Medical Monitoring of Worker Enzyme Exposure in the Detergent Manufacturing Industry

Richard Urbanek,

Medical Director Europe,
Occupational Health Services,
The Procter & Gamble Company
Why Enzymes in Detergents?

- Cleaning and stain removal
- Breaking water insoluble substances into smaller, water soluble fragments

Enzyme types:
- Proteases (soil, grass, blood)
- Amylases (starch)
- Lipases (greases)
- Cellulases (fabric protection)
Short History

- Pancreatic enzymes in laundry wash patented in 1931 (Dr. Rohm)
- First detergent with Protease 1951
- 1960’s occupational asthma problems
- 1970 enzyme granulates (prills)
- 1971 Amylases introduced to laundry
- Mid 1970: liquid enzymes....
- 1980’s introduction of modern medical monitoring methods
How has Safety been achieved?

- Enzyme Hygiene Program
  - Equipment Capability
  - Training of employees
  - Program Ownership, Commitment, Behavior
  - Tracking and Measurement of Exposure
  - Effective Medical Monitoring
Possible adverse health effects of enzymes/illness symptoms
Meaning of sensitization
Individual performance expectations
PPE use
Special situations (spills, equipment problems)
Behavior observation system
Tracking and Measurement of Exposure

- Airborne Enzyme Concentrations
  - Air Sample collection
  - Location of samplers
  - Analysis of samples: total dust plus ELISA technique for enzyme content
  - Quality Assurance – maintenance/calibration of sampling equipment
- Data long term analysis (OEG/Trends)
Medical Monitoring Objectives

- Protecting individual health by early detection of adverse changes
- Assisting in evaluation of exposure control measures
- Contributing to improvement(s) of employee protection
Medical Monitoring:
(Pre-placement and every 12 months)

- Medical History with particular reference to Allergy, Asthma, Lung diseases and medication taken
- Respiratory Questionnaire
- Lung Function Assessment
- Immunological Tests
- Physical Examination at the discretion of the Occupational Physician
Outcomes of Medical Monitoring

- Normal findings
- Positive immunological test to enzyme with no other adverse finding – employee may continue to work with enzymes with increased protection/ surveillance
- Respiratory Questionnaire abnormal data – immediate further assessment by physician
Impaired lung function on spirometry – should be re-tested within one month or at Occupational Physician’s judgment. Continued downward trend should be assessed as to need for removal from exposure.

Clinical symptoms of enzyme induced respiratory disease – fitness for work assessment must be done by Occupational Physician.
Basic Tools in Medical Monitoring

- Respiratory Questionnaire
- Pulmonary Function Test
- Immunological Monitoring
Respiratory Questionnaire

- Good description of symptoms
- Nurse participation welcome
- Pre-employment/periodical
- Evaluation by Nurse
Spirometry

- Standardized procedure/protocol
- Forced expiratory manoeuvre
- Test indices FVC, FEV1, FEV1/FVC ratio and PEFR
- Reproducible tests
Immunological Tests

- Demonstrate development of specific IgE, i.e. immunological response following exposure to allergen
- Immunological response does not mean disease
- Skin Prick Test
- Serological test procedures
Skin Prick Test

- Performed by trained and competent nurse (standards applicable for allergy clinics)
- Negative control (saline, to identify non-specific reactions)
- Positive control (histamine, to confirm normal skin reactivity)
- Standardized reagents
Skin Prick Test Technique

- Drop of reagent placed on the arm
- Skin lifted with tip of a hypodermic needle or tip of lancet pressed into skin and withdrawn
- Excess solution wiped off
- Test site inspected at 15 minutes
- Positivity: at least 3 mm of wheal diameter with flare (or at least 3 mm greater than response to the negative control)
Serological Test Procedures

- Most common RAST, UniCAP, ELISA
- Blood collection, venepuncture
- Only accredited laboratory can be used
- Quantitative results
Advantages of Skin Prick Test

- Less invasive than serology
- Immediate results
- Inexpensive
Advantage of Serology Tests

- Quantitative results
- Usable with patients taking medication which could interfere with Skin Prick Test (e.g. antihistamines)
- Usable in individuals with skin diseases
Conclusions

- It is not difficult to make of enzymes the best controlled occupational allergen.
- Good communication with employees absolutely necessary.
- Legal compliance of OH programs must be guaranteed.
Sector Cooperation

- In Safety and Health, all competitors are on one boat
- Industry associations role
- AISE initiatives
- Communication with authorities