is for service and sales workers 25.6%, head of the department/managers 25.2% and the lowest rate for chief executive officer (CEO) is 20.4%, and 22.1% for unskilled workers (p=0.006). Informal sickness absence highest rate of 8.4% is for senior specialists compared to lowest 4.6% and 4.9% in unskilled and skilled workers group (p=0.013). The higher salary group (more than 570 euro), the higher formal absence rate — 32.8% compared to 23.0% in lowest salary group below 215 euro (p<0.001).

УДК 613.6:331.453:621.191

OCCUPATIONAL HEALTH AND SAFETY IN TUNNELING

Niyazi Bilim, Atiye Bilim
Selcuk University, Konya, Turkey, 42030

ГИГИЕНА ТРУДА И ПРОИЗВОДСТВЕННАЯ БЕЗОПАСНОСТЬ ПРИ ПРОКЛАДКЕ ТУННЕЛЕЙ. **Нийязи Билим, Атийе Билим.** Университет Сельчук, ул. Анкары, 6, Конья, Турция, 42030

Key words: *occupational health and safety; work in tunnels; work accidence*
Ключевые слова: *гигиена труда и производственная безопасность; работа в туннелях; несчастные случаи на производстве*

Tunneling activities are rapidly growing in parallel with the increase in urbanization, industry, trade and transportation needs in the world. Tunneling in developed and developing countries is now becoming indispensable. Because in many areas of life the tunnel is now confronted as a structure used by human beings. Today, tunnels can be used for many purposes such as subway, highway, railway, water, sewerage, derivation (in hydroelectric power plants), under the river, immersed tunnel and nuclear waste repository. Nowadays, two methods are usually used in tunneling called drilling-blasting and mechanized excavation. However, there are many risks and dangers faced by the workers in the tunneling. Because the nature of work, the work conditions are very difficult. Hazardous gases in underground, fire, explosion, roof fall, mudflow, explosive material accidents transport hoisting accident (loading, hauling or hoisting) and machine accidents are the most common work accidents. Besides, it is unfortunately possible to encounter very tragic work accidents that are concluded with mass deaths. In this study, the procedures to be observed in tunneling and the safety precautions that are essential in terms of work safety are generally explained. The work safety procedures can be changed according to the factors such as the type of tunnel, the opening method, the geology, the equipment used, etc. For this reason, in this study general safety precautions in tunnels are explained. As a result, a summary safety procedure and flow chart for the tunnel has been developed by presenting the procedures that should be paid attention to firms and employees working in tunnels.

УДК 613.6.027

ASBESTOS AND LUNG CANCER IN A MULTINATIONAL CONSORTIUM OF CASE-CONTROL STUDIES (THE SYNERGY PROJECT)

Olsson A.[1], Kromhout H.[2], Brüning T.[3]
[1]Section of Environment and Radiation, International Agency for Research on Cancer, World Health Organization, 150 cours Albert Thomas, Lyon CEDEX 08, France, 69372; [2] Institute for Risk Assessment Sciences, Utrecht, The Netherlands; [3]Institute for Prevention and Occupational Medicine of the German Social Accident Insurance, Bochum, Germany

АСБЕСТ И РАК ЛЕГКИХ В МНОГОНАЦИОНАЛЬНОМ ОБЪЕДИНЕННОМ ИССЛЕДОВАНИИ ПО МЕТОДУ «СЛУЧАЙ-КОНТРОЛЬ» (ПРОЕКТ SYNERGY). **Олссон А.[1], Кромхут Х.[2], Брюнинг Т.[3]** [1]Международное агентство по исследованиям рака, ул. Кур Альбер Тома, 150, Лион СЕДЕКС 08, Франция, 69372; [2]Институт исследований по оценке риска, Утрехт, Нидерланды; [3]Институт профилактической и производственной медицины немецкого страхования от несчастных случаев, Бохум, Германия

Key words: *asbestos; smoking; cancer; epidemiology*
Ключевые слова: *асбест; курение; рак; эпидемиология*

Introduction. Asbestos fibers have been attractive for a wide range of industrial applications for over a century. Consequently, large groups of workers have been (and still are, in a shrinking number of countries) exposed to asbestos, for example in the insulation, textile, cement, roofing, and refractory industries. Lung cancer is the most common cancer globally, and tobacco smoking is well established as the main cause. Asbestos is the most important occupational carcinogen, and lung cancer is the most common asbestos-related cancer. Asbestos was the first occupational exposure to be suggested to have a joint effect with smoking. Several studies and reviews have supported this hypothesis, but the type of interaction (additive or multiplicative) has been debated. The evidence is limited regarding risk and the shape of the exposure-response curve at low levels of asbestos exposure. We estimated the exposure-response for occupational exposure to asbestos and assessed the joint effect of asbestos exposure and smoking by sex, and lung cancer subtypes (adenocarcinoma, squamous cell lung carcinoma, small cell lung carcinoma) in general population studies. **Research methods:** Fourteen case-control studies conducted between 1985 and 2010 from Canada and Europe were pooled, including 16,901 lung cancer cases (13,605 men, 3296 women) and 20,965 controls (16451 men, 4514 women) with detailed information on tobacco habits and lifetime occupations. The database comprises around 14% never smokers, whereof 822 cases. A quantitative job exposure matrix (SYN-JEM) was created based on exposure measurements from multiple countries together with auxiliary data, covering a time period of more than 50 years. SYN-JEM

is based on statistical models that predict job-, time-, and region-specific exposure levels of asbestos. Fiber years (ff/ml-years) were calculated for each subject by linking SYN-JEM with individual occupational histories. Unconditional logistic regression models were used to estimate odds ratios (OR), 95% confidence intervals (CI), and trends. **Results.** The OR for the highest quartile of cumulative asbestos exposure (>2.8 ff/ml-years) was 1.38 (95%CI 1.27-1.50) in men and 1.22 (95% CI 0.84-1.78) in women. In men, increasing lung cancer risk was observed with increasing exposure to asbestos in all smoking categories, and for all major subtypes of lung cancer. In women, the asbestos related lung cancer risk was increased for all subtypes in current smokers only, with ORs approximately 2-fold. The interaction between asbestos exposure and smoking was more than additive among men and women for all lung cancer types, although not statistically significant for all combinations of subtype and gender. **Conclusions.***Our results in men showed an excess risk of lung cancer and its subtypes at low levels of cumulative asbestos exposure.*

УДК 613.6.027

FUTURE CANCER MORTALITY FROM PAST AND CONTINUING WORLDWIDE ASBESTOS USE

Peto J., Gilham C., Rake C.
London School of Hygiene and Tropical Medicine, Keppel str., London, UK, WC1E 7ht

ОЖИДАЕМАЯ СМЕРТНОСТЬ ОТ РАКА НА ОСНОВАНИИ ИСПОЛЬЗОВАНИЯ АСБЕСТА В ПРОШЛОМ И НАСТОЯЩЕМ.
Пето Дж., Гилхам К., Рейк К. Лондонская школа гигиены и тропической медицины, ул. Кеппел, Лондон, Великобритания, UK, WC1E 7ht

Key words: *asbestos; cancer; epidemiology*
Ключевые слова: *асбест; рак; эпидемиология*

Mesothelioma rates in the population reflect the effects of asbestos exposure 30 to 70 years ago, so future deaths caused by asbestos exposure before 1980 can be predicted for countries included in WHO mortality statistics. However, the delay between asbestos exposure and mesothelioma risk is so long that the effects of asbestos exposure since the 1980s cannot be predicted from current death-rates. The only way to predict future risks from current exposure is therefore by estimating the percentage reduction in asbestos exposure that has occurred (people exposed multiplied by average level of exposure). If dose-response is approximately linear the future cancer risk due to current asbestos exposure will fall below the current risk caused by past exposure by a similar percentage. Changes in asbestos exposure can be estimated from occupational and environmental measurements of airborne asbestos levels now and in the past, trends in the amount of asbestos used per year, and asbestos concentrations in the lungs of people born 20, 40 and 60 years ago. Chrysotile is less dangerous than the amphiboles (mainly crocidolite and amosite), probably because it disappears from the lung more rapidly. Changes in exposure to each type of asbestos must therefore be considered separately. Trends in mesothelioma death-rates in different countries recorded by the WHO were analysed to predict lifetime mesothelioma rates in each country for people born between 1930 and 1965. We also conducted a study in Britain of asbestos concentration in the lungs of mesothelioma patients and of the general population born between 1940 and 1990. Mesothelioma deaths are close to or past their peak in West Europe and North America, where asbestos use declined sharply after 1975 and ended by about 1990. Death rates are much lower in East Europe, where amphibole use was lower. The UK has the highest mesothelioma rate worldwide. The lifetime mesothelioma risk in the whole UK population will fall from about 1 in 100 in men and 1 in 500 in women born in 1940 to about 1 in 10,000 in men and women born after 1980. Occupational exposure has been greatly reduced, and environmental exposure, presumably from older buildings that contain asbestos, is now the main risk. Most mesotheliomas in Britain were caused by amphiboles, mainly amosite and crocidolite. The risk from chrysotile is much lower and cannot be estimated reliably. Chrysotile disappears rapidly from the lung, and most people were exposed to amphiboles as well as chrysotile. The main hazard from chrysotile, the only type of asbestos still being used, is lung cancer. This can be studied in chrysotile mine and factory workers, but most asbestos-related cancers will be in people who use asbestos products. Most lung cancers are caused by smoking and the contribution of asbestos is difficult to estimate in population-based studies, so future numbers of asbestos-related lung cancers in countries where chrysotile is still used are likely to be large but cannot be predicted reliably. Chrysotile use should therefore be ended as soon as possible. Further research cannot predict the risk reliably, and countries that have replaced asbestos with safer alternatives have suffered no economic damage.

УДК 613.6.027

TOWARDS THE ELIMINATION OF OCCUPATIONAL CANCERS IN THE RUSSIAN FEDERATION: CANCER RESEARCH FOR CANCER PREVENTION

Schüz J., Olsson A.
International Agency for Research on Cancer (IARC), 150 cours Albert Thomas, Lyon, France, 69372

ОБ УСТРАНЕНИИ РАКА, ОБУСЛОВЛЕННОГО ПРОФЕССИОНАЛЬНЫМИ ВРЕДНОСТЯМИ, В РОССИЙСКОЙ ФЕДЕРАЦИИ: ИССЛЕДОВАНИЕ РАКА ДЛЯ ЕГО ПРОФИЛАКТИКИ. **Шуц Дж., Олссон А.** Международное агентство по исследованиям рака, ул. Кур Альбер Тома, 150, Лион СЕДЕКС 08, Франция, 69372

Key words: *occupational cancer; prevention; epidemiology*
Ключевые слова: *рак, обусловленный профессиональными вредностями; профилактика; эпидемиология*