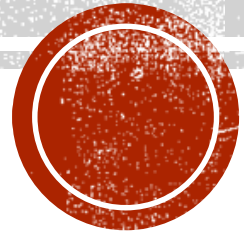
GRE DIT2018

green development infrastructure technology

3rd International conference

Health and Environment

CELLULAR AND MOLECULAR ALTERATION AS BIOMARKERS FOR XENOBIOTIC EXPOSURE



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INTRODUCTION

number of elements

compounds

acrylamide, organic solvents

professionally or incidentally

potential health risk

Increase the risc of different cancerous diseases

Xenobiotics

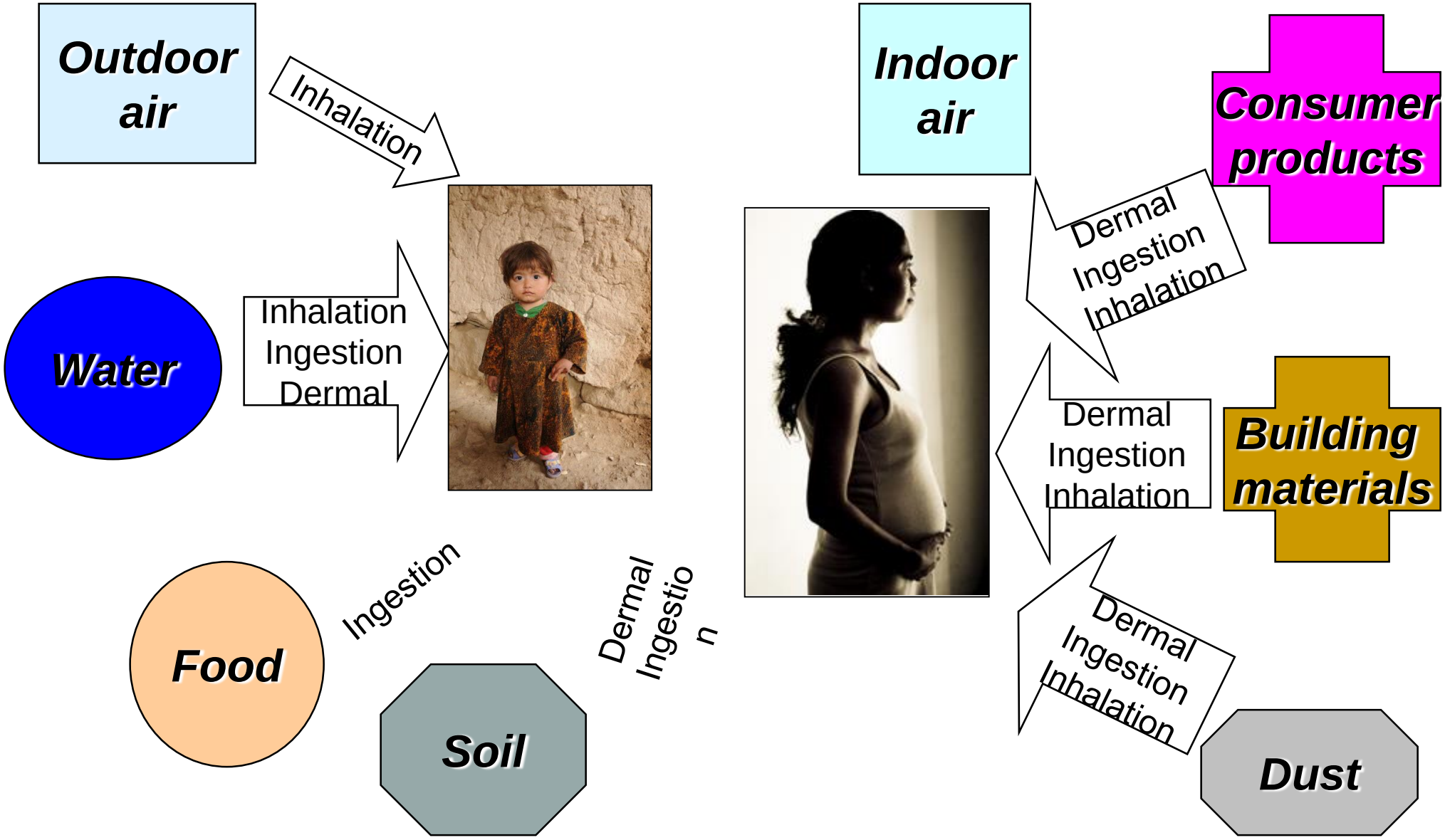
The word points out a large range of *artificial* components such as

Drugs - Medication
Sources:
Pharma Industries
Hospitals, Medical Centres and Human and Animal wastes

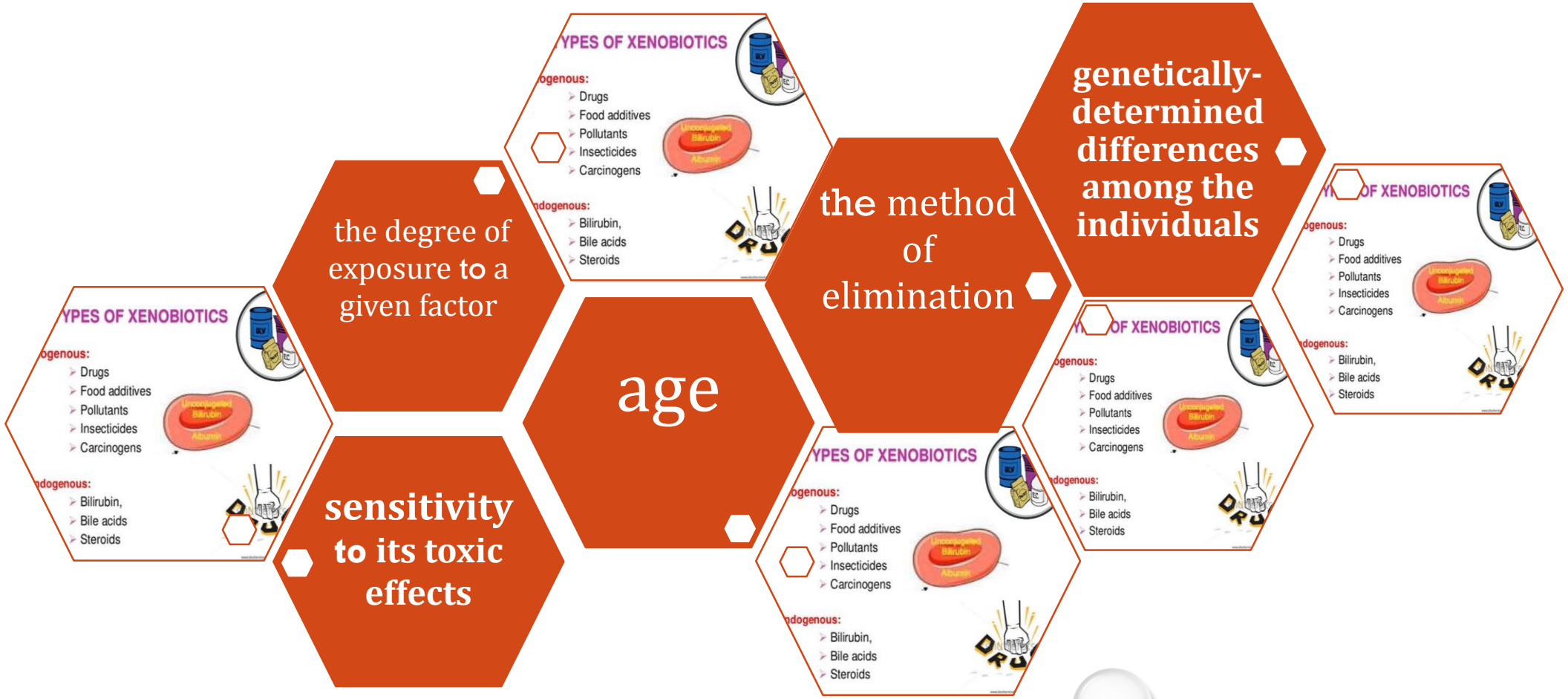
Chemicals
Sources:
Chemical Industries (mainly)

Pesticides
& Fungicides
Sources:
Agriculture

HUMAN XENOBIOTIC COME AS POLLUTANTS FROM TECHNOLOGICAL PROCESSES AND ARE ALSO A RESULT OF THE UNCONTROLLED MANUFACTURING OF CERTAIN CHEMICAL SUBSTANCES AND THEIR PRODUCTS


Outdoor air
Inhalation
Indoor air
Consumer products
Dermal
Ingestion
Inhalation
Water
Inhalation
Ingestion
Dermal
Dermal
Ingestion
Inhalation
Building materials
Food
Ingestion
Dermal
Ingestio
n
Dermal
Ingestion
Inhalation
Soil
Dust

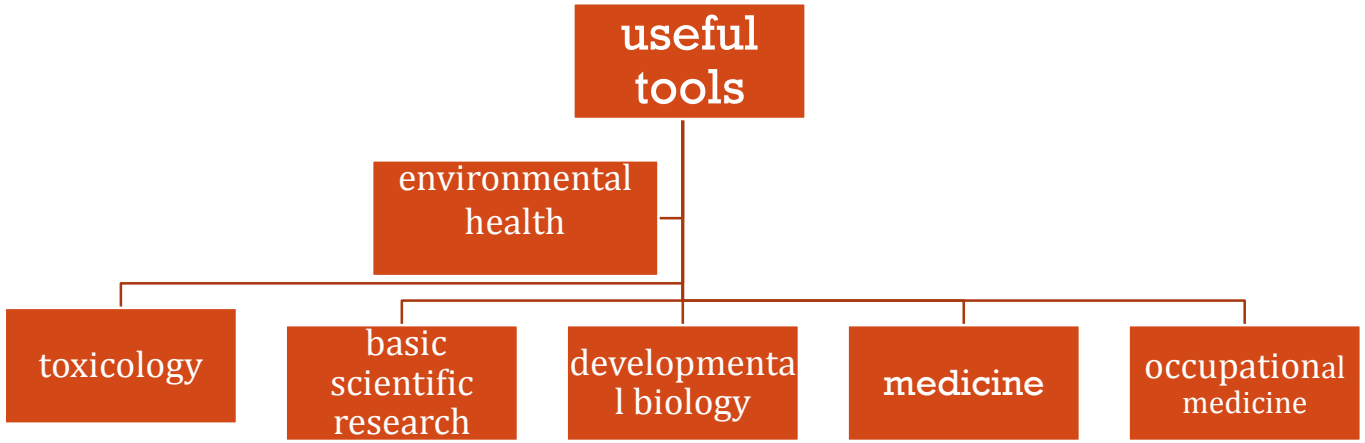
THE EFFECT ON EACH EXPOSED INDIVIDUAL DEPENDS OF



BIOMONITORNIG/BIOMARKERS

- biological marker as a xenobiotically induced alteration in cellular or biochemical components or processes or functions that is measurable in a biological system or sample (**The National Academy of Sciences USA**)
- biological response to a chemical or a group of chemical agents
- Biological monitoring has advantages over environmental monitoring because it measures the internal dose of a compound
- particularly useful in the evaluation of progressive diseases that manifest their symptoms long after exposure to initiating factors

Biological markers (biomarkers) were early defined as “cellular, biochemical or molecular alterations that are measurable in biological media such as human tissues, cells, or fluids”



biomarker of exposure

measurement of parent compound, metabolites and reflect the dose of exposu

biomarker of effect

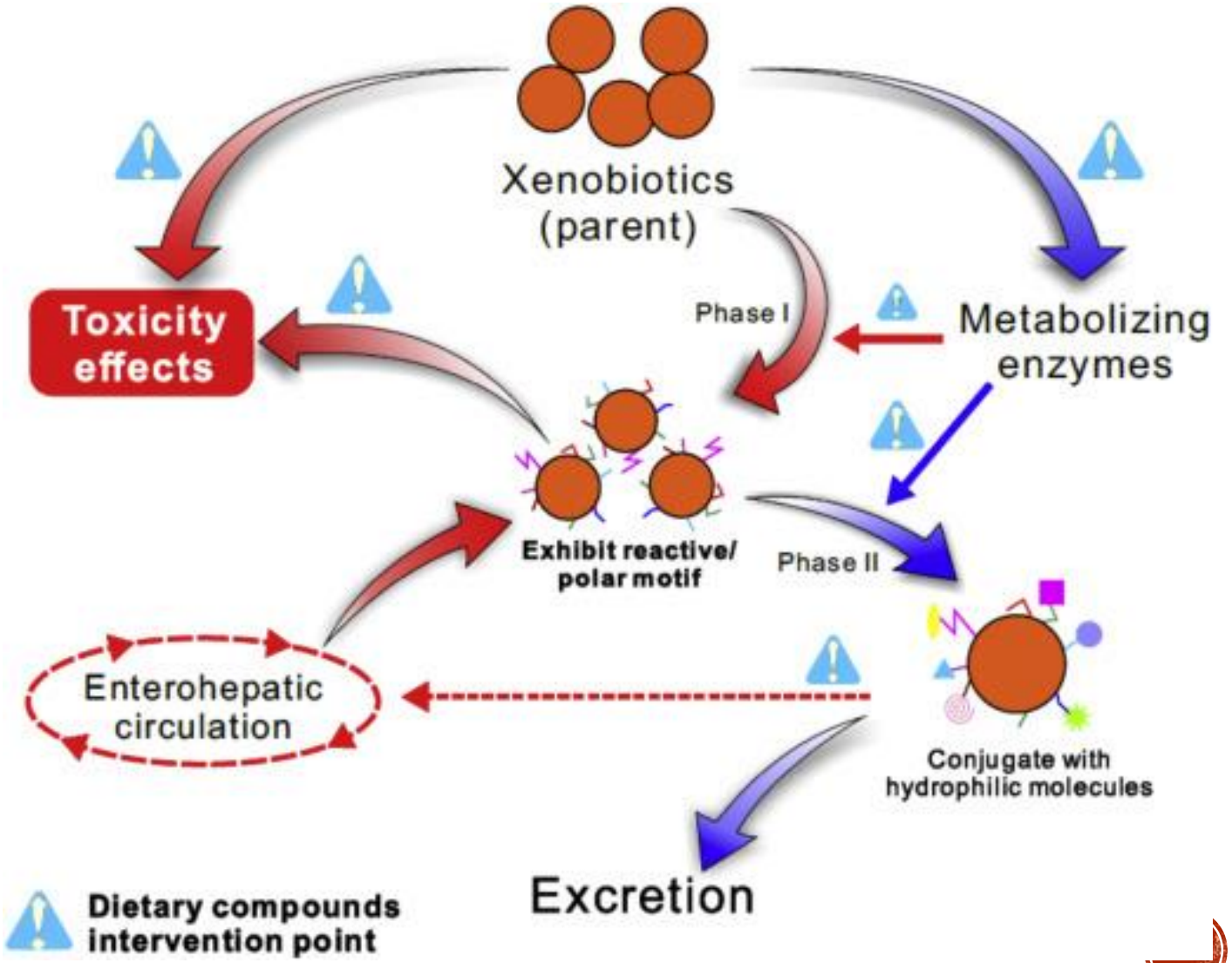
measurable biochemical, physiological, and behavioral alteration/health impairment or dise

biomarker of susceptibility

inherent or acquired ability of an organism to respond to specific exposure

SPECIFICITY OF BIOMARKERS

- sample collection and analysis are simple and reliable
- the biomarker is specific for a particular type of exposure
- the biomarker only reflects a subclinical and reversible change
- use of the biomarker is regarded as ethically acceptable



Blood system

- alterations of heme synthesis
- ALAD is an enzyme involved in the heme biosynthetic pathway
- is highly specific for lead exposure and effect.
- The inhibition of ALAD has been shown to be a reliable indicator of effect to lead

Nervous system

Neurochemical measurements for detecting neurotoxicity are limited by the inaccessibility of target tissue
the most significant and useful example of specific biomarker of neurotoxicity is the inhibition of acetyl choline esterase (AChE) caused by organophosphorus compounds or carbamate pesticides

Urinary biomarkers

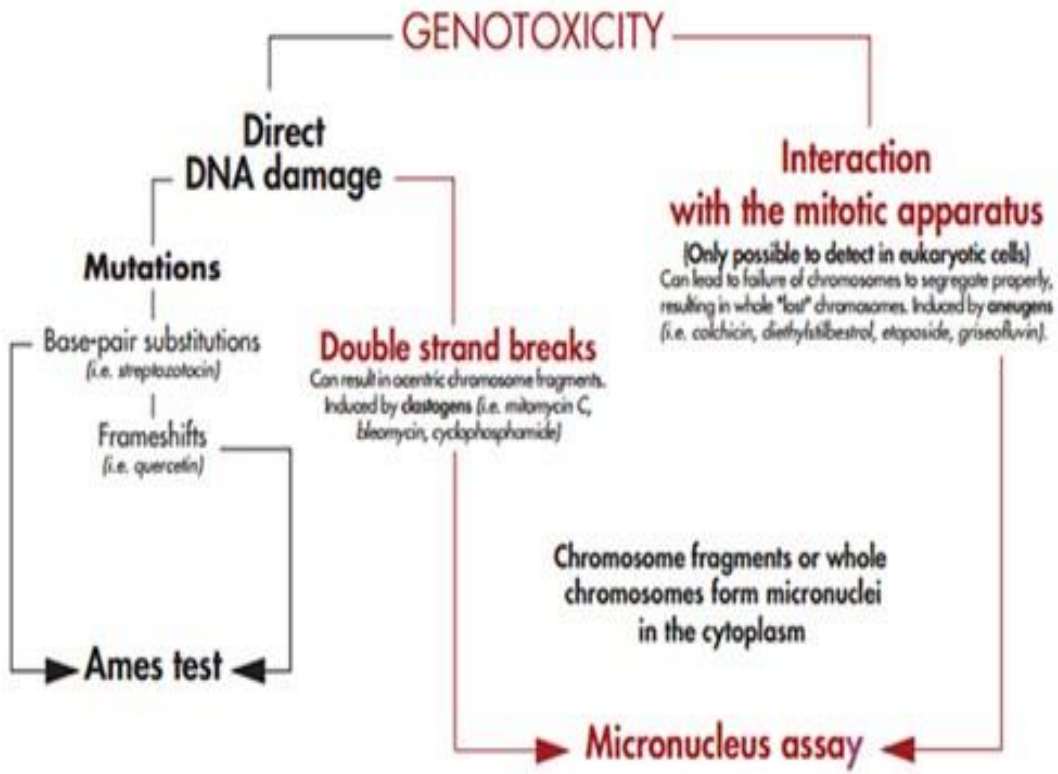
high molecular weight protein (HMWP) such us albumin and a low molecular weight protein (LMWP)
immunochemical methods, are referred to as renal antigens

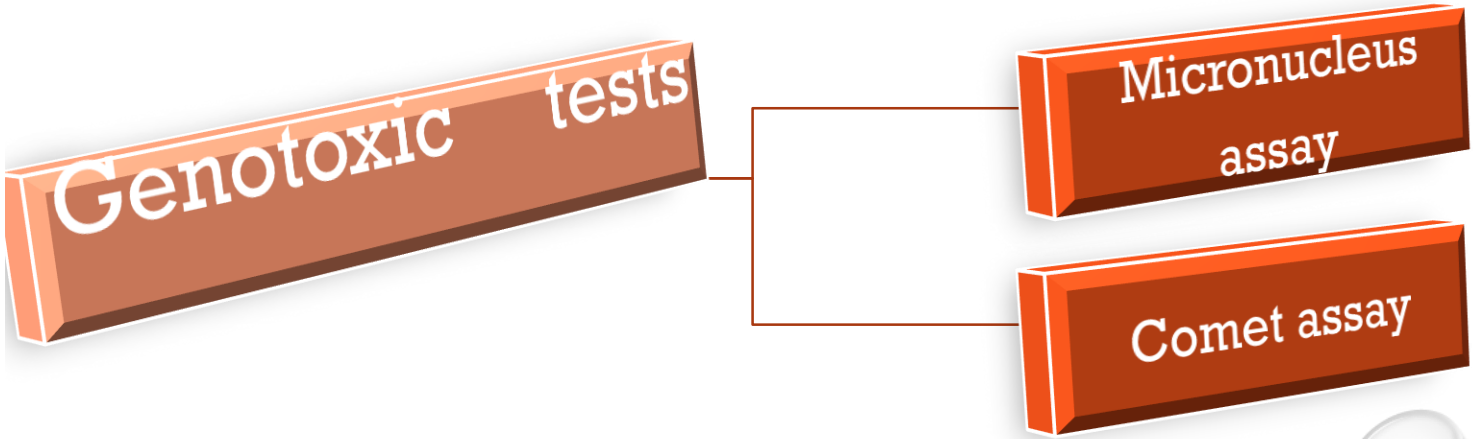
Biomarkers of DNA damage

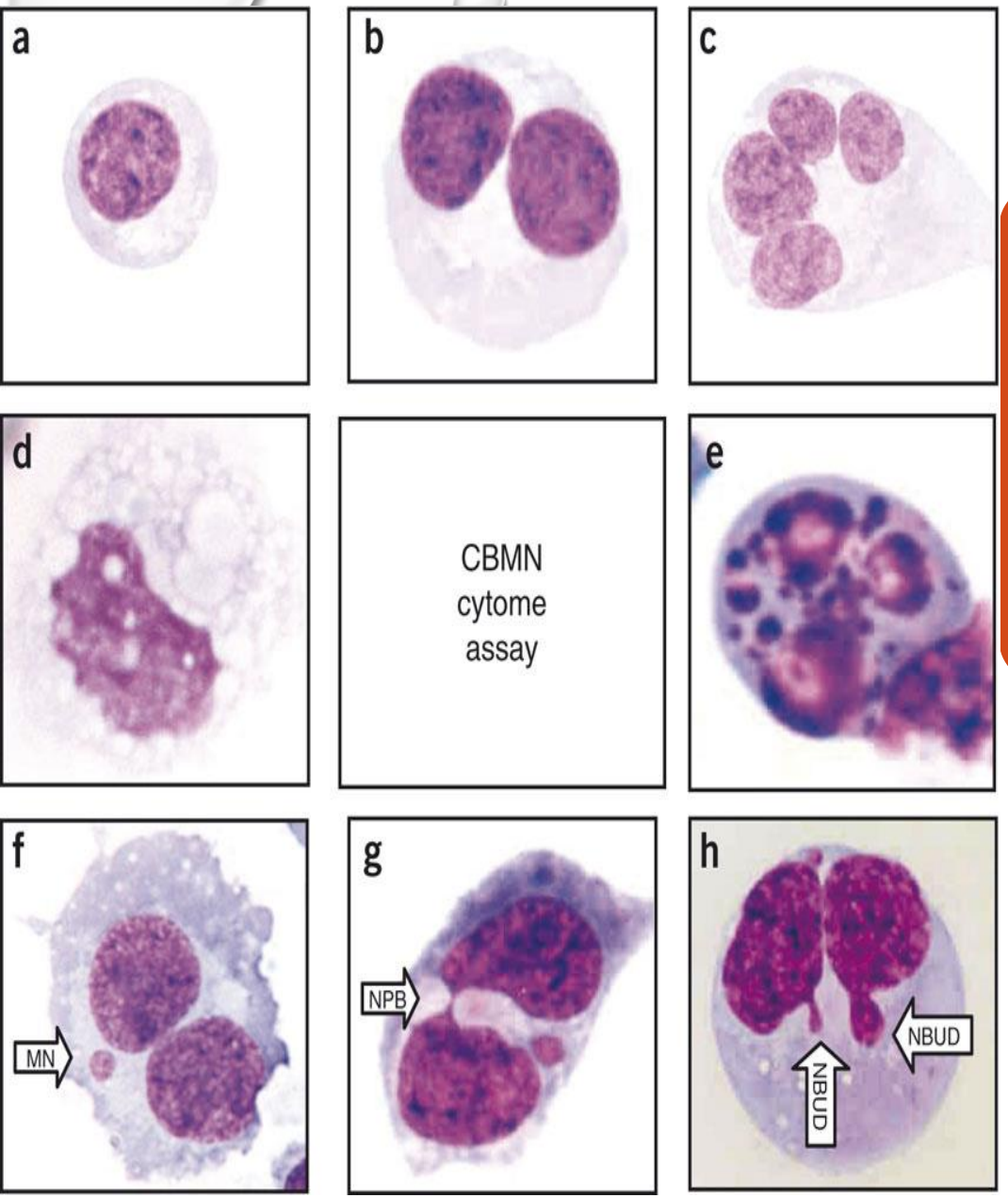
chromosomal aberrations
the sister chromatid exchange (SCE)

Metallothioneins have been proposed as biomarkers for exposure to metal ions since they are induced by the own metals


How To Measure Genotoxicity


GENOTOXICITY
Direct DNA damage
Interaction with the mitotic apparatus
(Only possible to detect in eukaryotic cells)
Can lead to failure of chromosomes to segregate properly, resulting in whole "lost" chromosomes. Induced by aneugens (i.e. colchicin, diethylstilbestrol, etoposide, griseofluvin).
Mutations
Base-pair substitutions (i.e. streptozotocin)
Frameshifts (i.e. quercetin)
Double strand breaks
Can result in acentric chromosome fragments. Induced by clastogens (i.e. mitomycin C, bleomycin, cyclophosphamide)
Chromosome fragments or whole chromosomes form micronuclei in the cytoplasm
Ames test
Micronucleus assay


Genotoxic tests
Micronucleus assay
Comet assay



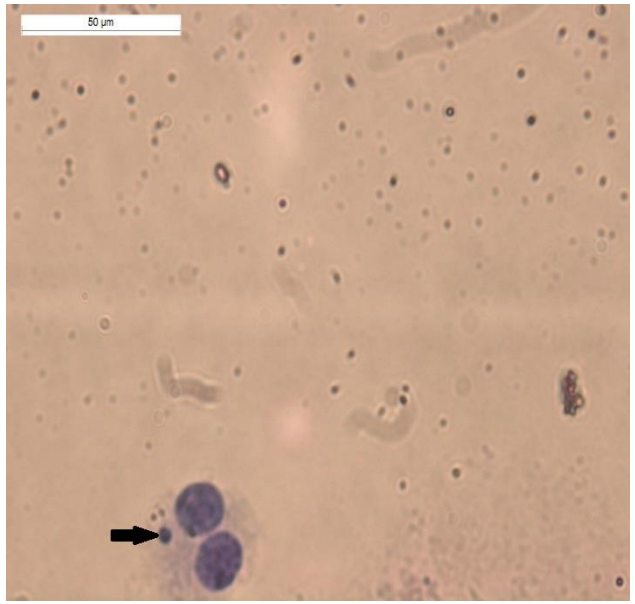
abnormal nuclear shapes (MNi), nucleoplasmic bridges (NPBs) and nuclear buds (NBUDs)

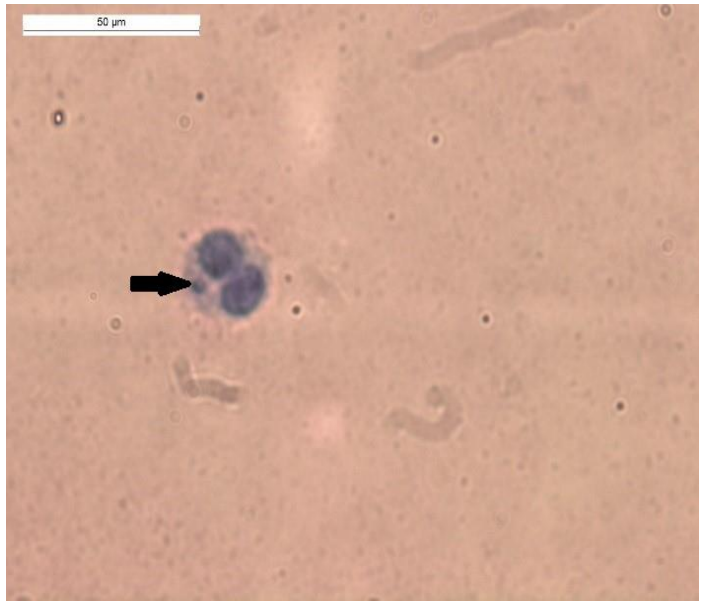
to evaluate the genotoxicity of ionizing radiation

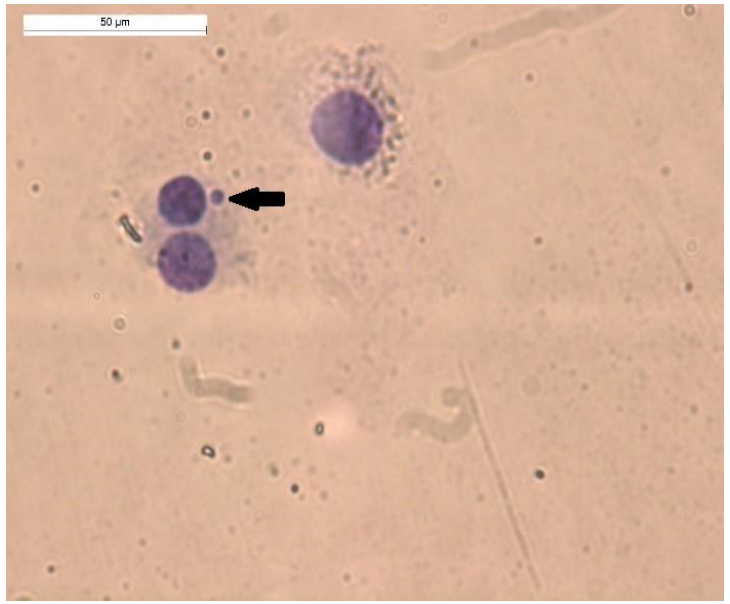
to determine the human health risk

AIMS OF THE STUDY

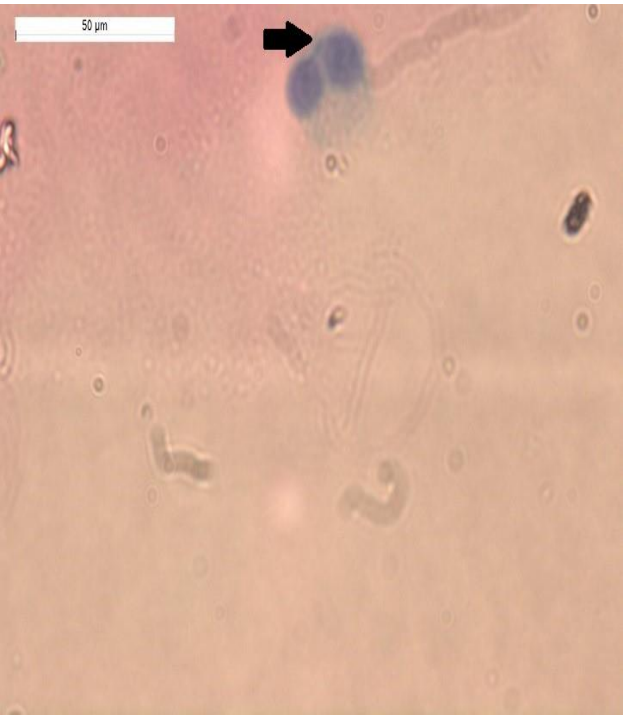
1,000 BN cells were evaluated

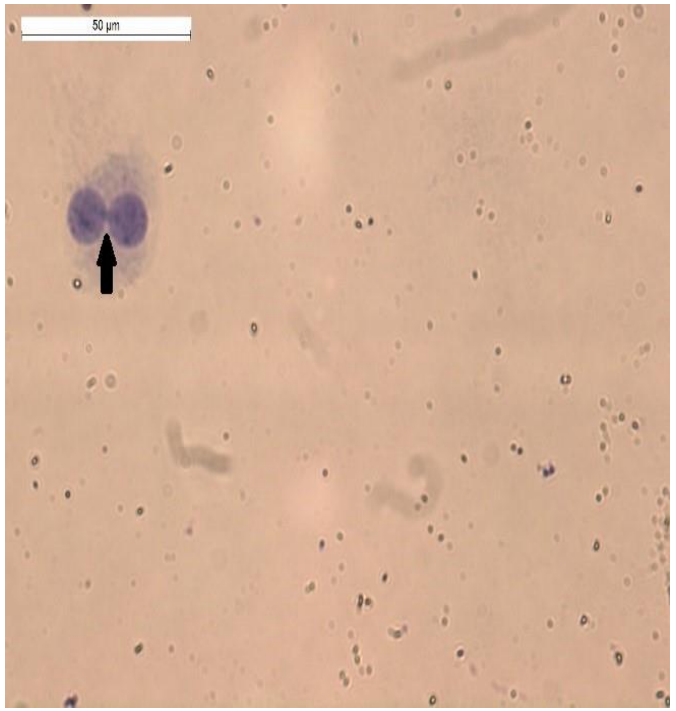


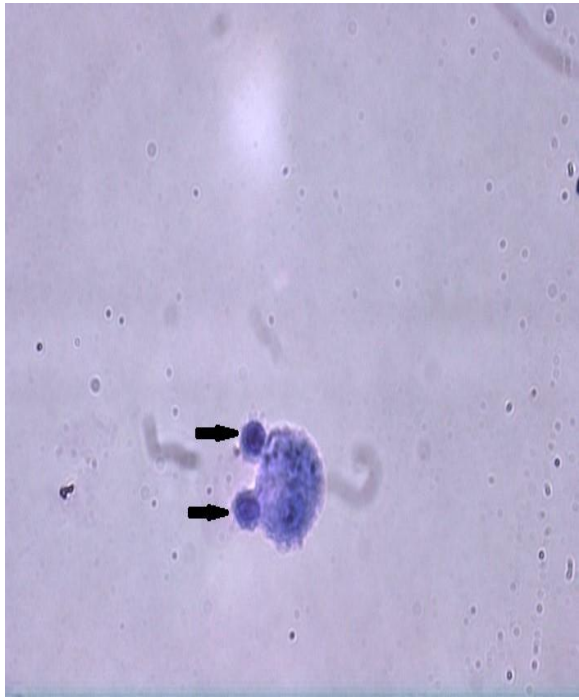




MNi are defined as small, round nuclei clearly separated from the main cell nucleus







BN cells containing NPB

BN cells containing NBUDs

UDC 575
DOI: 10.2298/GENSR1503927V
Original scientific paper

CYTOGENETIC ABNORMALITIES IN LYMPHOCYTES EVALUATED WITH MICRONUCLEUS ASSAY IN MEDICAL PERSONNEL OCCUPATIONALLY EXPOSED TO IONIZING RADIATION

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Faculty of medical science, University "Goce Delcev" - Stip,R. of Macedonia

Velickova N., M. Milev, T. Ruskovska, B. Petrova, B. Nedeljkovik, P. Gorgieva (2015): *Cytogenetic abnormalities in lymphocytes evaluated with micronucleus assay in medical personnel occupationally exposed to ionizing radiation*.–Genetika, Vol 47, No. 3, 927-939.

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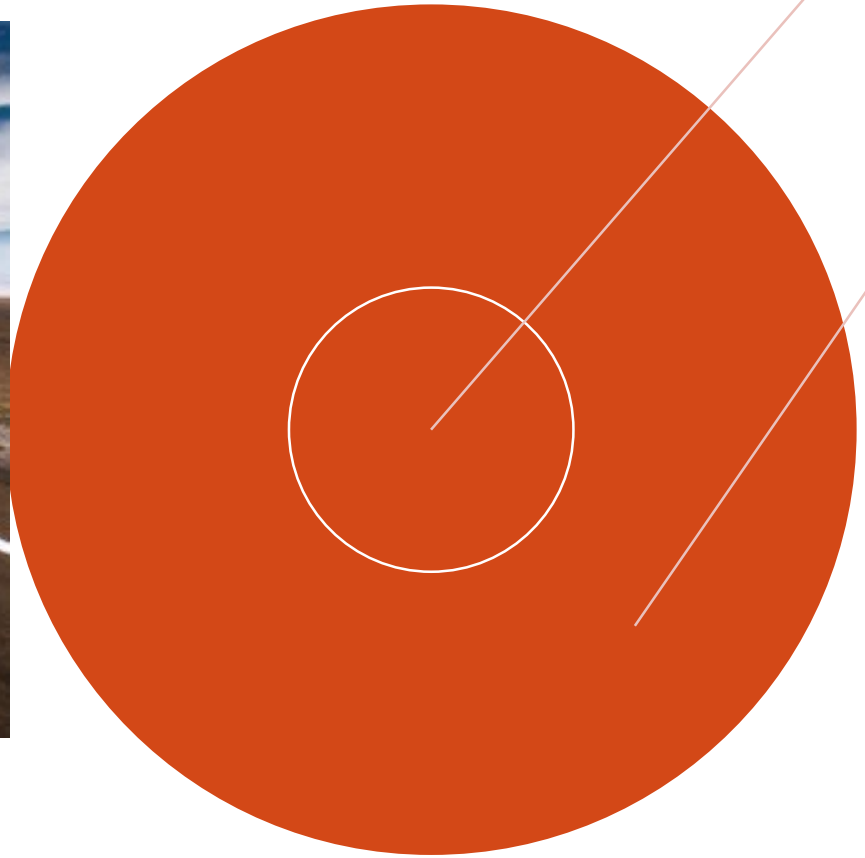
PRESENT KNOWLEDGE AND EXPERIENCE ON THE STRATEGIES EMPLOYED BY MYCOPLASMA CONTAMINATION OF THE HUMAN CELL CULTURES

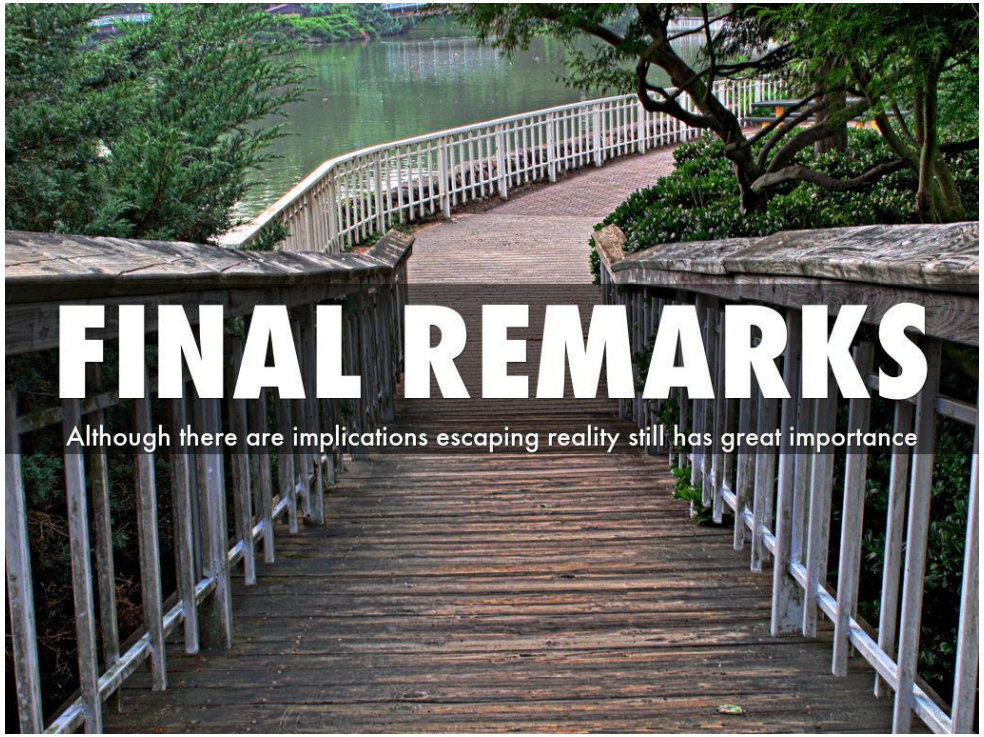
Nevenka Velickova[1], Misko Milev[2], Gorgi Sumanov[3], Biljana Petrova[4]

ONGOING RESEARCH



Comet assey

MMT



Understanding exposure is key to understanding environmental illnesses

Environmental monitoring coupled with exposure modeling is one approach to estimating exposures

Biomonitoring is able to measure integrated exposures within the human body but alone cannot explain where or how the exposure occurred or the toxic potential for that exposure

An integrated approach that uses all data types along the environmental disease continuum is required for a complete understanding of environmental illness

Thank you for your attention.