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Background

Malignant mesothelioma (MM) is a rare but lethal cancer. Its causation by asbestos has been established for more than 50 years. The average latency time of MM following exposure to asbestos is 30-40 years. Although asbestos processing is forbidden in many industrialized countries, the incidence of the disease is expected to rise further worldwide. In Germany the production and use of asbestos fibres, and of products and mixtures to which these fibres are intentionally added has been banned since 1993. However, the absolute numbers of new MM cases have been rising since 1990 mainly attributed to the long latency time [1]. These numbers are expected to drop between 2015-2030. In 1977 pleural and peritoneal mesothelioma were included in the official list of occupational diseases of the German statutory accident insurance. MM remains a diagnostic and therapeutic challenge for ambulatory and in-hospital care.

Here we describe incidence and mortality trends and relative survival (RS) of MM in Lower Saxony (LS).

Methods

Patients of all ages diagnosed in 2003-2012 with MM (ICD-10 C45, i.e. ICD-O-3 classification of all cancer sites with morphology codes M9050/3-M9053/3) in LS were included in the incidence and mortality computations. Death certificate only (DCO) cases were included in the incidence. For survival calculations, only patients aged 15-99 years and non-DCO cases were analyzed.

Statistics

Incidence and mortality rates (cases per 100,000 persons) were age-adjusted to the standard European population (ASR). The cohort approach was employed to derive 5-year RS (for all cancer sites with MM) by sex, morphological subtypes (fibroid MM: 9051/3, epitheloid MM: 9052/3, MM biphasic: 9053/3, MM Not Otherwise Specified (NOS): 9050/3), tumor size (T1, T2, T3, T4 and unknown) and by the most frequent topography (pleura: C38, retro- and peritoneum: C48). Expected survival was computed by Ederer II method. All calculations were carried out in CARESS [2].

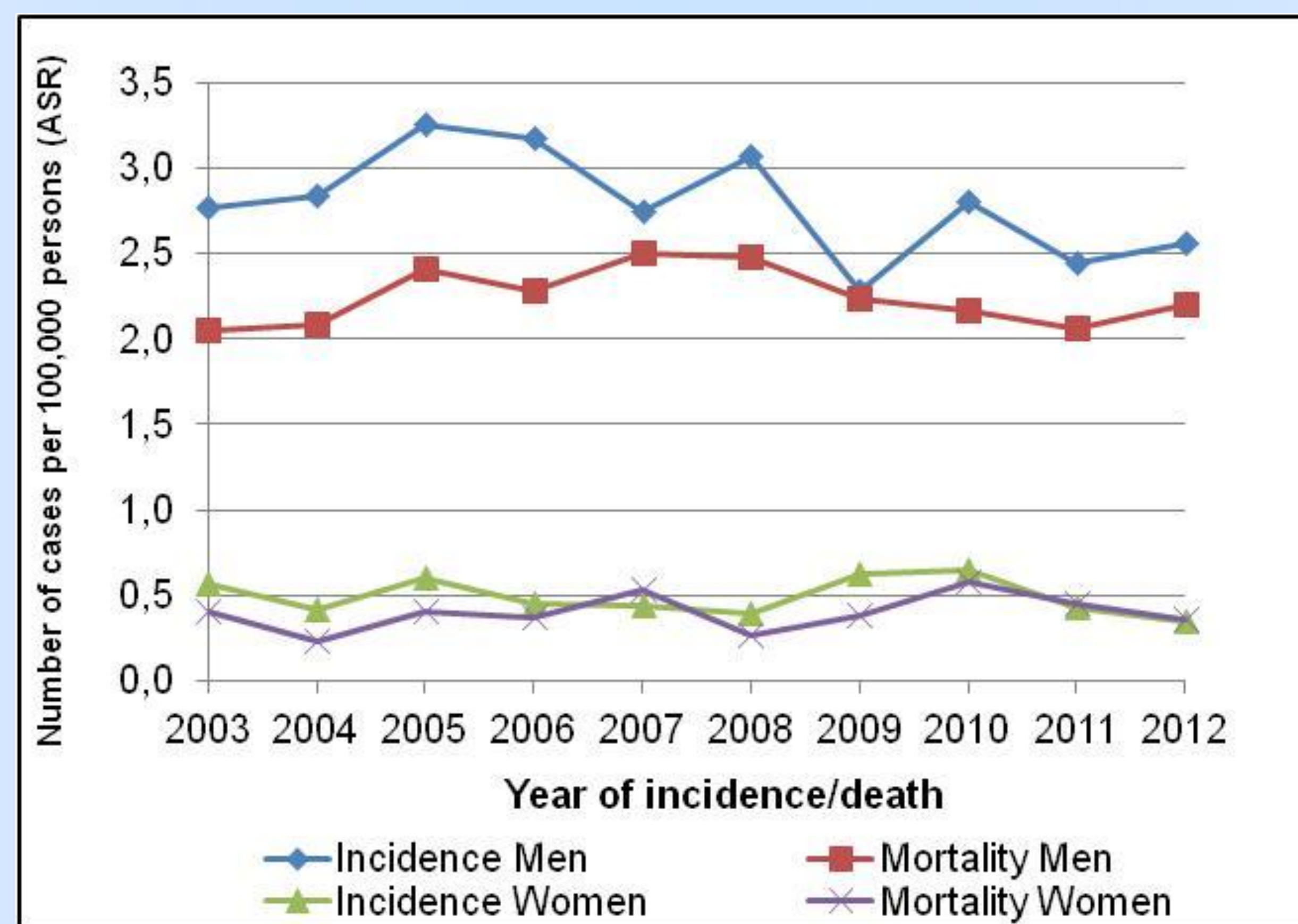


Figure 1: Comparison of incidence and mortality trends from 2003 to 2012 in patients with MM by sex in Lower Saxony

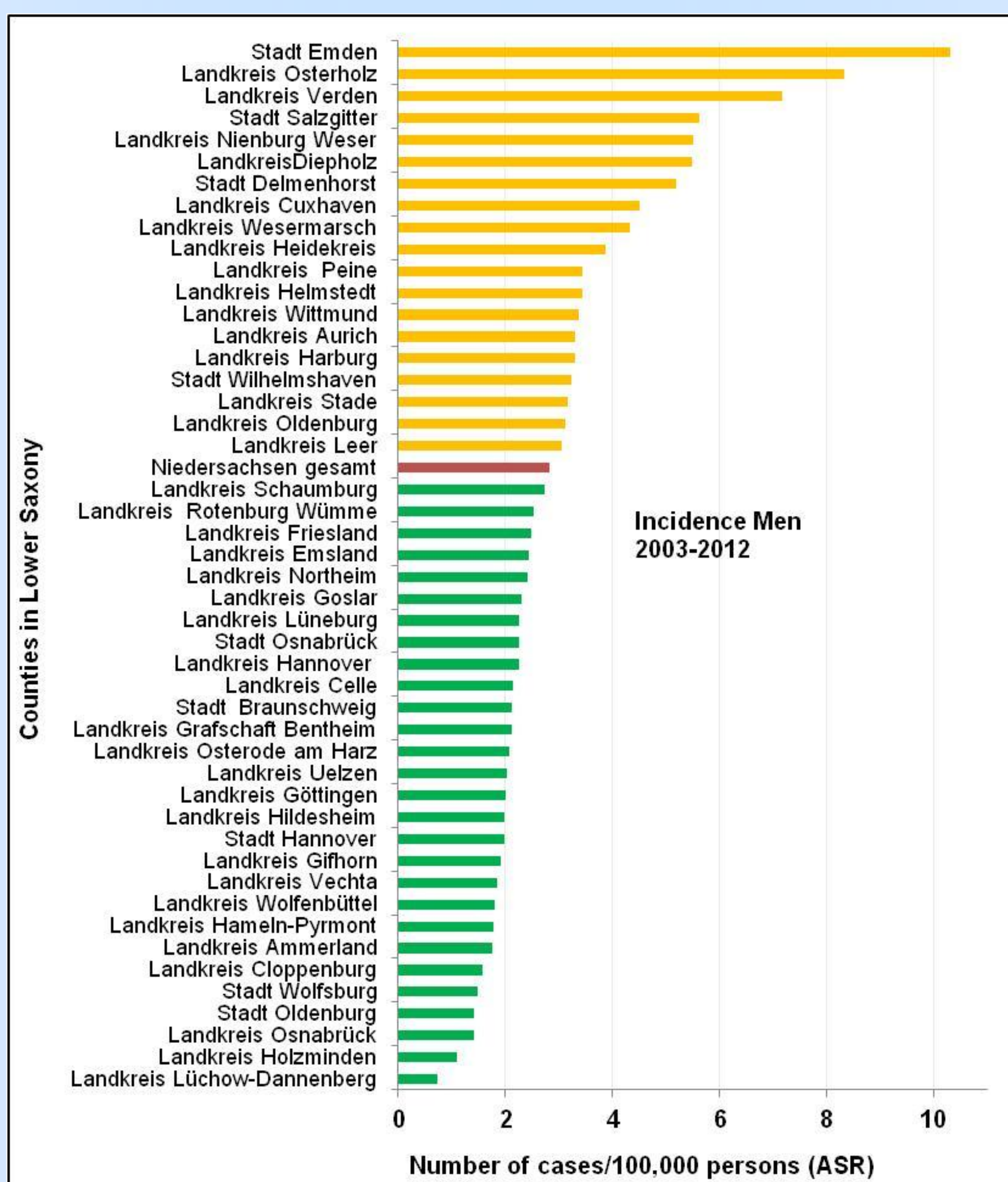


Figure 2: Comparison of incidence in 2003-2012 in men with MM by counties in Lower Saxony

Table 1: Five-year RS of patients with MM by sex, tumor size, morphology and topography in Lower Saxony, cohort of 2003-2012

Variable	N (%)	5-year RS	SE
Overall ^a	1,592 (100.0)	7.3	0.8
Sex ^a			
Men	1,330 (83.5)	6.0	0.9
Women	262 (16.5)	13.0	3.0
Tumor size ^a			
T1	66 (4.2)	11.3	5.6
T2	101 (6.3)	10.2	4.2
T3	112 (7.0)	9.7	4.2
T4	86 (5.4)	3.2	2.2
Unknown	1,227 (77.1)	7.0	0.9
Morphology ^a			
Fibroid MM	95 (6.0)	4.4	2.4
Epitheloid MM	790 (49.6)	10.3	1.4
Bisphasic MM	165 (10.4)	2.1	1.6
MM NOS	542 (43.0)	4.7	1.2
Topography			
Pleura (C38.4)	1,432 (90.0)	5.7	0.8
Retro- and peritoneum (C48)	126 (7.9)	23.6	4.6

^aAll cancer sites combined with morphology M9050/3-M9053/3

Results

In 2003-2012 1,580 men and 331 women were diagnosed with MM in LS, 1,265 men and 277 women died of MM in the same period. Median age at diagnosis was 71 years for both sex. The incidence in 2003-2012 was 2.8/100,000 for men, 6 times higher than for women (0.5/100,000). Mortality was also higher in men (2.4/1000,000) compared to women (0.4/100,000), see Figure 1. County-specific differences in incidence ranging from 0.7 to 10.3 per 100,000 men were observed (see Figure 2).

As shown in Table 1, the 5-year RS for all MM combined was very poor overall and in all sublevels. Survivorship was better for women compared to men. As expected, patients with small tumor sizes (T1-T2) survived better than patients with larger tumor sizes (T3-T4). Patients with epitheloid morphology showed a better prognosis 5 years following diagnosis compared to fibroid, biphasic or MM NOS morphologies. MM patients whose cancer originated from the retro- and peritoneum survived better compared to pleural origin.

Discussion/Conclusions

Although the production and use of asbestos has been banned, our results show that while the incidence of MM in men has slowly declined, the incidence in women has remained almost constant over the study period in LS. This could be attributed to the long latency period of 30-40 years.

The observation of the highest incidence of MM in counties with seaports, bordering Bremen (which has a large seaport) or operate steel plants, most probably points to occupational exposure to asbestos through ship building or handling of asbestos and its products.

The prognosis for patients with MM 5-years after diagnosis is poor overall and at all sublevels. This observation concurs with the poor prognosis seen with comparable cancers like lung cancer. There is therefore the need to intensify efforts to finding breakthroughs especially in the area of new therapeutic options which hopefully could improve prognosis for MM patients.