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Cancer incidence in ethnic German migrants from the Former Soviet Union in comparison to the host population

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ABSTRACT

Aim: To investigate cancer incidence patterns among ethnic German migrants (Aussiedler) from the Former Soviet Union, a large migrant group in Germany, in comparison to autochthonous Saarland population over a 20 year observation period.
Methods: Data were obtained from a cohort of Aussiedler residing in the federal state of Saarland (n = 18,619). Cancer incidence and vital status were ascertained through record linkage with the Saarland Cancer Registry and local population registries.
Results: During the follow up period from 1990 to 2009 we observed 638 incident diagnoses of malignant neoplasms (except non-melanoma skin cancer). The overall standardized incidence ratio (SIR) was 0.98 (95% confidence interval 0.92, 1.04). However, site-specific SIRs revealed great variation. Stomach cancer incidence was significantly higher among Aussiedler. Lung cancer was elevated for males, but lower among females. Additionally, diagnoses for colorectal cancer among males were significantly lower. Age-standardized rates (ASRs) over time show not all cancer rates of Aussiedler attenuate as expected to Saarland rates. For example, lung and prostate cancer incidence rates show increasing disparity from Saarland rates and female breast cancer incidence develops in parallel. Furthermore, ASR for overall cancer incidence of Aussiedler shows a yearly decrease (p = 0.06) whereas Saarland rates remain stable.
Discussion: Aussiedler incidence rates reflect incidence pattern observed in their countries of origin.

1. Introduction

Cancer is one of the leading causes of death in the industrialized world [1] and the second leading cause of death in Germany [2]. For many types of cancer etiology of disease is still unclear. Neoplasms are known to have a long latency between exposure and disease onset. Important exposure factors may trace back to childhood and young adulthood [3]. Therefore, migrant studies can help to identify causes of diseases [4]. Additionally, studies on migrants help to identify health inequalities and can thus contribute to improvements in health care. In general, it is expected that differences between migrants and the host population diminish with length of stay in the destination country [5]. Due to generally long latency periods between risk factor exposure and onset of cancer it is expected that cancer rates reflect country of origin pattern for many years. In consequence, it has been shown that migrants from non-western countries to Europe are more prone to cancers that are related to infections in early life, such as liver and stomach cancer and in contrast, they are less likely to suffer from cancers related to a western lifestyle, e.g. colorectal, breast and prostate cancer [6].

Since the beginning of the 1990s more than two million ethnic German migrants (Aussiedler) from the Former Soviet Union (FSU) migrated to Germany. A preliminary analysis with shorter and incomplete follow-up did not reveal differences between cancer incidence and cancer mortality of Aussiedler in Germany [7].

Here we present results of cancer incidence among Aussiedler in comparison to the Saarland population by means of standardized incidence ratios (SIRs) and age-standardized incidence rates (ASRs) over a follow-up of two decades between 1990 and 2009.

2. Materials and methods

The study population comprises Aussiedler from the FSU who settled in the Federal State of Saarland between 1990 and 2005. Since 1990 a German law ("Late emigrants act" *Aussiedleraufnahmegesetz*) decrease the immigration of Aussiedler and governs that

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Aussiedler families are settled in all federal states relatives to the population of each state. Therefore, distribution of Aussiedler in Germany is done quasi-randomly [8]. Data on 95.3% of all Aussiedler who settled in Saarland were collected from local refugee offices. The dataset contained names, date of birth, date of issue of the German passport as an approximation for date of migration, sex, country of birth, and first city of residence. The final cohort consists of 18,619 (65.7% of all Aussiedler) individuals without missing data on first residence.

Data on cancer incidence were provided by the Saarland Cancer Registry through computer-assisted record linkage. Most individuals were identified by names, sex, date of birth and residence. To minimize the problem of uncommonly spelled German names, which is relatively frequent among Aussiedler, phonetic codes of names were additionally used for record linkage. In other German states cancer registries were either built up over the last decades or are still being built up at present, and could not be used for linkage purpose for these who migrated out of the Saarland. Therefore censoring applied in case of migration out of Saarland with censoring date being the date of emigration.

To ascertain mortality follow-up information of all cohort members until 31st December 2009, the following procedure was performed: local population registries were asked for follow-up information (date of migration and new residence or date of death) via mail. In case of death, the underlying cause of death was retrieved from local health authorities. This follow-up of vital status was done for all individuals (also for those who moved to another federal state of Germany). In order to assess a possible selection bias due to out-migration of the Saarland we performed a sensitivity analysis. We compared mortality due to cardiovascular disease (CVD), and malignant neoplasms and overall mortality of the cohort in the study area to mortality outside the study area in terms of standardized mortality ratios (SMRs) in comparison to the Saarland population. To do so we divided the cohort into individuals who moved out of the Saarland and those who stayed in the study area. SMR for CVD and SMR for cancer was corrected for missing causes of death among those who moved outside the Saarland [9]. Outside the study area we are missing 36% of causes of death inside the Saarland 1%. If both subgroups had a similar mortality, we could conclude that this is likely to hold also for the cancer incidence.

Information on incident cancers included date of diagnosis and cancer site according to the codes of the International Classification of Diseases revision 9 (ICD-9). In the analysis 34 cancer cases were not considered because individuals were already diagnosed with cancer in their country of origin. Additionally, analyses were restricted to the first cancer diagnosis.

Person-years (PY) were calculated for each sex, five-year age group, and calendar year. Cancer incidence data of the Saarland population were available from the Saarland Cancer Registry [10] and were used to calculate the expected number of cancer diagnoses. Population numbers by sex, age groups and calendar year were obtained from the state statistical office. SIR was calculated for all cancers combined except non-melanoma skin cancer and for specific cancer sites.

In order to investigate differences in time trends of incidence rates in the cohort and in the Saarland population we modeled the yearly ASR for the most frequent cancer diagnoses (stomach cancer, colorectal cancer, lung cancer, prostate, and breast cancer) and all malignant cancers combined (except non-melanoma skin cancer, ICD-9: 173) among Aussiedler and among the Saarland population with Poisson regression as follows: first, yearly ASR adjusted to the European standard population was calculated directly for Aussiedler and the Saarland population using the database of the Saarland Cancer Registry [10]. Second, temporal trends of adjusted ASR were modeled with Poisson regression using the observed number of cases as Poisson distributed dependent variable, the logarithm of the standardized person-years as offset and sex and year as covariables. Saarland rates were modeled separately for both sexes. Ninety-five percent confidence intervals (95% CI) of the SIR were calculated using the exact method [11].

Data management was done using MS Access 2010 and statistical analysis was performed in SAS version 9.2 [12].

3. Results

Table 1 presents descriptive results of the cohort und the follow-up procedure. The cohort consists of slightly more females being on average three years older compared to males. Overall 194,440 PY were accumulated. Mortality follow-up was available for 95.1% of the cohort members. The mean follow-up time for the incidence study was 10.4 years. Altogether, 682 (3.7%) cohort members died from other causes than cancer or without a precedent cancer diagnosis within the Saarland, and 638 were diagnosed of having a malignant neoplasm (except non-melanoma skin cancer). Of the cohort members, 277 (1.5%) died before end-of-follow-up and after moving out of the Saarland state.

Table 2 shows the results of the cancer site-specific SIR analysis according to the complete observation period. Cancer incidence of male Aussiedler from all cancer sites except non-melanoma skin cancer (ICD-9: 140–208 excl. 173) is lower compared to the Saarland incidence, however not significant. Cancer incidence among women is not different compared to the host population. In contrast, lung cancer (ICD-9: 162) is elevated for males, but lowered for females. Stomach cancer (ICD-9: 151) is higher among both sexes. Furthermore, males have a lower incidence of colorectal cancer (ICD-9: 153–154). Prostate cancer (ICD-9: 185) and female breast cancer (ICD-9: 174) are lower among Aussiedler, but not significantly.

Trends of age-standardized cancer incidence rates per 100,000 among Aussiedler and the Saarland population are shown in Fig. 1. Yearly rates vary considerably due to small numbers and are not presented (except for all cancer sites combined). In general, ASRs reflect results of the SIRs. However, cancer site-specific ASR of Aussiedler develop very differently and not always in line with the Saarland incidence. Lung cancer among females as well as prostate cancer incidence shows increasing disparity from Saarland rates. In

Table 1
Descriptive results of the Aussiedler cohort from Saarland, Germany.

Number of cohort members	18,619
Males (%)	8976 (48.2%)
Females (%)	9643 (51.8%)
Immigration period	1990–2005
1990–1993	6933
1994–1997	6536
1998–2005	5150
Mean age at migration (median; standard deviation; range)	32.4 (31.1; 19.8; 0–103)
Males	30.9 (29.9; 19.0; 0–95)
Females	33.7 (32.2; 20.4; 0–103)
Descriptive results of the follow-up procedure	
Follow-up period	1-1-1990 to 31-12-2009
Mean time of follow-up	10.4 years
Person-years	194,440.0
Males	94,145.7
Females	100,294.3
Alive (within Saarland, without cancer[a])	12,323 (66.2%)
Deaths (within Saarland, without cancer[a])	682 (3.7%)
Incident cancer cases (first diagnosis only)	638 (3.4%)
Moved to other federal state	4062 (21.8%)
Of these: deaths	*265 (1.4%)*
Lost to follow-up	914 (4.9%)

[a] Malignant neoplasm (except non-melanoma skin cancer).