

N.N. Alexandrov National Cancer Center of Belarus

## Does an occupation at a tannery promote pancreatic cancer?

Ilya Veyalkin, PhD



Minsk Tannery Enterprise is one of the biggest in the world. Many peoples have been involved into leather production in the last 50 years. Many chemicals with proved or suspected carcinogenic or mutagenic ability are used in the tanning cycle. They are: formaldehyde, surface-active substances, benzidine and aniline dyes, oxidising agents and chromium compounds, leather dust and also such traumatic agents as sulfuric and hydrochloric acids, ammonia, organic solvents, sulphite and sulphide anions. Moreover the main strategy of leather production is to use the most hydrophobic reagents for the deepest skin impregnation, but it also facilitates their penetration via natural barriers of the human organism.

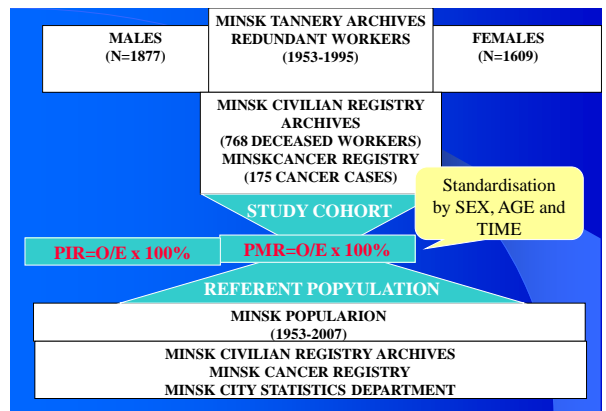
Enterprise can be divided into three main parts: leather tanning, painting and decorating workshops.

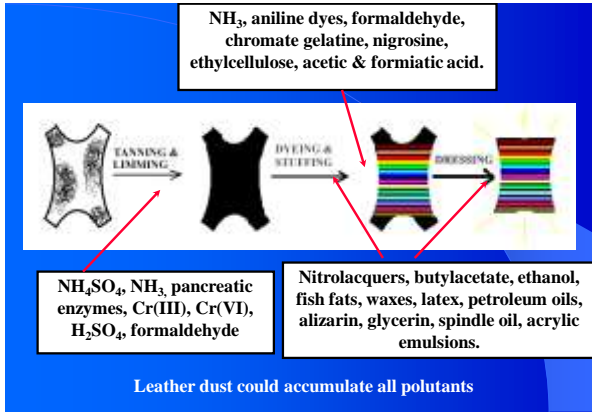
### Aim

- Investigate the possible relation between cancer mortality and tannery occupation

### Methods

The cohort of 3468 workers who were actively employed with a minimum of 6 months was retrospectively followed from 1 January 1953 to 31 December 2000 to calculate proportional mortality ratios (PMRs). 768 workers (328 women and 440 men) were died from different causes. The same cohort was additionally investigated by proportional cancer incidence ratios (PIRs) for 1960-2007 (262 cancer cases). Age and time standardization was implemented.





**FOUR STUDY GROUPS WERE CONSIDERED**

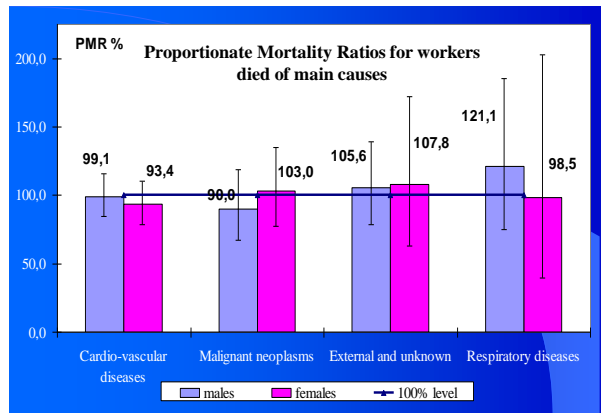
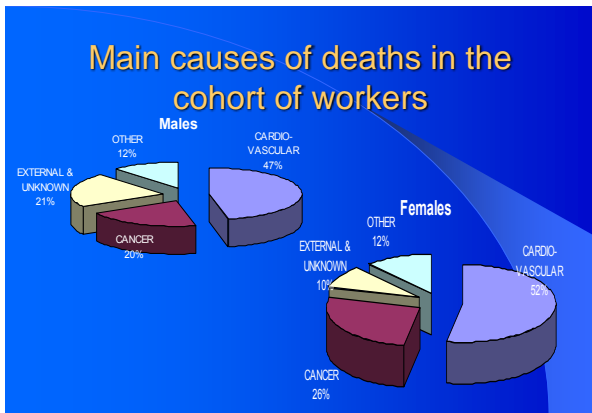
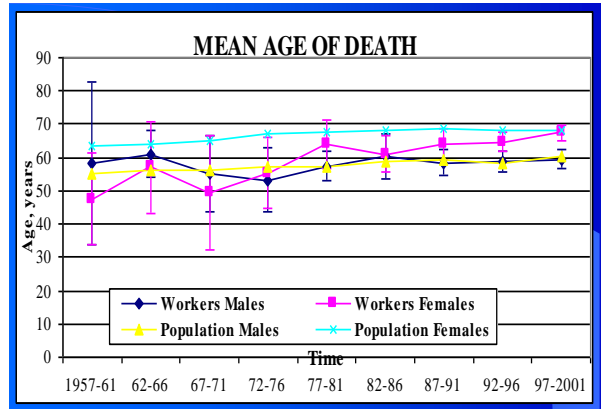
- >WORKERS OF LIMING AND TANNING WORKSHOPS (87% males & 13% females)
- >WORKERS OF DYEING, STUFFING AND DECORATING WORKSHOPS (20% males & 80% females)
- >ADMINISTRATION TEAM (85% males & 15% females)
- >ALL PEOPLE OCCUPIED AT THE TANNERY (54% males & 46% females)

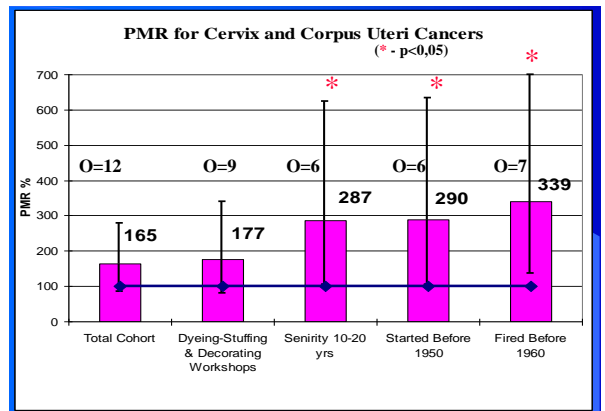
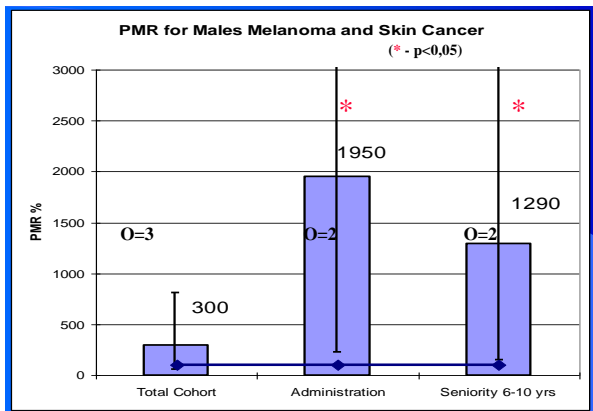
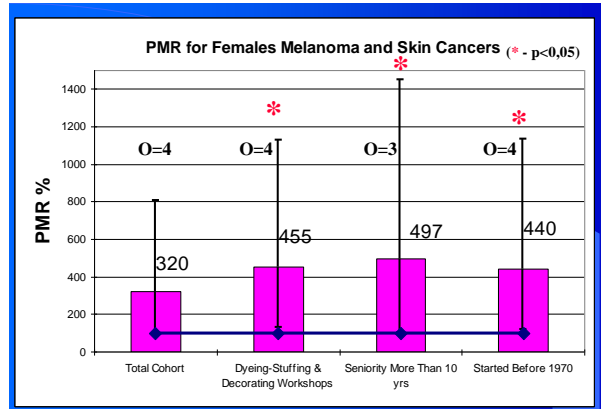
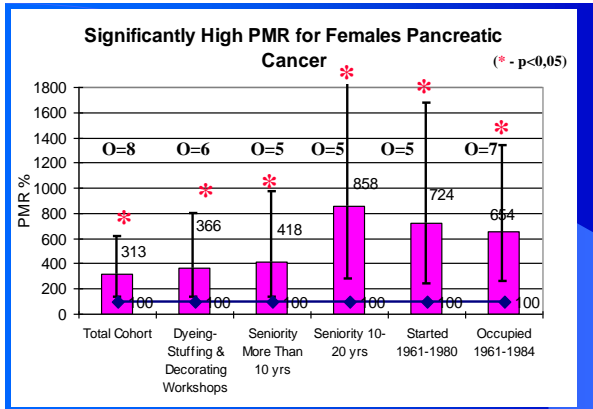
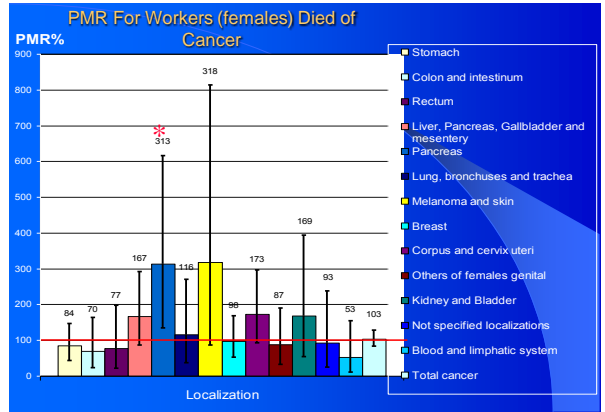
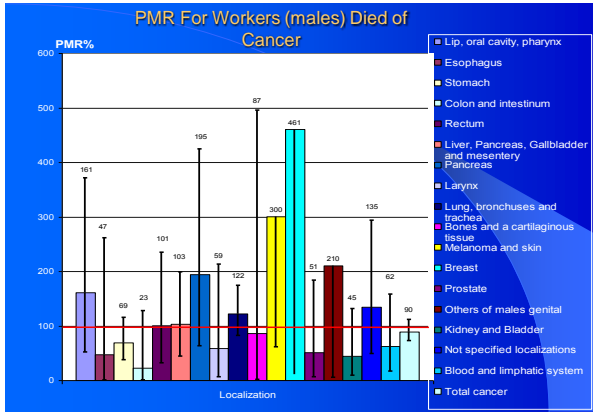
**We analyzed cohort in different ways**

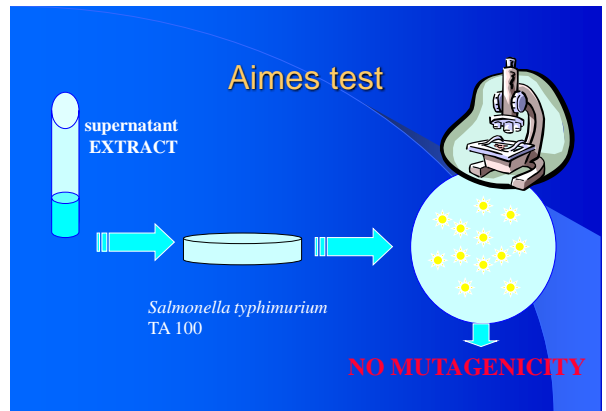
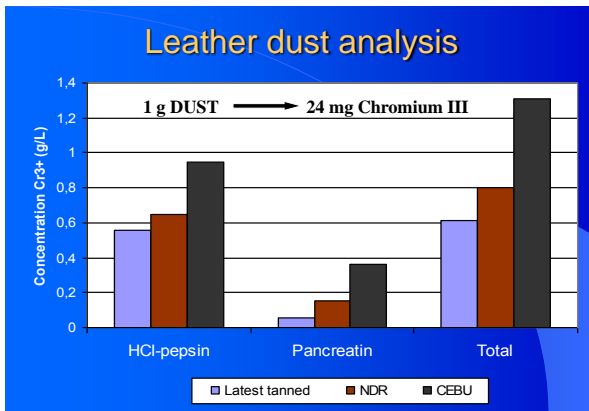
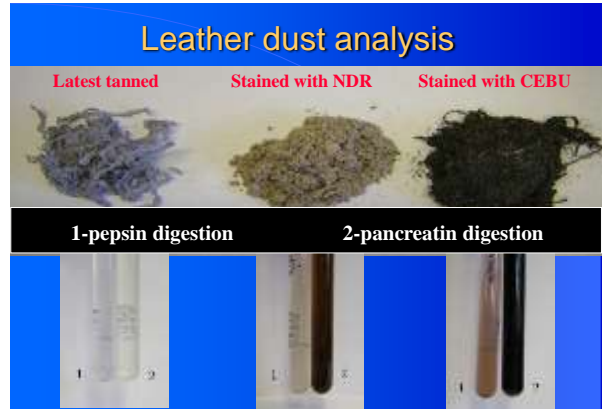
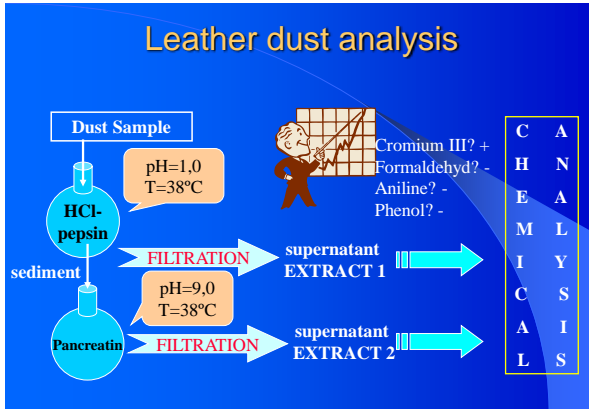
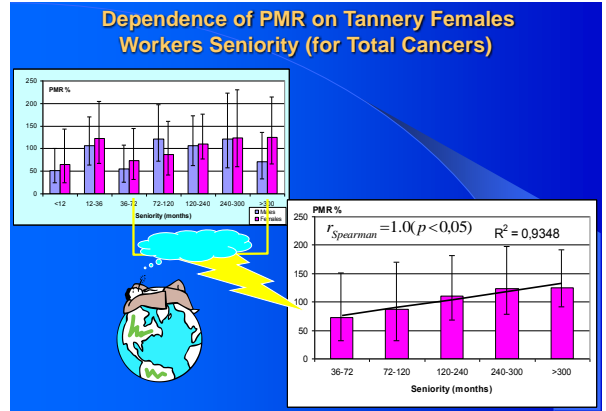
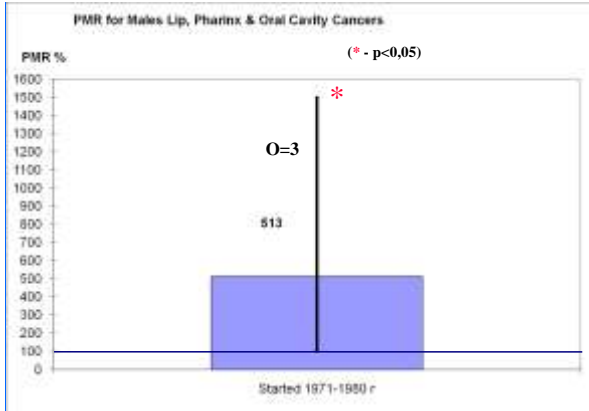
**BY SENIORITY:**  
 occupied less than 1 year;  
 From 1 till 3 yrs;  
 from 3 till 6 yrs;  
 from 6 till 10 yrs;  
 from 10 till 20 yrs;  
 from 20 till 25 yrs;  
 more than 25 yrs;  
 more than 20 yrs;  
 more than 10 yrs.

**BY TIME OF START WORKING:**  
 Hired till 1950;  
 Hired from 1951 till 1960;  
 Hired from 1961 till 1970;  
 Hired from 1971 till 1980;  
 Hired from 1981 till 1994 – inclusive.

**BY DATE OF DISCHARGE:**  
 Discharged since till 1960 inclusive;  
 Discharged since 1961 till 1970;  
 Discharged since 1971 till 1980;  
 Discharged after 1981 inclusive.







## PIRs For Workers (males)

Cancer (ICD 10)	Obs.	Exp.	PIR	95%CI-	95%CI+
LUNG (C34)	41	23.3	176	126	239
STOMACH (C16)	14	14.3	98	54	164
COLON (C18)	6	5.1	118	43	256
PANCREAS (C25)	6	2.8	214	79	466
LARYNX (C32)	4	3.8	105	29	270
SKIN (C44)	4	1.0	40	11	102
BLADDER (C67)	4	4.9	82	22	209
KIDNEY (C64)	4	4.2	95	26	244
BRAIN (C71)	2	1.6	125	15	452
FLOOR OF MOUTH (C04)	2	0.7	286	35	1032
OTHER AND OF NON-HODGKIN'S LYMPHOMA (C85)	2	1.3	154	19	556
OTHER CONNECTIVE AND SOFT TISSUE (C49)	2	0.7	286	35	1032
HYPOPHARYNX (C13)	2	0.5	400	48	1445
ESOPHAGUS (C15)	2	1.9	105	13	380
PROSTATE (C61)	2	7	29	3	103
RECTUM (C20)	2	3.6	56	7	201
PIRIFORM SINUS (C12)	1	0.4	250	6	1393
RETROPERITONEUM AND PERITONEUM (C48)	1	0.3	333	8	1857
MELANOMA OF SKIN (C43)	1	1.1	91	2	507
TONSIL (C09)	1	0.3	333	8	1857
RECTOSIGMOID JUNCTION (C19)	1	1	100	3	557
TESTIS (C62)	1	1	100	3	557
TOTAL	107				

But considerably high level of pancreatic cancer was noted in males workers (PIR=298%; 95%CI=110-650), who were employed in DSW for more than 7 years in 70th - 80th.

## PIRs For Workers (females)

Cancer (ICD 10)	Obs.	Exp.	PIR	95%CI-	95%CI+
BREAST (C50)	30	26.9	112	75	159
SKIN (C44)	21	25.2	83	52	127
STOMACH (C16)	14	14.3	98	54	164
CORPUS UTERI (C54)	11	11.1	99	49	177
CERVIX UTERI (C53)	10	7.9	127	61	233
LUNG (C34)	8	5.1	157	68	309
MELANOMA OF SKIN (C43)	7	2.4	292	117	601
COLON (C18)	7	9.7	72	29	140
THYROID GLAND (C73)	6	3.8	158	58	344
OVARY (C56)	6	6.8	88	32	192
PANCREAS (C25)	5	3.4	147	48	343
KIDNEY (C64)	5	4.4	114	37	265
OTHER AND UNSPECIFIED TYPES OF NON-HODGKIN'S LYMPHOMA (C85)	3	1.3	231	48	674
HODGKIN'S DISEASE (C81)	2	0.86	233	28	840
OTHER AND UNSPECIFIED PARTS OF BILIARY TRACT (C24)	2	0.8	250	30	903
MYELOID LEUKAEMIA (C92)	2	1.3	154	19	556
MULTIPLE MYELOMA AND MALIGNANT PLASMA CELL NEOPLASMS (C90)	2	1	200	24	722
BLADDER (C67)	2	1.7	118	14	425
RECTUM (C20)	2	5.8	34	4	125
LIP (C00)	1	0.5	200	5	1114
DIFFUSE NON-HODGKIN'S LYMPHOMA (C83)	1	0.4	250	6	1393
OTHER AND UNSPECIFIED PARTS OF TONGUE (C02)	1	0.2	500	13	2786
RETROPERITONEUM AND PERITONEUM (C48)	1	0.6	167	4	929
MESOTHELIOMA (C45)	1	0.3	333	8	1857
RECTOSIGMOID JUNCTION (C19)	1	1.9	53	1	293
TOTAL	155				

## Conclusions

- Workers occupied in Dyeing-Stuffing and Decorating workshops has higher risk to die with pancreatic cancer (PMR).
- Time related analysis suggested that the most favorable for pancreatic cancer conditions were before 1962-1964 and before 1978-84.
- In these years the tannery worked in full operation and used formaldehyde and some Direct Black 3 azo-dye.
- A majority of workers who died with pancreatic cancer were either driers (high formaldehyde exposure) or painters (high dye and solvents exposure). Leather dust was presented in all places.
- Analysis of leather dust has shown huge extrication of Chromium III compounds and dyes but not phenol, aniline and formaldehyde after enzymatic digestion.

## Conclusions

- Just non-significant excess in pancreatic cancer incidence both in males (PIR=214 (79-466)) and females (PIR=147; (48-343)), but considerably high level of pancreatic cancer was noted in males workers (PIR=298%; 95%CI=110-650), who were employed in DSW for more than 7 years in 70th - 80th.
- Significant excess in PIR for lung cancer was established in males workers (PIR=176 (126-239)).
- Significant excess in PIR for melanoma of skin was established in females workers (PIR=292 (117-601)).

N.N. Alexandrov National Cancer Center of Belarus  
p/o Lesnoy-2, 223040, Minsk area, Belarus, tel. +375(17)269 95 05,  
E-mail [Oncobul@omr.med.by](mailto:Oncobul@omr.med.by), [www.omr.med.by](http://www.omr.med.by)

