

AD-784 237

CHRONIC BRONCHITIS CAUSED BY FLAX DUST

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Foreign Technology Division
Wright-Patterson Air Force Base, Ohio

2 August 1974

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UNCLASSIFIED

Security Classification

AD 784237

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Foreign Technology Division Air Force Systems Command U. S. Air Force		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
3. REPORT TITLE CHRONIC BRONCHITIS CAUSED BY FLAX DUST		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Translation			
5. AUTHOR(S) (First name, middle initial, last name) N. A. Skep'yan and L. N. Gurin			
6. REPORT DATE February 1970		7a. TOTAL NO. OF PAGES 10	7b. NO. OF REFS 7
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) FTD-HT-23-1887-74	
b. PROJECT NO		8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Foreign Technology Division Wright-Patterson AFB, Ohio	
13. ABSTRACT 06			

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NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. Department of Commerce
Springfield VA 22151

EDITED TRANSLATION

FTD-HT-23-1887-74

2 August 1974

AP 2221626

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By: N. A. Skep'yan and L. N. Gurin

English pages: 5

Source: Zdravookhraneniye Belorussii, Vol. 16,
Nr. 2, February 1970, pp. 76-78

Country of Origin: USSR

Translated by: Marilyn Olacchia

Requester: FTD/PDTR

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FOREIGN TECHNOLOGY DIVISION
WP-AFB, OHIO.

All figures, graphs, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<i>А а</i>	A, a	Р р	<i>Р р</i>	R, r
Б б	<i>Б б</i>	B, b	С с	<i>С с</i>	S, s
В в	<i>В в</i>	V, v	Т т	<i>Т т</i>	T, t
Г г	<i>Г г</i>	G, g	У у	<i>У у</i>	U, u
Д д	<i>Д д</i>	D, d	Ф ф	<i>Ф ф</i>	F, f
Е е	<i>Е е</i>	Ye, ye; E, e*	Х х	<i>Х х</i>	Kh, kh
Ж ж	<i>Ж ж</i>	Zh, zh	Ц ц	<i>Ц ц</i>	Ts, ts
З з	<i>З з</i>	Z, z	Ч ч	<i>Ч ч</i>	Ch, ch
И и	<i>И и</i>	I, i	Ш ш	<i>Ш ш</i>	Sh, sh
Й й	<i>Й й</i>	Y, y	Щ щ	<i>Щ щ</i>	Shch, shch
К к	<i>К к</i>	K, k	Ъ ъ	<i>Ъ ъ</i>	"
Л л	<i>Л л</i>	L, l	Ы ы	<i>Ы ы</i>	Y, y
М м	<i>М м</i>	M, m	Ь ь	<i>Ь ь</i>	'
Н н	<i>Н н</i>	N, n	Э э	<i>Э э</i>	E, e
О о	<i>О о</i>	O, o	Ю ю	<i>Ю ю</i>	Yu, yu
П п	<i>П п</i>	P, p	Я я	<i>Я я</i>	Ya, ya

* ye initially, after vowels, and after ъ, ь; e elsewhere. When written as ѣ in Russian, transliterate as yě or ě. The use of diacritical marks is preferred, but such marks may be omitted when expediency dictates.

FOLLOWING ARE THE CORRESPONDING RUSSIAN AND ENGLISH
DESIGNATIONS OF THE TRIGONOMETRIC FUNCTIONS

Russian	English
sin	sin
cos	cos
tg	tan
ctg	cot
sec	sec
cosec	csc
sh	sinh
ch	cosh
th	tanh
cth	coth
sch	sech
csch	csch
arc sin	sin ⁻¹
arc cos	cos ⁻¹
arc tg	tan ⁻¹
arc ctg	cot ⁻¹
arc sec	sec ⁻¹
arc cosec	csc ⁻¹
arc sh	sinh ⁻¹
arc ch	cosh ⁻¹
arc th	tanh ⁻¹
arc cth	coth ⁻¹
arc sch	sech ⁻¹
arc csch	csch ⁻¹
<hr/>	
rot	curl
lg	log

CHRONIC BRONCHITIS CAUSED BY FLAX DUST

N. A. Skep'yan and L. N. Gurin

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Flax dust affects the respiratory organs by decreasing the olfactory functions and by causing subatrophic and atrophic colds to develop in the nose and nasopharynx. It was demonstrated in an experiment on animals that flax dust also causes inflammatory desquamative bronchitis (R. B. Pinus, 1930; N. P. Savenko, 1962; V. P. Malen'kin, 1966; E. A. Krechkovskiy, 1967; V. P. Malen'kiy, 1968).

In the present study materials are introduced which describe the frequency of chronic bronchitis in workers as a function of time served in industry and sensitization to flax dust by healthy persons and persons suffering from chronic bronchitis.

Studied were 229 individuals (219 women and 10 men) from the weaving and spinning shops of a flax combine.

Along with the general therapeutic survey, 213 workers were given inhalation acetylcholine tests with a 0.1% and 1% solution

of acetylcholine. The time of inhalation was 1-2 minutes. As we know, inhalation of a 0.1% solution of acetylcholine in individuals who are practically healthy causes no reaction whatsoever. In bronchial illnesses, however, it is accompanied by a coughing reaction and by a decrease in the respiratory capacity, which indicates the change in the irritability of the receptor apparatus of the bronchopulmonary system (in diseases of the upper respiratory tract the coughing reaction alone is more frequently observed). Before and after the test the pneumotachometric indices - inhaling and exhaling ability - were measured. In the case that a coughing reaction with bronchial spasms developed after inhaling a 0.1% acetylcholine solution, the test with 1% acetylcholine was not administered. Inhalation tests with acetylcholine were not administered to workers who had bronchial asthma or pathology of the cardiovascular system or digestive tract.

The workers' sensitization to the flax dust was studied by performing scarification allergic tests with an allergen prepared of flax dust and flax fiber according to the method described in the book "Practical Allergiology," edited by A. D. Ado and A. A. Pol'ner. The flax dust and ground flax fiber, poured into jars of Kohn's extractant, was agitated on a rocker for eight days. Then the mixture was filtered through gauze, paper, and sterile Zeitz filters. After testing the sterility of the filtrate it was placed in ampoules and was then ready for use. One or two drops of the allergen containing 21 mg/l amino nitrogen were applied to a cleansed skin area and rubbed into the scarification place, which had been made with a scarification needle in the form of three incisures of up to 1 cm. The test was considered positive when hyperemia and papules larger than 1 cm appeared.

Of the 229 persons studied 42 complained of a periodic dry cough, which was explained by the presence of periodically repeated rhinitis, pharyngitis, colds of the upper respiratory tract.

In 37 the cough was accompanied by sputum in the morning and toward the end of the working shift for from 1 to 2 or more years, possibly indicating chronic bronchitis. In auscultation of these persons isolated dry, scattered whistling, or moist rale could be heard.

Chronic bronchitis was characterized by gradual development, a relatively benign course with a small amount of sputum, and in 11 individuals the chronic bronchitis was preceded or accompanied by bronchial asthma, the formation of which occurred gradually and was characterized in the beginning by shortness of breath after work, frequently toward the end of the working week.

The frequency of chronic bronchitis developing as a function of age and time in production is shown in Table 1.

Table 1

Study contingent	Age			Time on job		
	up to 30 years	31-40 years	above 40 years	up to 10 years	11-20 years	above 20 years
All workers studied	26	133	70	35	145	49
Chronic bronchitis revealed in %	-	14.3±3	25.7±5.2	5.7±3.3	12.1±2.6	34.6±6.8

In workers ages 31-40 years 19 were discovered to be ill with chronic bronchitis (14.3±3%), in those above 40 years - 18 (25.7±5.2%). When statistically processed the difference in the indicated age groups was substantial ($t=4$).

Of the workers who had been on the job for up to 10 years . 2 were discovered to have chronic bronchitis (5.7±3.3%); in the

group of from 11 to 20 years - 18 ($12.1 \pm 2.6\%$); above 20 years - 17 ($34.6 \pm 6.8\%$). The difference in these groups was statistically somewhat greater ($t=2.5$ or 7), which indicated the important role of on-the-job factors in the development of chronic bronchitis.

In individuals suffering chronic bronchitis the functional external respiratory indicators were significantly lower than those of the healthy individuals of the same age group (statistically the difference was substantial at $t=2.5-3$) (Table 2).

Table 2

Age	Group	Number studied	External respiratory indicators		
			vital capacity in ml	exhaling capacity in ml/s	inhaling capacity in ml/s
Up to 30 years	healthy	14	3360 \pm 130	4550 \pm 190	3800 \pm 100
31-40 years	healthy	77	3260 \pm 50	4430 \pm 107	3800 \pm 75
Above 40 years	chronic bronchitis	19	3080 \pm 43	3700 \pm 22	3600 \pm 15
	healthy	52	3100 \pm 140	3670 \pm 120	3500 \pm 90
	chronic bronchitis	18	2870 \pm 60	3260 \pm 270	3400 \pm 110

When tests were conducted with 0.1% and 1% solutions of acetylcholine those suffering chronic bronchitis generally developed a cough reaction and the functional external respiratory indicators declined. The decline in exhaling capacity after the test was 338 ± 80 ml/s, while in healthy individuals the pneumotachometric indices did not change. This indicated the increased sensitivity of the receptor apparatus of the broncho-pulmonary system to external irritants.

In order to detect sensitization in 91 workers (of which 25

were ill with chronic bronchitis) and in 30 persons of the control group, who had not had contact with the flax dust, scarification tests were administered with the allergen. Fast (30-50 min) and slow (24 h) allergic reactions were studied. In the control group no allergic reactions were observed upon administration of the allergen. In 18 of the 66 ($27 \pm 5.5\%$) workers with a long time on the jobs and no pulmonary pathology a fast allergic reaction was observed on the scarification area (the papule measured between 1 and 2 cm in diameter). In 14 of the 25 ($56 \pm 10.1\%$) of those suffering chronic bronchitis a similar allergic reaction was also observed. Allergic reactions of the slow type were negative in the control and experimental groups.

By means of the allergic tests it was possible to detect the presence of sensitization in the workers who had spent the most time on the job and in patients suffering chronic bronchitis. Here the latter more frequently displayed increased sensitivity to the flax dust allergen than did healthy individuals (difference statistically reliable at $t=7$).

Thus, several factors are significant in the development of chronic bronchitis: the effect of industrial dust over a period of many years, sensitization of the organism, age. Considering the fact that chronic bronchitis is far from harmless and results in a considerable decline in the functional external respiratory indicators in persons suffering from it, these persons do deserve attention. Those suffering chronic bronchitis who do not have a respiratory insufficiency require modern inhalation therapy and health-resort treatment, while those with a definite respiratory insufficiency require appropriate job placements.

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