Are All Screening Programmes Created Equal? The Case of Melanoma

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In this issue of *Dermatology*, Cristofolini et al. [1] present data on the incidence of cutaneous melanoma among 3,635 subjects who were found not affected by skin cancer in a screening programme conducted in the province of Trento, a northern Italian area, from January 2001 to December 2004, and who were followed up to December 2013 for assessing new lesions. Since no new case of melanoma was detected in a 2-year period after the first examination had taken place, and only 2 cases by the third year, the authors conclude that ‘in a selected population a screening program can be performed every 2–3 years’. There are some methodological problems that limit the validity of these conclusions. The screened population was younger than the general population in the area, and no age and gender standardization was made; moreover, the number of cases was too small to draw any firm conclusion.

Educational campaigns for the early diagnosis of melanoma started in the province of Trento in the late 1970s and were then repeated periodically. The campaigns included several components: (1) training of dermatologists; (2) training of general practitioners; (3) education of the public for self-examination, through different media, and (4) free access to dermatologists for suspected lesions. In 1993, data were published showing that the province of Trento had lower mortality rates and a higher median age of death from melanoma compared to neighbouring Italian areas with a similar sociodemo-

graphic profile, but not undergoing educational campaigns [2].

One of the reasons to promote the early diagnosis of melanoma in the province of Trento was the consideration, in the words of the organizers in 1993, that ‘currently, the primary prevention of cutaneous melanoma is not possible’ since ‘risk factors have not been established and quantified with certitude’ [2]. After more than 20 years, the risk factors for melanoma are well established, and primary prevention is considered advisable, especially targeting children and young adults [3]. What about early diagnosis and screening?

Screening is a strategy to identify an unrecognized disease in individuals, enabling earlier intervention and management in the hope to reduce mortality and suffering from a disease. Several types of screenings exist, from ‘mass screening’ involving a whole population to ‘selective screening’ conducted in subpopulations at higher risk (for example, people with more than a given number of melanocytic naevi or with a given skin phenotype) [4, 5]. Also different screening modalities, frequently combined, could be adopted. When dealing with skin cancer, for example, they may include promotion of self-examination, opportunistic screening by primary care physicians, dermatologist-based initiatives or referral to specialized pigmented lesion clinics. The use of teledermatology is also a new rising option.

In spite of the fact that melanoma satisfies all the pre-requisites for a screening programme as defined by the World Health Organization (table 1) [6], there have been limited experiences of structured screening programmes, like the one in the province of Trento, and, remarkably, no data have been obtained from randomized trials. As a consequence, many expert bodies such as the United States Preventive Services Task Force did not find sufficient evidence to recommend skin cancer screening of the general population [7]. More recently, large-scale, observational studies, particularly the SCREEN programme conducted in Germany, have added new evidence that integration of skin examination into a routine physical assessment by a primary care physician, followed by referral of selected cases to a dermatologist, may be an effective strategy in reducing skin cancer mortality [8]. Sta-

Table 1. Requirements for a ‘screening disease programme’ defined by the World Health Organization in 1968 (Wilson’s criteria)

(1) The disease should be an important health problem
(2) The natural history of the disease should be known
(3) There should be a long preclinical stage of the disease (latent stage)
(4) There should be a safe, simple and inexpensive screening test that is acceptable to the population being screened
(5) There should be a treatment for earlier disease that is more effective than treatment for later disease
(6) Facilities for diagnosis and treatment should be available
(7) The total cost of finding a case should be economically balanced in relation to medical expenditure as a whole
(8) Case-finding should be a continuous process, not just a ‘once and for all’ project

tistical models have also been produced to identify individuals at higher risk of melanoma. These may be further investigated and employed to optimize screening intervals, avoiding general advice on its scheduling [9].

Screening procedures are somewhat unique in medicine since they are performed on persons apparently in good health. In spite of their purported benefit, a number of adverse effects could be connected with screening procedures, including, among others, overdiagnosis, misdiagnosis and creating a false sense of security [10]. Screening interventions are not designed to be diagnostic, and often have significant rates of both false-positive and false-negative results. In addition, several biases and artefacts might influence the analysis of results of screening procedures (table 2). For these reasons, screening programmes should be better evaluated in the context of randomized clinical trials. These are urgently needed to establish skin cancer screening as an evidence-based procedure.

A final consideration concerns health inequality. Declines in melanoma mortality have recently been documented in Australia and the USA but largely confined to the more educated social groups and with a disproportionate burden of fatal melanoma among groups of low socio-economic status [11, 12]. More efforts should be directed toward reducing the melanoma burden in high-risk, more vulnerable and less wealthy segments of the population.

Disclosure Statement

The authors declare no conflicts of interest.

Table 2. Common biases when analysing the impact of screening procedures

Bias	Definition	Ways to minimize bias
Lead time bias	The systematic error of apparent increased survival from detecting disease in an early stage	Use mortality as an outcome rather than survival rates
Length bias	The systematic error from preferably detecting disease with a long latency or preclinical period	Count all outcomes regardless of method of detection
Referral/volunteer bias	The systematic error from detecting disease in persons who have a propensity to seek health care	Count all outcomes regardless of participation in the screening programme; follow up those who refuse to participate
Detection bias	Detection of clinically insignificant disease	Consider disease stages in the analysis and carefully inspect the shifting of prevalence from more advanced to earlier stages

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