IN P&G DETERGENTS?**

- **Proteases** ➔ Remove grass, blood, egg and human sweat ex. Savinase, FNA, FNA-Base, ...
- **Lipases** ➔ Remove oily and fatty stains ex. Lipolase, Lipex,…
- **Amylases** ➔ Remove residues of starchy foods ex. Natalase, Termamyl, …
- **Cellulases** ➔ Modify structure of cotton cellulose fibrils ex. Carezyme, Celluclean
- **Hemicellulase** ➔ Degrades guar gums (food thickeners) ex. Mannanase
- **Carbohydrase** ➔ Degrades pectins and pectates (stains of fresh-fruits, tomatoes and fruit type baby foods) ex. Pectate Lyase

**Current Status**

- Tested – 12,000
- Sensitized - ~ 180
- Allergic Rhinitis + 1 every 2 years
- Asthma 4 cases over 18 years

**What Factors Contributed to Success?**

1. Prilling of Granular Enzymes

**What Factors Contributed to Success?**

- 2. Institution of an Enzyme Hygiene Program
  - Engineering design for enzyme handling systems, and ventilation
  - Globalized Risk Assessment Process
  - Condition Monitoring
  - Air monitoring
  - Ventilation System Monitoring
  - Behaviors/Personal Protective Equipment
  - Audits
What Factors Contributed to Success?

- 3. Globally standardized medical monitoring program:
  - Skin Prick Testing
  - Respiratory Questionnaire
  - Pulmonary Function Tests
  - Medical Program Audits

Today’s Presentations

- “Prevention of Enzyme Allergy in the Manufacturing of Detergent Enzymes” - Dr. Larsen
- **Break**
- “The Current State of Enzyme Hygiene Practice to Control Allergy in a Detergent Manufacturer” – Mr. Panepinto
- “Enzyme Medical Monitoring Systems in Detergent Manufacturing” – Dr. Kirchner