

Dermatoses

1605 APPLICATION OF BIOMARKERS IN WORK-RELATED CONTACT DERMATITIS

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Aim of special session Understand the role of biomarkers for early interventions in occupational health settings

Work-related contact dermatitis represent a substantive part of occupational diseases in many countries of the World. They cause extensive suffering for the affected workers and represent a huge socio-economic burden. Selection of appropriate biomarkers, including those involved in skin barrier and inflammation, can provide the basis for early, health-protective interventions in occupational health settings. Furthermore, they allow identify new potential therapeutic targets, aid diagnostics and monitoring of therapy and interventions to improve workers' skin health

1605a INDIVIDUAL SUSCEPTIBILITY TO WORK-RELATED CONTACT DERMATITIS

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Introduction Contact dermatitis (CD) is the most common cause of occupational skin diseases, especially in occupations such as nursing, hairdressing, metalworking and construction industry. Environmental exposure and personal susceptibility both contribute to its development.

Methods Recent studies on phenotypic and genotypic factors which might modify risk for irritant- and allergic contact dermatitis (resp. ICD and ACD) will be addressed.

Results Polymorphisms in several candidate genes responsible for skin barrier, immune response and metabolism showed to play a role in individual susceptibility to CD. Next to genetic factors, a history of atopic dermatitis and filaggrin loss-of-function mutations have been confirmed as major risk modifying factors for ICD. Association between atopic dermatitis and filaggrin mutations with ACD is less clear which might at least partly be assigned to differences in study design e.g. choice and definition of phenotype, investigated contact allergens, and population size. E.g. the effect of filaggrin mutations seems to be allergen-specific. Several studies suggested polysensitization as a phenotype for increased susceptibility to ACD.

Discussion Advances in our knowledge on the mechanisms underlying CD initiated a large number of studies searching for candidate genes that might modify the risk for ICD and ACD. Future studies are warranted to investigate whether genetic and phenotypic factors shown to be related to individual susceptibility are specific for a certain skin irritant or contact allergen and further evaluate their suitability in clinical practice.

1605b FILAGGRIN DEGRADATION PRODUCTS AS A BIOMARKER OF IRRITANT- AND ALLERGIC CONTACT DERMATITIS

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Introduction Filaggrin, a structural protein of the uppermost skin layer, stratum corneum (SC) plays an important role in aetiology of contact dermatitis (CD). Filaggrin contributes to the mechanical strength of the skin while its degradation products are major constituent of natural moisturising factors (NMF) responsible for adequate skin hydration. The major determinant of NMF in the skin are mutations in the filaggrin gene, a known risk factor for occupational contact dermatitis. Next, NMF can be affected by dermal exposure to skin irritants or contact allergens. The levels of NMF might therefore serve as a biomarker of individual susceptibility or to assess skin damaging effect of irritants and allergens.

Methods In experimental studies in humans, the levels of NMF components in the SC were determined before and after exposure to common skin irritants (SLS; n-propanol, acetic acid and NaOH) and contact allergens (Cr, Ni, MCI/MI and PPD).

Results All skin irritants led to significant decrease in NMF levels in the SC while among contact allergens this effect was observed only by MCI/MI.

Discussion Decrease in NMF levels indicates damage of the skin barrier which occurred after dermal exposure to both, contact allergens and irritants. Therefore, NMF might be a useful biomarker to detect early effects associated with dermal exposure to chemicals in occupational settings. Furthermore, NMF might be useful to identify skin damaging properties of contact allergens.

1605c INDIVIDUAL SUSCEPTIBILITY FOR OCCUPATIONAL SKIN DISEASES IN METAL WORKERS

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Introduction Occupational contact dermatitis (OCD) is one of the most frequent occupational diseases worldwide and very common among metal workers. The burden of disease is high due to its often chronic course and a high risk of work absenteeism and unemployment. The prerequisite for the development of OCD is work-related exposure to irritants and/or allergens. However, endogenous factors may increase the individual susceptibility and interfere with preventive interventions.

Methods A prospective controlled intervention study has been initiated in metal apprentices with annual follow-up assessments over three years. The apprentices in the intervention cohort received specific health education on prevention of OCD at the beginning of their training. Saliva and stratum corneum samples were taken for genotyping and analysis of phenotypic biomarkers, including assessment of epidermal

levels of natural moisturising factor and cytokines. Questionnaires will be used to investigate the exposure to skin hazards, protective behaviour and knowledge on prevention of OCD. The skin condition of the hands will be assessed by regular clinical examinations and questionnaires. In addition, the same genetic and phenotypic biomarkers will be analysed in a cohort of metal workers affected by OCD. The primary objective is to evaluate if health education is effective in prevention of OCD in metal apprentices. Moreover, the value of different biomarkers to identify individuals at risk for OCD will be assessed.

Results The design of the study and its first results will be presented at the meeting.

Discussion Health education has been shown to be an important key in prevention of OCD. However, intervention studies are necessary to evaluate and improve preventive programmes based on health education. Biomarkers may help to identify individuals at risk and to develop targeted strategies to reduce the burden of OCD.

1605d CORRELATING BIOLOGICAL MONITORING FOR PLATINUM WITH DERMAL AND RESPIRATORY EXPOSURE

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Introduction Occupational respiratory exposure to platinum is well established in precious metals refineries (PMR). Soluble platinum causes respiratory sensitisation leading to amongst others occupational asthma and rhinitis. However, several skin symptoms have been reported and the relationship between skin exposure and uptake determined in urine has not been investigated.

Objectives To evaluate the dermal and respiratory exposure of PMR workers to soluble platinum, and to quantify the absorbed platinum concentration excreted via the urine.

Methods Dermal exposure samples were collected on the dominant palm, wrist, neck and forehead using Ghostwipes. Respiratory samples were collected using an Institute of Occupational Medicine inhalable aerosol sampler. Wipe and respiratory samples were analysed according to the MDHS 46/2 using inductively coupled plasma-mass spectrometry. The dermal and respiratory exposures of workers from different production areas in two PMRs were measured simultaneously on two consecutive days. Urine samples were collected on the morning of the first day and on the two following mornings.

Results The degree of dermal and respiratory exposure varied considerably between workers working in different areas of the refineries. Most workers experienced dermal and respiratory exposure to soluble platinum above the detection limit (0.005 µg) with 25% of the respiratory exposures exceeding the national 8 hour occupational exposure limit of 2 µg/m³. Dermal exposure (average of anatomical positions) were ≤6.79 µg/cm². Urine platinum concentrations ranged between <0.1 and 3 µg/g creatinine. Statistically significant positive correlations were established for: (i) average dermal exposure and average respiratory exposure, (ii) average dermal exposure and average platinum urinary concentration, and (iii) average respiratory exposure and average platinum urinary concentration.

Discussion The concentration platinum in the urine of workers is determined by both the dermal and respiratory exposure routes. The skin is as a route of exposure to soluble platinum should be considered.

1605e HEALTHY HANDS: HOW TECHNOLOGY CAN SUPPORT A CULTURE OF BEST PRACTICE FOR HAND CARE AMONG NURSES WITH HIGH RISK FOR HAND DERMATITIS

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Introduction Occupational hand dermatitis (OHD) is a major risk for health care workers (HCW) due to frequent exposure to 'wet work'. With an estimated point prevalence of OHD ranging between 12%–30%, nurses are at highest risk. There is a big burden of disease due to chronicity, absenteeism, risk of unemployment and impaired quality of life. Despite evidence and guidelines on the importance of skin care in the prevention of OHD, use of hand creams during work is reported to be very low. New preventive strategies are obviously needed.

Methods A cluster randomised controlled trial has been initiated in nurses performing wet work, with a follow-up of 18 months. Twenty wards have been recruited to include 504 participating nurses in the study at baseline. Nurses in the control and intervention wards received health education about optimal hand care every three months from baseline. The intervention wards were additionally provided with hand creams in dispensers equipped with the electronic system for the continuous registration of cream consumption. Regular feedback on skin care performance at ward level was provided by using posters. At baseline and 12 months clinical examination of the skin condition was done using the Hand Eczema Severity Index (HECSI score). In addition, stratum corneum samples were collected for analysis of epidermal levels of Natural Moisturising Factor (NMF), as an early biomarker of skin barrier damage. All participants completed questionnaires regarding exposure to wet work and skin protective behaviour during the study period.

Results The design of the study and a summary of the main results will be presented at the session

Discussion This trial will assess whether provision of hand creams coupled with continuous monitoring and regular feedback on its consumption improves skin condition in healthcare workers

1618 TAKING STOCK OF NEW DEVELOPMENTS IN THE PREVENTION OF OCCUPATIONAL AND ENVIRONMENTAL DERMATOSES

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Aim of special session Showcase that with innovative approaches sustainable prevention can be achieved to decrease cases of occupational skin diseases

OSD represent up to 35% of notified occupational illnesses. Prolonged absence from work due to OSD jeopardizes