Briefing notes to Parliamentary Committee Hearing on research into Mitochondrial proteins in DeSeal/ReSeal personnel

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Mitochondria in a cell

Diagram of a typical animal cell. Organelles are labelled as follows:

1. Nucleolus
2. Nucleus
3. Ribosome
4. Vesicle
5. Rough endoplasmic reticulum
6. Golgi apparatus (or "Golgi body")
7. Cytoskeleton
8. Smooth endoplasmic reticulum
9. Mitochondrion
10. Vacuole
11. Cytosol
12. Lysosome
13. Centriole
Mitochondria from stem cells

Intact mitochondria migrate in membrane tubular network connections formed between human stem cells. Attila Csordas¹, Attila Cseleányák¹, Ferenc Uher², Marianna Murányi¹, Simone Hennerbichler³, Heinz Redl³, Márk Kollai⁴, & Zsombor Lacza⁴
Symptoms seen in exposed personnel

- Myopathy
- Fatigue
- Parkinsonism
- Dementia
- Psychoses
- Night blindness
- Peripheral neuropathy
- Skin pigmentation
Substances toxic to Mitochondria

- Approximately sixty (60) hazardous substances involved in all aspects of the Deseal/Reseal Programs. Of these, the major risk chemicals are considered to be:
  - a. Methyl ethyl ketone (also methyl isobutyl ketone);
  - b. Aromatic hydrocarbons:
    - c. Toluene, and
  - d. Xylenes;
  - e. Naphtha;
  - f. n-butyl acetate;
  - g. Ethyl acetate;
  - h. Isopropanol;
  - i. Glycol ethers;
  - j. Thiophenol;
  - k. Isocyanates (HMDI Monomer); and
  - l. Chromium VI compounds, particularly strontium chromate
  - m. Jet Fuel Anti-fungal compound.
Protein Mass Spectrometry

- Protein extraction
- In-solution or in-gel digestion
- Online nano LC
- MSQuant PTM Scoring
- BioInformatical analysis
- MASCOT Protein Database
- Datadependant MS and MS^n
- LTQ-Orbitrap
Schematic overview of the typical workflow of the proteomics informatics processing of a data set

1. Conversion to and use of open data formats
2. Spectrum identification with a search engine
3. Validation of identifications
4. Protein inference
5. Quantification

Principal component analysis to select proteins affected


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Pathway analysis of identified proteins

Related Articles, Links: Effects of brief cutaneous JP-8 jet fuel exposures on time course of gene expression in the epidermis.
Basis of a screening test
Executive Summary

- The results of these studies implicate changes in mitochondrial proteins in peripheral blood samples in individuals exposed to fuel solvents.
- The finding of changes persisting in peripheral blood several years after the exposure suggests that the cells responsible for generation of peripheral blood cells (stem cells) in the bone marrow have been affected.
- The cohort of individuals involved in fuel exposure are likely to vary considerably in their response to the cellular injury. The variation would be due to:
  - differences in exposure,
  - individual genetically determined susceptibilities,
  - individual genetically determined repair abilities, and
  - other lifestyle factors.
- The protein profile could be used as a test for injury following exposure.
- A mechanism to discriminate (injured from non-injured) would be improved by the combination of indices including:
  - History of Exposure
  - Presence of medical (including psychiatric) symptoms not fully explained by other disease causing aetiologies.
  - Abnormal protein profile.