

Alterations in serum levels of inflammatory cytokines (TNF, IL-1 alpha, IL-1 beta and IL-1 Ra) 20 years after sulfur mustard exposure: Sardasht-Iran cohort study

Yaraee, R.^{ab}, Ghazanfari, T.^{ab}, Ebtekar, M.^c, Ardestani, S.K.^d, Rezaei, A.^e, Kariminia, A.^f, Faghihzadeh, S.^g, Mostafaie, A.^h, Vaez-Mahdavi, M.R.ⁱ, Mahmoudi, M.^j, Naghizadeh, M.M.^{ak}, Soroush, M.R.^l, Hassan, Z.M.^c

^a Immunoregulation Research Center, Shahed **University**, Tehran, Iran

^b Department of Immunology, Shahed **University**, Tehran, Iran

^c Department of Immunology, Tarbiat Modares **University**, Tehran, Iran

^d Institute of Biochemistry and Biophysics, **University** of Tehran, Tehran, Iran

^e Department of Immunology, Isfahan **University of Medical Sciences**, Isfahan, Iran

^f Department of Pediatrics, **University** of British Columbia, Vancouver, Canada

^g Department of Biostatistics, Tarbiat Modares **University**, Tehran, Iran

^h **Medical Biology Research Center**, Kermanshah **University of Medical Sciences**, Kermanshah, Iran

ⁱ Department of Physiology, Shahed **University**, Tehran, Iran

^j Immunology Research Center, **Mashhad University of Medical Sciences**, Mashhad, Iran

^k Fasa **University of Medical Science**, Fasa, Fars Province, Iran

^l Janbazan **Medical and Engineering Research Center (JMERC)**, Tehran, Iran

[View references \(↗\)](#)

Abstract

Mustard gas, even in low doses, has the ability to inflict damage in multiple organs especially the skin, eyes, as well as the respiratory tract. This damage may cause many complications which persist during the lifespan of exposed subjects. Pro-inflammatory cytokines including TNF, IL-1 α , IL-1 β and IL-1Ra cause systemic inflammatory reactions and numerous changes including altered cell signaling and migration, changes in cytokine production and fever. The aim of this study was to determine the serum levels of these cytokines in subjects who were exposed to mustard gas 20 years ago in comparison with an unexposed control group. In this historical cohort study 364 sulfur mustard (SM) exposed participants from Sardasht and 126 age-matched unexposed volunteers from Rabat (a nearby town) as controls were chosen by a random systematic sampling. The serum concentrations of IL-1 α , IL-1 β , IL-1Ra and TNF were measured by a sandwich ELISA technique. Median of the serum levels of cytokines TNF, IL-1 α , IL-1 β and IL-1Ra in the control group was 22.7 μ g, 1.8 μ g, 1.9 μ g and 22.9 pg/ml respectively, while in the SM-exposed participants these values were 11.11, 0.81, 1.73 and 26.7 pg/ml respectively. The serum pro-inflammatory cytokine levels were significantly lower in the exposed group than in controls ($p < 0.01$). There was also significant positive correlation between concentration of all of mentioned cytokines, the strongest being between IL-1 β and TNF ($r = 0.809$ in the control group). The observed down-regulation of pro-inflammatory cytokines should be considered in interpretation of diagnosis and therapeutic measures taken to improve clinical complications. © 2009 Elsevier B.V. All rights reserved.

Author keywords

Cytokines; Interleukin-1 alpha; Interleukin-1 beta; Interleukin-1 receptor antagonist; Iran; Mustard gas; Tumor necrosis factor

Indexed Keywords

EMTREE drug terms: interleukin 1 receptor accessory protein; interleukin 1 alpha; interleukin 1 beta; mustard gas; tumor necrosis factor

EMTREE medical terms: article; cell migration; clinical assessment; cohort analysis; controlled study; correlation analysis; cytokine production; down regulation; enzyme linked immunosorbent assay; fever; human; inflammation; Iran; long term exposure; major clinical study; priority journal; protein blood level; signal transduction