

## The use of screening methods as element array system improvement public health

Iakovlev A., Meshkov A., Sitdikova I., Balabanova L., Huzihanov F., Kamaev S.  
*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

---

### Abstract

The priority pollutants of the environment in industrial cities are such reproductive toxic substances as benzo(a)pyrene, formaldehyde, phenol and nitrogen dioxide [1]. Chemical substances, which a person confronts in the course of professional activity, may cause mutagenic and genotoxic effects and hereditary disorders. The exposure to physical factors of production environment may result in pathology. The study of harmful factor impact on the reproductive health of workers, the development of study screening methods and prevention activities is an important one. The tiered screening system was used, including socio-sanitary, physical, chemical, clinical, biochemical and cytogenetic studies. 318 men were observed - the workers of the machine-building enterprise who deal with harmful chemical and physical factors during their work and 148 workers without a contact (control group). Questionnaire screening showed that almost 70% of respondents work in contact with a chemical factor, 2/3 of respondents work in a noisy atmosphere, about 40% work with local vibration, at that 8.5% of the patients consulted a doctor concerning reproductive function disorders. The measurements of physical factors at workplaces revealed the excess of maximum permissible levels of noise and local vibration. The exceeding of maximum permissible concentrations (MPC) of benz(a)pyrene, mineral oil aerosols, nitrogen dioxide, epichlorohydrin were also revealed in the working area. The results of testosterone, lutropin and follitropin levels showed that abnormalities were found among 25.5% of the employees, including 21% of workers exposed to a local vibration. The mathematical model is developed for the estimation of reproductive disorder occurrence probability, significantly influencing factors were determined. These factors are presented by vibration impact, the experienced diseases, the activator of which could have the affinity for seminiferous epithelium, the changes of testosterone levels, the miscarriages among women in history. The noise at workplaces ( $87.7 + 4.5$  dB) significantly affects the blood levels of testosterone ( $r = 0,51$ ,  $p < 0.04$ ), which may be associated with the influence on Leydig cells and hypothalamic-hypophysial system. The impact of reprotoxicants (benz(a)pyrene, mineral oil aerosols, nitrogen dioxide), may cause reproductive health damage. In order to study the reproductive health status, to determine risk groups and the development of preventive measures it is advisable to use a multi-level screening system, including questioning, the hygienic assessment of industrial environmental factors, hormonal status determination, mathematical modeling.

---

## **Keywords**

Industrial ecology, Occupational risk, Reproductive health, Screening studies