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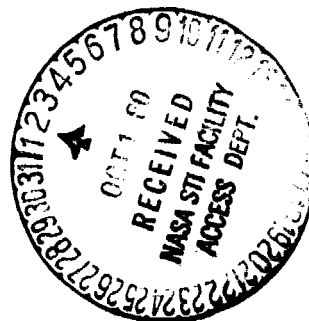
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OCCUPATIONAL CHANGES IN THE ORGAN OF HEARING  
AND EQUILIBRIUM IN SAILORS AND FISHERMEN

Associate Professor R. P. Menyakin and  
V. I. Poperetskaya

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organa slukha i ravnovesiya u moryakov i rybakov,"  
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16. Abstract Prophylactic examination in persons engaged in fishing industry and in sailors of the Far-Eastern ocean-going ships demonstrated occupational cochlear neuritis, resulting from the action of noise and vibration, in 6.5% of persons examined (occupied in "noisy" or in "quiet" work). Sailors and fishermen (553) working under conditions of noise were studied; 43.7% (233 persons) were found to be suffering from changes of the auditory analyser typically resulting from the action of noise and vibration. The most pronounced changes of hearing were revealed in fishermen, in 44.8% of the persons examined, the percentage also being the highest among the engine room workers (63%). The incidence of cochlear neuritis in sailors of the Far-Eastern steamship line and in personnel of research ocean-going ships was almost equal (39.9-40%). These indices differed in the engine room workers (42-46%). Vestibular function was investigated by caloric and rotation tests with the use of electronystagmography. The data obtained point to diminution of the vestibular analyser excitability with increase of the length of navigation service.			
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OCCUPATIONAL CHANGES IN THE ORGAN OF HEARING  
AND EQUILIBRIUM IN SAILORS AND FISHERMEN

Associate Professor R. P. Menyakin and V. I.  
Poperetskaya\*

Data on the condition of the auditory function in individuals working on /39\*\*  
sea transportation are given in the works of S. N. Rzhavkin (1933), I. I. Slavina  
(1955), L. Ya. Skuratova (1961), N. P. Astapovich et al., (1961), A. L. Sinitsina  
(1970), L. S. Godin and V. A. Gugel' (1975), O. A. Vasil'yev and V. M. Kozoda  
(1976), Steps et al. (1955), Sergeev (1975). Changes in the vestibular analyzer,  
the importance of motion sickness and occupational selection have been noted in  
the works of B. I. Ol'shanskiy (1969), V. I. Kopanev and S. S. Markaryan (1971),  
O. Ya. Plepis (1973), L. S. Godin et al. (1973), N. I. Kostrov et al. (1976),  
V. I. Kopanev et al. (1976). The joint effect of noise and vibration has a more  
significant effect on workers than noise alone (N. Ya. Shalashov, 1968, V. G.  
Artamonova et al., 1975, V. F. Vatsipan and N. M. Paran'ko, 1975, A. A. Dovgaylo,  
1975). The data presented in the aforementioned publications indicate the  
urgency of studying the problem of the effect of noise and vibration on sailors  
and fishermen. However, studies of the organ of hearing and equilibrium in  
workers of sea transportation linked to the stay on modern ships are not very  
common, and they have not been made under conditions of the fishing industry of /40  
of the Far East.

We studied the sanitary-hygienic working conditions of workers of sea  
transportation on the 15 main types of the Far East steamship company vessels,  
scientific research fleet and fishing industry vessels. In the study of noise

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\* Department of Otorhinolaryngology of the Vladivostok Medical Institute

\*\* Numbers in margin indicate pagination in original foreign text.

and vibration that was made during the performance tests under route conditions, it was established that part of the sound energy occurs at frequencies of 250-2000 Hz and surpasses the permissible level by 5-30 db. The parameters of general vibration are characterized by a high level in the low frequency band (2-30 Hz). Our data are confirmed by the studies of A. V. Grishanov (1976). After studying the hygienic characteristics for the working conditions of fish processors on the floating base fish-canning plants of the "A. Zakharov" type, the author noted that the air temperature at the work sites of the separators and packers reaches 26-30°C with relative air humidity of 80-90%, and air movement velocity of 0.1-0.15 m/s. The noise level with the optimal load of the working equipment is 79-90 db. A large part of the sound energy occurs at the most "aggressive" medium and high frequencies of 500-2000 Hz with exceeding of the permissible level by 5-8 db. During the entire period of sailing, the workers are exposed to the effect of total vibration, whose root-mean-square values of oscillating velocity reach the maximum at frequencies of 8-31 Hz. The vibration parameters are in the limits of the permissible amounts, but in a number of cases surpass them.

As a result of preventive treatment examinations of the fish industry and navy workers it was established, that occupational cochlear neuritis under the influence of noise and vibration develops in no more than 6.5% of those examined from the total number of those working under conditions of noise and outside of it.

The evaluation of the degree of disorder in hearing was based on the complex method with regard for the data of tonal and speech audiometry, perception of whispering suggested by the Institute of Industrial Hygiene and Occupational Diseases of the USSR Academy of Medical Sciences (V. Ye. Ostapkovich and N. I. Ponomareva).

An examination was made of 553 sailors and fishermen working under conditions of noise. Depending on the working conditions we divided those examined into those working in machine sections and the deck command. In 233 (43.7%) a change in the auditory analyzer was found that was typical for the effect of noise and vibration. The most significant changes in hearing among the workers

in noisy conditions in the fishing industry fleet were found in 44.8% of those examined, in those working in the machine section this index also was the highest (63%). The index for detectability of occupational cochlear neuritis in the Far East steamship company and on ships of the scientific research fleet was almost the same (respectively 39.9 and 40% of those examined). These indices differ in individual working in the machine sections (42 and 22.5%).

Due to the significant, alerting changes in the audiometric data in the personnel of the deck command (48.2%) of the scientific research fleet especial attention was focused on them; the work of this group was investigated under route conditions. We separated 50 harpooners working under special conditions into a separate group. As a result of tonal audiometry occupational hypoacusis of varying degree was found in 36 people (2/3).

Analysis of the distribution according to degree of hypoacusis of occupational cochlear neuritis found in sailors and fishermen was made on 269 people, including the harpooners. Second degree hypoacusis was found in 122 (45.3%) of the people, first degree--in 77 (28.6%), third degree--in 58 (21.6%), and fourth degree in 12 (4.5%) of the people.

There were 39 people under 21 years of age (14.5%), under 40--92 (34.2%), from 41 to 50--111 (41.3%) and over 51--27 people (10%).

Of definite practical importance were the data (in a percentage relationship) /41 for the dependence of the degree of reduced hearing on the average age of those examined in each of the fleets.

A clinical-audiological examination established that a hearing disorder in the sailors and fishermen began with frequency 4000 Hz with subsequent transition to higher tonal frequencies and frequencies of the speech zone. In the majority of workers, the drop in hearing was manifest by a single-type audiological relief with increase in the thresholds at the high frequencies. In the first 10 years of work no significant differences were established in the average amounts of hearing thresholds. With period of service from 11 to 15 years a rapid increase in the hearing thresholds was noted in 30% of those examined. In subsequent years the rates of decline in hearing in the workers slowed down.

The slow progression of hypoacusis during a lengthy occupational service period in workers of the noisy enterprises has also been noted by A. G. Rakhmilevich (1964) and Ya. S. Temkin (1968).

We studied the function of the vestibular analyzer in 230 workers with occupational cochlear neuritis engaged in the fish industry. An investigation was made of the complaints, data of anamnesis, spontaneous reactions, statokinetic function, and caloric test. The findings were compared with the indices in the control group (20 people). It was established that as compared to the control, all the occupational groups have a tendency towards shortening in the post-rotational nystagmus from the data of a visual evaluation.

In the group of mechanics, painters and welders not exposed to the effect of vibration, although they did have occupational hearing disorders, according to the data of our studies, the reduction in duration of the post-rotational nystagmus in these individuals proved to be insignificant ( $P > 0.05$ ). In the group of boiler makers the difference became reliable ( $P < 0.02$ ). This can be explained by the effect on the boiler makers, in addition to noise, of local vibration of small parameters. In the group of deck command and the harpooners, the duration of nystagmus was considerably reduced ( $P < 0.01$ ). The change in duration of nystagmus was most pronounced during the effect of general vibration (mechanics of machine sections).

The most complete idea about nystagmus is provided by electronystagmography (S. N. Khechinashvili, 1958; B. B. Sharov, 1966; N. S. Blagoveshchenskaya, 1966; V. K. Uryupin, 1968). The method of electronystagmography was used to examine 147 workers of the deck commands. A comparison was made with the data of the control group (57 students in the first course of the higher seafaring school). It was established that as compared to the data of those examined in the control group, in the workers of the deck command 41 years old and over there are statistically insignificant differences in the indices for the duration of nystagmus and the average amplitude in 10 s; a reduction was also noted in the duration of nystagmus with an increase in the period of work.

Based on a visual evaluation and the data of electronystagmography the following law was revealed: the effect of intensive production noise results

in a reduction in the duration of post-rotational nystagmus, the joint effect of noise and vibration induces the greatest reduction in its duration. This is confirmed by the data of B. B. Sharov (1966) and N. I. Ivanov (1967).

Thus, the change in the function of the vestibular analyzer was manifest in its suppression, which can be explained by the additional effect of low- and medium-frequency vibration on the ship personnel serving the fishing industry.

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Summary. Prophylactic examination in persons engaged in fishing industry and in sailors of the Far-Eastern ocean-going ships demonstrated occupational cochlear neuritis, resulting from the action of noise and vibration, in 6.5% of persons examined (occupied in "noisy" or in "quiet" work). Sailors and fishermen (553) working under conditions of noise were studied; 43.7% (233 persons) were found to be suffering from changes of the auditory analyser typically resulting from the action of noise and vibration. The most pronounced changes of hearing were revealed in fishermen, in 44.8% of the persons examined, the percentage also being the highest among the engine room workers (63%). The incidence of cochlear neuritis in sailors of the Far-Eastern steamship-line and in personnel of research ocean-going ships was almost equal (39.9-40%). These indices differed in the engine room workers (42-46%). Vestibular function was investigated by caloric and rotation tests with the use of electronystagmography. The data obtained point to diminution of the vestibular analyser excitability with increase of the length of navigation service.

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