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Commentary

Descriptive epidemiology of cutaneous melanoma – A treasure for generating hypotheses

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England has a long tradition of a high quality cancer registration. Quality indicators such as the proportion of death certificate only (DCO) cases and morphological verification of melanomas show that the registration quality in England is good as presented in "Cancer Incidence in Five Continents", volume VI-XI (https://ci5.iarc.fr/Default.aspx, accessed Jan 5, 2020). The cancer registry data for all of England, compiled from many regional population-based cancer registries, offers many fascinating opportunities for epidemiologic data analysis.

Memon et al. analysed incidence rates of melanoma by age, sex, and anatomical localization of cutaneous melanoma [1]. Furthermore, they studied the time trend of the mortality rate of cutaneous melanoma. They included 265.302 incident cutaneous melanoma diagnosed in England between 1981 and 2018. As in most European countries with predominant Caucasian population, they observed marked increases of the incidence rates within all age groups, both sexes, and within each anatomical subsite [1]. It is interesting to note that the annual incidence rates of cutaneous melanoma in the young age group (0-34 years) stabilised during the recent period (2006-2018) after these rates increased from 1981 through 2005. Among people older than 34 years, annual incidence rates continuously increased until 2018. This age- and time-dependent trend pattern may be explainable by a birth cohort effect that has also been shown in several other populations in European mainland [2,3], Australia[4], and the U.S.[5]. Memon et al. also present remarkable differences of the relative increase of incidence rates by sex. For each anatomic subsite, the relative increase in melanoma incidence was greater in men than in women.

In epidemiology, the detailed study of incidence time trends represents an important component of *hypothesis generation*. However, for an even deeper understanding of the incidence trends, a more in-depth analyses of the data from England is needed. **First**, the study of incidence trends by histological subtypes of melanoma, given the large sample size and given the high proportion of morphological verification, can become quite informative. Histological subtypes of cutaneous melanoma (superficial spreading, lentigo maligna, nodular, acral lentiginous, and other less frequent subentities) differ in terms of age-specific incidence rates and time trends. For example, the incidence increase of cutaneous melanoma in Southern Germany was mainly due to an increase of superficial spreading melanoma. Lentigo maligna melanoma which has a considerably higher age at diagnosis than other subtypes of melanoma and occurs predominantly on the head showed virtually no increase over time [6]. In a previous study, Walter et al. stratified their data from Eastern England by histology with unclassified histological type of only 7.6% [7]. **Second**, as the cancer registry data contain survival information, 5-year relative survival that quantifies the excess mortality due to melanoma should be studied. Given the large sample size, survival could be stratified by age, sex, anatomic subsite, histological subtype and stage at least for 10-year periods. **Third**, a detailed study of incidence trends by stage (at least Breslow's tumor thickness) at diagnosis may give insights into potential effects of improved public awareness regarding the significance of skin lesions that may represent skin cancer, and on the part of the medical profession. From previous publications (e.g., [7]), it can be seen that for instance in Eastern England the completeness of the Breslow thickness has been above 85% since 2006. In contrast, incidence trend analyses by stage based on cancer registry data in Germany still suffer from a relatively high proportion of missing data [8].

Memon et al. found that "the incidence of melanoma among young people has stabilised (or levelled off) in recent decades, whereas it continues to increase substantially in older populations". They conclude that "public health campaigns targeted at children/adolescents/parents may be favourably influencing melanoma incidence". How do we know? According to Wallingford et al., public health campaigns to prevent skin cancer in England started in 2003 by the Cancer Research UK SunSmart program [9]. The effect of such prevention campaigns on the melanoma incidence is associated with a latency of years, so that incidence changes before 2010 are very unlikely to be attributable to the campaigns. The UK-wide ban on sunbed use for adolescents under 18 years started even later in 2010 [9]. Furthermore, the observed incidence trends can be explained by

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a mixture of age and period effects or by birth cohort effects. Period effects could be triggered by public health campaigns. A predominant birth cohort effect would speak against an effect of public health campaigns. Therefore, in the next step, Memon et al. could fit age-period-cohort (APC) models to their data and find out, which effects are predominant.

This study did not present empirical data on changes in sun exposure patterns or sun protection behavior in England over time nor do they present empirical information about adherence in skin cancer prevention measures. For this reason, the presented retrospective study cannot decipher the role that sunbathing behavior or preventive measures played for these trends. An ecological analysis that contrasts incidence rates for each calendar period with representative survey data on sunbathing or sun protection behavior of the population in England [10] would have been insightful. However, this study underlines the need for a general awareness amongst citizens and the medical profession to take care of newly occurring pigment lesions that may lead to an early detection of curable melanomas.

Declaration of Competing Interests

AS does not declare any conflict of interest.

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