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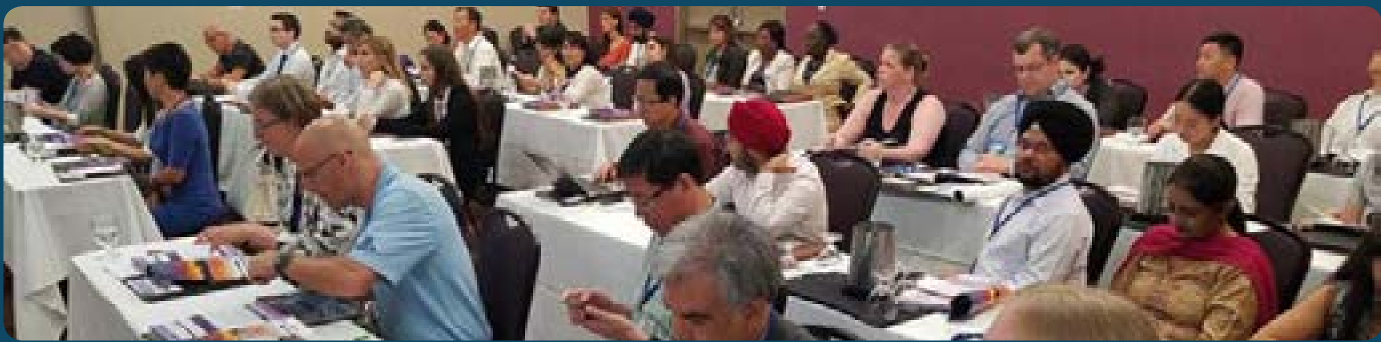

2nd International Conference on

ENVIRONMENTAL HEALTH & GLOBAL CLIMATE CHANGE

September 7-8, 2017 | Paris, France

Keynote Forum

Day 1

Environmental Health 2017

Ali Bahloul, Occup Med Health Aff 2017, 5:2(Suppl)
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Ali Bahloul

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EFFICIENCY EVALUATION OF N95 FILTERING FACEPIECE RESPIRATORS TO CAPTURE ULTRAFINE PARTICLES UNDER CYCLIC AND CONSTANT FLOWS

Ultra Fine Particles (UFP) (diameter of particle, Dp, <100 nm) can be found in most industrial workplaces, where their long term inhalation could result in serious detrimental impacts on health. In some situations, engineering and administrative controls are insufficient to adequately protect the workers from inhaling UFPs. Individual respiratory protection is then required, and N95 Filtering Facepiece Respirators (FFR) are the most widely used by industrial and healthcare workers. Previous study on the efficiency of the N95 filter using a constant flow and a polydispersed aerosol showed that the maximum particle penetration in these filters was obtained for a size of particles of less than 100 nm and that the penetration exceeded the threshold penetration of 5% for high airflow (>85 L/min). The present investigation of N95 FFRs efficiency evaluates the representativeness of these results by using a cyclic flow rate. A procedure to investigate the efficiency of N95 FFRs under cyclic and constant flows was developed for this study. The first objective was to investigate the individual impact of breathing frequency and inhalation flow rate on the efficiency of N95 FFRs. The experiments were performed for two Peak Inhalation Flows (PIFs) (135 and 360 L/min) and two breathing frequencies (24 and 42 Breaths Per Minute (BPM)) for a total of four cyclic flows. The second objective was to compare the efficiency of N95 FFRs under cyclic flows with the ones under constant flows equal to the cyclic flow minute volume, Mean Inhalation Flow (MIF) and PIF. Minute volume is defined as the average volume of inhaled air per one minute of breathing, while MIF is determined as the average volume of inhaled air per inhalation cycle. Peak Inhalation Flow (PIF) is the maximum flow obtained in any inhalation cycle. The selected constant and cyclic flows (with equivalent MIFs) were in the range of 42 to 360 L/min. Finally, the impact of particle loading time on N95 FFRs efficiencies was investigated under cyclic and constant flows for periods of up to six hours. A cyclic flow (with equivalent MIF rate of 170 L/min) and two constant flow rates of 85 and 170 L/min were selected. In all experiments, the filters were exposed to polydispersed NaCl particles ranging from 10 to 205 nm. The results showed that an increase in both PIF and breathing frequency could potentially raise the particle penetration through N95 FFRs. However the effect of PIF was observed to be much more important than the effect of the frequency. It was also shown that, among three constant flows equal to the cyclic flow PIF, MIF and minute volume, a constant flow equal to MIF can much better predict the initial penetration of N95 FFRs. Finally, particle loading had a significant impact on particle penetration through N95 FFRs, while the trend in penetration changes, in terms of loading time, highly depended on the levels of rRelative Humidity (RH). With low RH, the protection level increased with particle loading on the filter. Penetration of smaller particles (usually <100 nm) significantly dropped following a filter long-term exposure, and a distinct shift in the most penetrating particle size towards larger particles was also observed. With high RH, on the other hand, a reverse trend was observed, since particle penetration was generally increased with the loading time. In addition, this investigation showed that, in terms of loading time, a constant flow could not necessarily predict particle penetration during cyclic flows for long term exposure of the filters.

Biography

Ali Bahloul is a researcher at the IRSST since 2005, he has developed expertise in the field of industrial ventilation and indoor air quality. He is an associate professor at Montreal's School of Advanced Technology and Concordia University, as well as an adjunct professor at University of Montreal. His main research interest includes to anticipate, identify, evaluate and control exposure to chemical substances and biological agents.

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LIGNINOLYTIC FUNGI: THEIR DEGRADATIVE POTENTIAL AND THE PROSPECT FOR THE DEVELOPMENT OF ENVIRONMENTALLY SIGNIFICANT BIOTECHNOLOGIES

Ligninolytic fungi are taxonomically heterogeneous higher fungi characterized by a unique ability to depolymerizee and mineralize lignin. They include *wood*-and *soil-inhabiting basidiomycetes* and some *ascomycetes*. The extracellular, non-specific, and oxidative enzymatic system of these fungi catalyses lignin degradation. This system includes lignin peroxidase, Mn-peroxidase, versatile peroxidase, and laccase, allowing the degradation of many persistent aromatic compounds with structures similar to those of the metabolites formed in the biosynthesis or degradation of lignin. Among such compounds are both individual substances [pesticides, polychlorinated biphenyls, halogenated aromatic compounds, nitro- and amino-substituted phenols, trinitrotoluene, synthetic dyes and Polycyclic Aromatic Hydrocarbons (PAHs)] and their complex mixtures.

Enzyme synthesis is not repressed when the concentrations of these substances are too low to induce the enzymes. Therefore, the enzymes can degrade even low concentrations of pollutants. The catalytic action of the Ligninolytic enzymes gives rise to polar and water-soluble products, which are more accessible for both fungal metabolism and further degradation by the natural soil micro flora.

On the basis of a screening of *basidiomycetes* and *ascomycetes*, we selected the most active fungi for their degradative activity toward PAHs, nonionic surfactants, alkyl phenols, synthetic dyes, and oil. These fungi were found to hold promise for further studies and use in biotechnology. Despite some differences, PAH degradation followed the same scheme, first forming quinone metabolites and later forming phthalic acid, which is included in basal metabolism. All the investigated *basidiomycetes* and the ascomycete *Cladosporium herbarum* completely decolorized anthraquinone dyes, and both the chromophore part of the molecule and the aromatic ring were available for degradation. The site of attack on oxyethylated alkylphenols (the oxyethyl chain or the aromatic ring) was shown to be determined by the fungal species. The fungi were able to metabolize oil under submerged cultivation and in soil. Pollutant degradation was accompanied by the production of ligninolytic enzymes and of emulsifiers, substances that promote pollutant solubility and affect enzyme catalytic activity. The unique properties of Ligninolytic fungi make them promising for use in bioremediation, particularly if pollutants are difficult to decompose by bacteria.

Biography

Natalia Pozdnyakova is a leading researcher at the Environmental Biotechnology Laboratory of the Institute of Biochemistry and Physiology of Plants and Microorganisms Russian Academy of Sciences. Her Main research area is Enzymology of the fungal degradation of lignin and xenobiotics.

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B Krasovitov

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MODELING OF AIR POLLUTANTS DISPERSION FROM INDUSTRIAL SOURCES IN ENVIRONMENTAL IMPACT ASSESSMENT

Although it is commonly accepted that air pollution is dominated by local emissions many studies report that plumes of harmful pollutants can be transported by wind across oceans and continents and warn about the growing danger of air quality degradation. Air pollutants released from industrial sources in a city may have a significant impact on human health, depending on the properties and atmospheric lifetime of the pollutants. The International Agency for Research on Cancer (IARC) evaluation showed an increasing risk for a wide range of diseases, e.g. lung cancer, respiratory and heart diseases, with increasing levels of exposure to particulate matter and air pollution (IARC, 2013). Adsorption of trace atmospheric gases such as NO_2, SO_2 and CO_2 by carbon based aerosol particles emitted from industrial sources contributes to the evolution of concentration distribution of the trace constituents and can affect the subsequent chemical reactions in the atmosphere. In this connection, it is essential to evaluate the air quality levels of the atmosphere in order to assess the possible health impact of air pollutants. Clearly, modeling of air pollutants dispersion and deposition, in combination with air quality monitoring, are essential and complementary tools for long and short term air pollution control strategies.

In the framework of our study, we developed new approaches for urban and regional air pollution modeling, wet and dry deposition of particulate matter and adsorption of trace atmospheric gases by carbon based aerosol particles emitted from industrial sources. The developed models are used to predict the impacts of emission controls on the atmospheric concentrations and deposition of gaseous pollutants, fine and coarse particulate matter (PM2.5–10) and other air pollutants. The assessments of human exposure to various contaminants are based on contaminant concentration and on the parameters related with the exposure event e.g. characteristics of the atmospheric boundary layer, precipitation rate etc. The obtained results can be useful in the analysis of different meteorology–chemistry models including scavenging of aerosols in air pollution plumes by rain and for the assessment of human exposure to various contaminants including particulate matter and hazardous gases emitted from industrial sources.

Biography

Boris Krasovitov currently working at the Mechanical engineering department of Ben-Gurion University of the Negev in Israel has more than twenty years of experience in physics of aerosols, air quality and air pollution control. His research focuses on air pollution modeling and scavenging of polluted aerosols and gases from the Atmosphere.

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Abiodun Adeola

South African weather service, South Africa

CLIMATIC VARIABLES AND THE RECENT SPIKE IN MALARIA MORBIDITY AND MORTALITY IN MUTALE MUNICIPALITY, SOUTH AFRICA: AN 18-YEAR DATA ANALYSIS

Statement of the Problem: The malaria control program community of South Africa, received a seemly blow as an awakening call on the reality of the country's target of year 2018 to eliminate malaria. The north-eastern part of the country comprising of Limpopo, Mpumalanga and KwaZulu-Natal have recorded a sudden rise in the number of malaria morbidity and mortality in the current malaria season. This paper aims at retrospectively and prospectively exploring the impact of climate variability among other factors driving the persistent transmission of malaria in Mutale, Limpopo Province of South Africa.

Methodology & Theoretical Orientation: A time series and multivariate analysis was performed on monthly total rainfall, monthly mean maximum and minimum temperature and monthly case data of malaria in Mutale municipality for the period of 2000 to 2017. The Rossby centre regional atmospheric model, (RCA4 RCM) was used to perform climate analysis and projections for rainfall and near-surface (2m) temperature.

Findings: The time series analysis indicated that an average of 629.5mm of rainfall was received over the period of study. The rainfall has an annual variation of about 0.46%. Both maximum and minimum temperature showed a positive increasing trend in their mean. Spearman's correlation analysis indicated that all climatic variables are positively correlated with malaria morbidity. Further analysis revealed that total monthly rainfall and monthly minimum temperature, with one month lagged effect were the most significant climatic variable influencing malaria transmission. More particularly, malaria morbidity showed a strong relationship with episode of rainfall above 800 mm and above 5-year running mean of rainfall. Furthermore, the RCA4 model indicated that, annual rainfall in the province will be 0% - 15% drier (below average) and seasonally, the western part of the province will be 5% wetter in December – February (DJF) and 5% dryer in the eastern part in March – May (MAM), June – August (JJA) and <20% dryer in September – November (SON). Near-surface temperature is projected to increase between +1.5°C to +2.5°C in 29-year period.

Conclusion & Significance: Adequate understanding of climatic variables dynamics retrospectively and prospectively is imperative in seeking answers to malaria morbidity among other factors, particularly in the wake of the sudden spike of the disease in the province.

Biography

Abiodun Adeola works as a lead scientist: climate change and variability in the research unit of South African Weather Service. His particular research interest is climate, climate change and variability impacts on heath. He is proficient in the application of remote sensing and geographic information system in providing solutions to environmental health problems through climate change analysis and modelling. He has a strong passion in improving the health and wellbeing. As part of his PhD research, he has developed a SARIMA model using remotely derived environmental variables to predict malaria cases in South Africa. Article of the model is under review with Eco Health journal. He is currently a leading member of a research collaboration group on Developing an integrated modeling and surveillance system based on climate, land use, and malaria transmission dynamics in the eastern Limpopo river valley, South Africa.

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