

A-4.5. Studies on Human Health Effects by increased Ultraviolet Ray
Molecular epidemiological study on skin cancer and precancerous
lesion

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Abstract

Skin cancer is one of representative biological effects of ultraviolet ray on human health. Prevalence and incidence rates of cutaneous lesions are surveyed by mass-screening program in 5 different areas in Japan. Prevalence of skin lesions were surveyed in Akita, Nagano, Hyogo, Miyazaki and Okinawa prefecture. Genetic changes of the biopsy materials were examined, and p53 alteration was found in precancerous solar keratosis. Continuous mass-screening in the same area make it possible to calculate

the incidence rate. International collaboration is also important because the increasing UV exposure is the global issue.

Key Words Ultraviolet ray, Skin cancer, Solar keratosis

1. Introduction

Chronic exposure to ultraviolet ray (UVB) causes skin cancer in both human and experimental animals. Relative risk by UVB exposure seems to be higher among white in Australia and the USA. Japanese and other Orientals are known to cause less melanoma, squamous cell carcinoma and basal cell carcinoma. Increases UVB by the destruction of ozone layer, however, may cause cutaneous lesions for Japanese like Caucasians. Prevalence and/or incidence rates of these diseases were so far reported from only out-patient clinics of the university hospitals. More accurate survey for cutaneous lesion has been done by this study to estimate prevalence and incidence rates in 5 areas with different strength of UVB.

2. Research Objectives

In Japan, mass-screening program to detect stomach, uterine cervix, breast, lung and colon cancer has been done for many years. In collaboration with local government, survey for cutaneous lesions was introduced to the mass-screening and health check-up program.

Prevalence and incidence rates of cutaneous lesions are surveyed by mass-screening program in 5 different areas in Japan. Prevalence of skin lesions were surveyed in Akita, Nagano, Hyogo, Miyazaki and Okinawa prefecture.

3. Method

Five different areas were selected: Yokote city in Akita prefecture, Saku in Nagano prefecture, Kase city in Hyogo prefecture, Miyazaki city in Miyazaki prefecture, and Ie village in Okinawa prefecture.

At the time of mass-screening, expert dermatologists routinely diagnosed skin lesion by watching head, face, arm, and shoulder. Biopsy was performed if necessary. Biopsy materials were frozen stored and used for molecular analyses after the routine diagnosis by surgical pathology. Standardized questionnaire was self described by the examinees and checked by nurses at

the time of screening.

4. Results

Number of examinees in each districts is shown in Table 1.

Table 1. Number of examinees for skin mass-screening.

Area	Period	Male	Female	Total
Yokote	1993-95	3747	3636	7383
Saku	1993-95	2214	4117	6331
Kasesi	1992-95	3984	2643	6627
Miyazaki	1995	304	544	848
Ie	1993-95	1229	1433	2662

In Yokote (Akita prefecture), 23 solar keratosis and 1 basal cell carcinoma were found. Prevalence rate of solar keratosis for more than age 40 was 814/100,000. In Saku (Nagano prefecture), 116 solar keratosis, 4 Bowen's disease, 3 basal cell carcinoma and 1 melanoma were detected. Prevalence rate of solar keratosis for more than age 40 was 654/100,000. In Kase city (Hyogo prefecture), 36 solar keratosis and 3 basal cell carcinoma was found. Prevalence rate was 480/100,000. In Miyazaki city, 10 solar keratosis and 2 basal cell carcinoma were found. Prevalence rate of solar keratosis over age 40 was 744/100,000.

In Ie (Okinawa prefecture), 66 solar keratosis, 7 basal cell carcinoma, 2 squamous cell carcinoma, 1 Bowen's disease, and 1 cutaneous T cell lymphoma were found. Prevalence rate of solar keratosis over age 40 became 1968/100,000. This value was significantly high compared to other areas in mainland Japan. Incidence rate of solar keratosis was calculated from consecutive 3-year screening in Okinawa. It became 1492-1547/100,000. Elastic degeneration (pseudoxanthoma elasticum) was very frequent in biopsy tissue.

In Hyogo study, examinees were categorized by the number of benign tumors, such as seborrheic keratosis or senile keratosis, into group I (more than 6 tumors), group II (1-5 tumors), group III (no tumor). Solar keratosis is frequently found in group I (Relative Risk=3.8).

5. Discussion

Increased UVB exposure due to the depletion of ozone layer is considered to increase skin cancer. Our epidemiological study on the prevalence of solar keratosis and other skin lesions in 5 areas from north to south showed significantly high prevalence of solar keratosis in Okinawa. Other 4 areas in mainland Japan did not show significant difference, although Kyushu showed higher prevalence. Mardonich et al suggested that the increase of UVB would become more prominent in the northern area with high latitude compared to the equatorial area. According to his observation, it is necessary to monitor the frequency of cutaneous lesions in northern prefectures.

Solar keratosis and related squamous cell carcinoma usually occur after age 70 years. The mass-screening program for detecting gastric, uterine cervix, mammary, pulmonary and colonic cancer is targeting age 40 to 65, so the older age group should be called to join the mass-screening to calculate more accurate incidence.

In Kase study, skin type I (easy to sun-burn without tan) group showed higher prevalence of solar keratosis than skin type II and III (easy to sun-tan). In Okinawa, this finding could not be confirmed. Many people in Ie village belonged to agriculture or fishery, so the chronic sun-tanning from childhood may conceal the difference of skin type. In Kase study, outdoor workers showed 3 times higher prevalence than indoor workers. Some genetic factors should be considered. People with more than 6 benign skin tumors, such as seborrheic keratosis or senile keratosis, showed that the relative risk of solar keratosis was three times higher than those with less than 5 tumors.

Continuous survey for the incidence rates in monitoring districts should clarify the real risk of UVB in the future.

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