The Prevalence of Common Acquired Melanocytic Nevi and the Relationship With Skin Type Characteristics and Sun Exposure Among Children in Lithuania

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Objective: To evaluate the prevalence of common acquired melanocytic nevi and its relationship with pigmentary characteristics and severe sunburns in children.

Design: Cross-sectional study.

Setting: Kaunas city, Lithuania (latitude of 55° 55 minutes).

Patients: A random sample of 484 children aged 1 to 2 years, 4 to 5 years, and 9 to 10 years and adolescents aged 14 to 15 years.

Interventions: A questionnaire that provided information about the history of sunbathing and skin type.

Main Outcome Measures: Atypical melanocytic nevi were defined according to the clinical criteria of the ABCDE rule.

Results: The median number of all common acquired melanocytic nevi was 12 in boys and 11 in girls; the median number of melanocytic nevi 2 mm or larger in boys and girls was 4. Twenty-seven percent of children experienced severe sunburns more than once. After adjustment for age and sex, it was found that children who had severe sunburns in summer and skin type I had a higher density of all melanocytic nevi and melanocytic nevi 2 mm or larger. The prevalence of atypical melanocytic nevi was 7% in all children and was age dependent (age 4-5 years, 1%; 9-10 years, 4%; 14-15 years, 16%). Three percent of children had congenital melanocytic nevi.

Conclusions: The total number of common acquired melanocytic nevi in children increased with age. There was a positive association between severe sunburns, the tendency of the skin to burn, and the number of all melanocytic nevi and nevi 2 mm or larger.

Arch Dermatol. 2005;141:579-586
in the published studies to date. Interestingly, some authors\textsuperscript{13} did not find any relevant relationship between the prevalence of MN and skin color (fair, medium, and dark). English and Armstrong\textsuperscript{7} have noticed that Australian children with red hair, fair skin color, a tendency to freckle, and a propensity to burn (skin type I) have less MN compared with children with dark hair, dark skin color, no tendency to freckle, and no propensity to burn.

Most prevalence studies on MN have been conducted in zones of sunny climate. Only a very few were performed in Eastern Europe. To our knowledge, until our study there have been no prevalence estimates of MN available in Lithuania as an example for the Baltic states, where the incidence of malignant melanoma is steadily increasing\textsuperscript{14} and where insufficient attention is paid to skin cancer prevention. The aim of our study, therefore, was to evaluate the prevalence of MN and its relationship with pigmented characteristics and sun exposure in children.

**METHODS**

**SUBJECTS**

This cross-sectional study was conducted on a random sample of 484 children (258 boys and 226 girls; ie, 50 children aged 1-2 years, 139 children aged 4-5 years, 141 children aged 9-10 years, and 154 adolescents aged 14-15 years). Children were selected from 10 kindergartens and 4 secondary schools in 1 Lithuanian city (Kaunas, latitude of 55° 55 minutes).

Initially, we selected 30 kindergartens and 24 higher grade schools of the city. For the study, we randomly selected 1 public school and 2 kindergartens from 4 different regions of Kaunas city. During the survey, it was necessary to add 2 kindergartens with groups of children aged 1 to 2 years. Within schools and kindergartens, children were recruited in whole classes and groups. When there were more classes of a particular grade, classes were chosen randomly.

After permission was obtained from state educational departments to approach school and kindergarten principals, meetings were held with principals, other teachers, and representatives of parents or parent groups at each school and kindergarten to explain the aims of the study. All schools and kindergartens that were approached agreed to participate. Children were first recruited by means of a letter to parents with a consent form. The study purposes were explained to the children and/or parents who were informed that the participation was voluntary. Positive response rates varied considerably among the age groups, with 99% of parents of children aged 1 to 2 years responding, compared with lower rates from parents of children aged 4 to 5 years and 9 to 10 years and adolescents aged 14 to 15 years (95%, 93%, and 80%, respectively).

**EXAMINATION**

One experienced dermatologist (S.V.) conducted the examination of the skin and nevi. A standard protocol\textsuperscript{15} was defined for the counting and identification of MN. Melanocytic nevi were defined as brown to black pigmented macules or papules of any size, darker in the color than the surrounding skin, excluding lesions with the clinical characteristics of freckles, solar lentigines, or café au lait spots. No attempt was made to differentiate lentigo simplex from junctional MN. Skin-colored palpable lesions with the morphological features of compound or dermal MN, halo nevi, nevi spili, congenital nevi, and blue nevi were numbered separately but were included in the total number of MN. The number of café au lait spots and the severity and distribution of freckles and solar lentigines were recorded separately.

Height and weight were measured to estimate body surface area (BSA) of the children and thereby allow the calculation of the density of MN.\textsuperscript{16} The body surface was divided into 26 sub-sites, excluding buttocks and genitalia in 9- to 10-year-old children and breast in 14- to 15-year-old adolescent girls. A metric mole analyzer with circles ranging from 1 to 12 mm was used to measure MN of any size, nevi of 2 mm or larger in diameter, and palpable MN separately from the flat lesions. Melanocytic nevi were measured without stretching the skin, and the size was assessed if the greatest dimension of the lesion touched both sides of the circles. The location of MN was marked on anatomic charts as proposed by Gallagher et al.\textsuperscript{17}

A separate note was made of any large (≥5 mm in diameter) AMN. Atypical MN was defined according to the clinical criteria of the ABCDE rule (asymmetry, border irregularity, mixed color, diameter ≥5 mm, and erythema at the margins or elevation of the lesions). The diagnosis of an AMN was established if at least 3 of the 5 clinical criteria were fulfilled. Epiluminescent microscopy was used to further differentiate AMN from other pigmented lesions.

We assessed the diagnostic validity of AMN counting of one of the authors (S.V.) in a substudy of German patients at the University Hospital in Magdeburg, Germany. The clinical judgment regarding AMN differed by less than 5% from the judgment of an experienced dermatologist (H.G.) in Magdeburg.

Hair, skin, and eye color were recorded for each child. Skin color was estimated using a 12-skin tone panel for the left buttock. Freckles and solar lentigines (categorized as scores 0, 10, 20, and ≥30) were numbered on the face, arms, and shoulders. Later on, the presence of these lesions was analyzed together to avoid misclassification.

**STANDARDIZED INTERVIEWS**

Before the physical examination of the children, standardized interviews were performed with at least one of the parents of children aged 1 to 9 years (most frequently with mothers) and adolescents aged 14 to 15 years. Questions were asked regarding the residential history of the child, the family history of malignant melanoma, sunbathing and sun protection in the summer, sensitivity to sunlight, and the incidence (in numbers) of severe sunburns since birth. The knowledge about risk factors of malignant melanoma (parents of the children and adolescents) was asked as well. Skin types (I-IV) were assessed according to the Fitzpatrick scale.

**STATISTICAL EVALUATION**

The more detailed multivariate analysis was performed among 4- to 15-year-old children and adolescents (n=378). Children aged 1 to 2 years (n=50) and children with missing values of provided questionnaire data were excluded (n=56).

The number of MN on the whole body (all sizes and MN ≥2 mm) was expressed both as totals and as number per unit of BSA. For total body density of MN, adjustment was made to account for the buttocks, genitalia, and breast, reducing the BSA on average by 8% in children older than 9 years and by 12% in adolescent girls aged 14 to 15 years.

Because the total number of MN and densities were positively skewed, median values and interquartile range (IQR) are given. To eliminate the asymmetry of the MN distribution, we applied a logarithmic transformation of the MN number. Geometric mean and its 95% confidence intervals (CIs) were cal-

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calculated, assuming that the number of nevi per BSA was log-normally distributed. The geometric mean in most cases closely approximated the median number.

Age and sex differences of MN number were assessed with nonparametric Kruskal-Wallis and Wilcoxon-Mann-Whitney median comparison tests. For the comparison of the variables divided into 2 groups, the asymptotic arch sinus test or precise probability comparison test was used. A correlation matrix of bivariate relationships between the variables stated herein and the total number of MN was constructed using linear regressions, nonparametric Kruskal-Wallis and Wilcoxon-Mann-Whitney median comparison tests, and $\chi^2$ statistics.18

We assessed the independent effects of possible risk factors on the log of the number of MN per unit BSA by multiple regression models using the computer software GLM.18 We used the log of the MN per unit of BSA as the dependent variable.

The independent categorical variables were declared as generalized linear model factors. The statistical analysis was performed using SPSS version 10 (SPSS Inc, Chicago, Ill) software.18 Throughout the statistical analysis, $P<.05$ was considered statistically significant.

**RESULTS**

**THE NUMBER OF COMMON ACQUIRED MN**

Of the 484 children, 92% (95% CI, 87%-97%) had MN, flat or raised. The MN smaller than 2 mm comprised two thirds of all countable lesions in children. Most (72%) of these MN were flat lesions. Melanocytic nevi 2 mm or larger, flat or raised, were found in 86% (95% CI, 83%-89%) of the screened children.

The total number of MN ranged from 0 to 100 and that of MN 2 mm or larger from 0 to 53. Most children aged 1 to 2 years did not have any MN (all sizes and MN ≥2 mm, median=0 [IQR, 0-1]). In 434 children and adolescents aged 4 to 15 years, the median of the number of MN of all sizes in boys was 15 (IQR, 5-28) and in girls, 13 (IQR, 6-22); the median of the number of MN 2 mm or larger in both boys and girls was 4 (boys: IQR, 2-9; girls: IQR, 2-8).

The total number of MN (all sizes and ≥2 mm) increased progressively with age among both boys and girls (P<.001) (Figure 1), and the increase was not explained by increasing body size because there was a similar increase in the number of nevi per square meter of BSA examined with age (P<.001) (Figure 2).

Number of MN per unit of BSA (density of MN) was higher in 1- to 2-year-old girls than in boys (2 [girls] vs 0 [boys]; $P<.01$). Boys aged 9 to 10 years showed both a higher number and density of MN of all sizes compared with girls ($P<.05$). Also, adolescent boys aged 14 to 15 years had higher number and density of MN (all sizes and ≥2 mm) compared with the girls (Figure 1 and Figure 2).

**THE PREVALENCE OF ATYPICAL AND CONGENITAL MN**

One or more AMN were found in 33 (7% [95% CI, 5%-9%]) of 484 children. Atypical MN were detected more frequently in adolescents aged 14 to 15 years than in children aged 9 to 10 years and 4 to 5 years (16% [95% CI, 11%-22%]; 4% [95% CI, 2%-8%]; and 1% [95% CI, 1%-4%], respectively). There were no significant differences between the sexes for the prevalence of AMN (Figure 3). Children aged 1 to 2 years and girls aged 4 to 5 years had no AMN.

Most (77%) of the 49 diagnosed AMN in all children were found on the trunk; half of them were found on the back, including the shoulders and buttocks. The remaining AMN were detected on the scalp (8%) and the upper limbs (10%), and 6% (in equal proportions) were found on the lower extremities, neck, and face. Three percent of children had congenital MN.

**PIGMENTARY CHARACTERISTICS**

A collection of more than 20 variables of the density of MN was assembled after exploratory analyses of the questionnaire and examination data. The density of MN (all sizes and ≥2 mm) showed no association with skin color of the sun-protected site of buttocks, family history of melanomas (found in 5 subjects), frequency of visits to the
beaches, use of sunscreens, and the level of knowledge of risk factors of melanoma reported by adolescents aged 14 to 15 years and mothers of younger children.

Table 1 gives the number of MN of all sizes by the child’s sex and other important predictors of the prevalence of MN. Crude rate ratios were calculated for predicted mean of the number of MN per BSA in specified categories to predicted mean in baseline category. Adjusted rate ratios were calculated from the linear regression program used to evaluate the effect of age on MN number, controlling for the effects of other factors listed in Table 1.

After the adjustment for the differences of age and other factors, the number of MN of all sizes in boys was not significantly higher than that in girls (Table 1). The children whose skin tends to burn (skin type I) had a 50% higher MN rate ratio compared with those who tend to burn less easily (skin types II-III). Children with red hair had less MN of all sizes compared with those with light and dark hair. The number of MN of all sizes was not related to skin and eye color. The presence of freckles or solar lentigines on the face, arms, or shoulders was significantly associated with a higher number of MN of all sizes. Children with 1 or more AMN had 2 times higher crude rate ratios of MN of all sizes (Table 1).

**SUN EXPOSURE**

Most (77%) of the 484 children suntanned on beaches regularly each year. Half (50%) of the children most frequently visited beaches at noon. About one third (27%) of the children experienced a severe sunburn resulting in soreness and reddened skin more than once. Of the subjects, 28% used sunscreens. Of these, 78% used sunscreens sometimes on sunny summer days and 22% on sunny days all year long. 19% of children used sunscreens appropriately (half an hour before the expected sun exposure and repeatedly every 2 hours as after bathing). Children who had severe sunburns (with redness, peeling, and/or blistering) once or several times had significantly higher crude and adjusted ratios of MN of all sizes compared with those who did not experience severe sun exposure (Table 1). The frequency of being outdoors and sunbathing in beaches, the duration of summer holiday in beaches, and the use of sunscreens and wearing shirts were nonsignificantly associated with the number of MN of all sizes (data not shown).

The similar analysis of the number of MN 2 mm or larger on the body adjusted for age, sex, and other factors showed that this number was higher in boys compared with girls and in blue-eyed subjects compared with brown-eyed subjects (Table 2). The children whose skin tends to burn (skin type I) had a significantly (2 times) higher number of MN 2 mm or larger compared with those who tan without burning (skin type IV) (Table 2). Subjects with AMN and severe sunburns had significantly more MN 2 mm or larger compared with the referential variable groups (Table 2). The presence of freckles and solar lentigines and skin color were nonsignificantly associated with the number of MN 2 mm or larger (Table 2).

**COMMENT**

The evaluation of the prevalence of MN and its potential risk factors for malignant melanoma is difficult because this means lifelong longitudinal studies. The number of MN changes during a person’s life and is dependent on the total sum of various internal and external factors (ie, genetics, hormonal, constitutional, and pigmentedary characteristics and sun exposure, and geographic latitude). The varying prevalence estimates of MN among children depend not only on these factors but also on the qualification of the investigator, the definition of MN, and on the methods of MN counting. As a rule, experienced clinicians count more nevi compared with students. It is plausible that the observation errors in this study are small because the study was performed by only 1 experienced examiner-dermatologist, randomly controlled by 1 “supervisor” dermatologist.

The size of MN in this study was determined using standardized methods of measurement, and the inspection of the body was performed in spring and autumn, when freckling and skin pigmentation is not yet increased because of sun exposure. Although there are recommendations on how MN should be evaluated, controversies exist regarding the size of MN that should be counted. Most researchers exclude small (<2 mm) nevi and small dark brown pigmented freckles called lentigo simplex to avoid measurement errors. Until now, the issue of the size of nevi has not been resolved in the literature. We included small (<2 mm) nevi into the general number of nevi.

Because the children were selected randomly and the response proportions were high, it is likely that our results represent unbiased population-based prevalence estimates of MN among all Lithuanian children if one assumes that children from Kaunas city are a representative sample of all children in Lithuania. To make the findings of the study comparable with those of other studies, separate evaluation of the prevalence of MN 2 mm or larger was performed.
The comparison of numbers of MN of all sizes and MN 2 mm or larger in our study provides another advantage. We were able to study how much our results depend on the arbitrary cutoff for counting MN.

The number of MN on the body among white children depends on the geographical place and sunshine intensity. In England (Midlands) and in Lithuania (Kaunas), 1685 sunny hours per year, respectively, can be measured.24,25 In Queensland (Australia), the incidence of malignant melanoma is the highest, and the number of sunny hours per year reaches 2928 hours.26 In England, for children of a similar age and from the same regions, 2 MN 2 mm or larger were found;27 in Lithuania, 4 MN 2 mm or larger were found (present study); and among Australian children in Townville, 77 MN of the same size were found.10

In our study, the number of MN progressively increased by age. The number of MN in adolescents aged 14 to 15 years was several times higher than the number in children aged 4 to 10 years. Data from other researchers confirm that the number of MN is higher among adolescents aged 14 to 18 years compared with children aged 6 to 12 years.10,17 However, others determined that the period of adolescence is not relevant for the density of MN, and the number of nevi per unit of BSA increases only up to age 9 years. According to the results of another study, a repeated examination of adolescents after 5 years showed a decrease in the density of MN due to the relative increase in BSA.28

In the present study, the calculations of the density of MN showed that the number of MN increases with age even after adjusting for BSA. Consequently, adolescents have the highest number and density of MN compared with children in other age groups. A longitudinal study in adolescents39 also found that increasing age was the most important factor in the development of nevi.

Most researchers7,13,21,30-32 have found a higher number and density of MN in boys compared with girls, and we found the same tendency in our study. Boys aged 9 to 10 years had more MN of all sizes compared with girls, while male adolescents aged 14 to 15 years had more MN, both of all sizes and MN 2 mm of larger. After adjustment for several potential confounders, male sex remained an independent, although weak, factor associated with the number of MN.

Although limited published data exist on the prevalence of AMN among children, it is emphasized that adolescence is a critical period for their development.9 Among adults, AMN were found in 2% to 18% of cases, most fre-
quently in people aged 20 to 30 years. In Australia, where the prevalence of malignant melanoma is the highest, AMN were found in 4% to 21% of cases among children and adolescents aged 6 to 15 years. Only a limited number of studies present statistical data on the prevalence of AMN evaluated according to both clinical (18%) and histological (8%) changes and only among adults. A similar strong positive relation was also found in other studies.8-10,21,35

Several studies showed that the prevalence of MN among white children decreased with the increase in skin pigmentation,8,10,30,31 although other studies did not confirm this relationship either.11,22,23 Our study did not show any relationship between the skin type (light, medium, or dark) and the number of MN. These conflicting results could have been caused by a subjective evaluation of the skin color. The color of the skin may change from season to season or be dependent on the illumination of the room, and therefore in further studies it is necessary to apply objective methods by consensus (eg, a spectrorimeter), as was done by Harrison et al. Most studies, however, have found a positive association between freckling,8,10,11,21,35 light hair color,10,30,31 and the number of MN among children.

To reduce misclassifications in our study, we separately documented the presence of both freckles and solar lentigines on the face, shoulders, or arms. After adjustment for constitutional and other variables, we found that the presence of freckles and solar lentigines on the face, shoulders, or arms is related to a higher total number of MN. These results could have been caused by a subjective evaluation of the skin color. The color of the skin may change from season to season or be dependent on the illumination of the room, and therefore in further studies it is necessary to apply objective methods by consensus (eg, a spectrorimeter), as was done by Harrison et al. Most studies, however, have found a positive association between freckling,8,10,11,21,35 light hair color,10,30,31 and the number of MN among children.

Table 2. Median and Geometric Mean Number of Common Acquired MN 2 mm or Larger by Sex, Pigmentary Characteristics, and Severe Sunburns Among 378 Children in Kaunas City, Lithuania*

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. of Children</th>
<th>No. of Common Acquired MN</th>
<th>Crude RR† (95% CI)</th>
<th>P Value</th>
<th>Adjusted RR‡ (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girl</td>
<td>177</td>
<td>4.2</td>
<td>3.9 (3.4-4.3)</td>
<td>1.0 (Referent)</td>
<td>1.0 (Referent)</td>
<td>.09</td>
</tr>
<tr>
<td>Boy</td>
<td>201</td>
<td>4.5</td>
<td>4.4 (3.9-4.9)</td>
<td>1.1 (0.9-1.3)</td>
<td>1.2 (0.7-1.6)</td>
<td>.006</td>
</tr>
<tr>
<td>Skin type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burn, then tan (II-III)</td>
<td>303</td>
<td>4.5</td>
<td>4.3 (3.9-4.7)</td>
<td>1.3 (1.0-1.5)</td>
<td>1.5 (1.3-1.8)</td>
<td>.001</td>
</tr>
<tr>
<td>Tan only (IV)</td>
<td>64</td>
<td>3.3</td>
<td>3.4 (2.7-4.1)</td>
<td>1.0 (Referent)</td>
<td>1.0 (Referent)</td>
<td>.01</td>
</tr>
<tr>
<td>Burn only (I)</td>
<td>11</td>
<td>7.1</td>
<td>7.2 (3.9-10.4)</td>
<td>2.1 (1.1-3.1)</td>
<td>2.0 (1.1-3.1)</td>
<td>.02</td>
</tr>
<tr>
<td>Hair color</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>7</td>
<td>5.1</td>
<td>5.1 (2.1-8.0)</td>
<td>1.3 (0.5-2.1)</td>
<td>&gt;.99</td>
<td>.09</td>
</tr>
<tr>
<td>Blond and light brown</td>
<td>156</td>
<td>4.6</td>
<td>4.7 (4.1-5.2)</td>
<td>1.2 (1.0-1.4)</td>
<td>&gt;.99</td>
<td>.99</td>
</tr>
<tr>
<td>Dark</td>
<td>215</td>
<td>4.3</td>
<td>3.9 (3.5-4.3)</td>
<td>1.0 (Referent)</td>
<td>1.0 (Referent)</td>
<td>.06</td>
</tr>
<tr>
<td>Freckles/solar lentigines§</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>197</td>
<td>4.1</td>
<td>3.7 (3.2-4.0)</td>
<td>1.0 (Referent)</td>
<td>1.0 (Referent)</td>
<td>.001</td>
</tr>
<tr>
<td>Present (≥1)</td>
<td>181</td>
<td>4.9</td>
<td>4.9 (4.3-5.4)</td>
<td>1.3 (0.9-1.5)</td>
<td>&gt;.99</td>
<td>.01</td>
</tr>
<tr>
<td>Atypical melanocytic nevi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>31</td>
<td>4.1</td>
<td>3.9 (3.6-4.3)</td>
<td>1.0 (Referent)</td>
<td>1.0 (Referent)</td>
<td>.001</td>
</tr>
<tr>
<td>Present (≥1)</td>
<td>347</td>
<td>9.0</td>
<td>8.5 (6.2-10.7)</td>
<td>2.2 (0.3-1.6)</td>
<td>1.7 (1.2-2.4)</td>
<td>.001</td>
</tr>
<tr>
<td>Severe sunburns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>263</td>
<td>4.1</td>
<td>3.8 (3.7-3.9)</td>
<td>1.0 (Referent)</td>
<td>1.0 (Referent)</td>
<td>.04</td>
</tr>
<tr>
<td>Present (≥1)</td>
<td>115</td>
<td>5.8</td>
<td>5.3 (4.5-6.0)</td>
<td>1.4 (1.2-1.6)</td>
<td>1.2 (1.1-1.7)</td>
<td>.001</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; MN, melanocytic nevi; NS, nonsignificant variables (skin color and freckles/solar lentigines) were not included in the final model; RR, rate ratio.

*Median and geometric mean of total MN number per body surface area. P value trend is given from pair-wise comparisons; bold indicates statistical significance.

†Crude rate ratio of predicted geometric mean in specified category to predicted geometric mean in baseline category.

‡Adjusted RR for age and all variables listed in the tables were calculated from the linear regression program.

§On the face, arms, and shoulders.
We found that severe sunburns experienced once or several times were associated with a higher number of MN (all sizes and MN ≥2 mm). Other groups also found more nevi in children who experienced severe sunburns once or several times during their last summer vacations, during the last 5 years before examination, or at any time in their lives. In more recent studies, the most important environmental risk factors for the development of MN were holidays in sunny areas, outdoor activities during the summer, and routine time exposed to the sun during the middle of the day. Some studies showed that mild to moderate sun exposure also contributes to the development of MN. This finding is at least partly in contrast to our study and several cross-sectional studies with children and case-control studies with adults, with the defined hypothesis that severe sunburns are required for the development of MN.

In our study, children very rarely used sunscreens compared with children in other countries. The results of our study and recent cross-sectional studies of MN development in European children and suggest that sunscreen is not effective in preventing the development of new MN. One possible explanation of this is that the use of sunscreens with high sun protection factors promotes behavior associated with extended duration of sun exposure. This finding is in agreement with the study by Luther et al, who found an increase in new MN among children using sunscreen regularly. In contrast, the findings by Gallagher et al show that broad spectrum sunscreens may attenuate the development of nevi in children, especially if they have freckles.

Some limited data from Harrison et al demonstrate the presence of nevi within the first year after birth in a cohort of Australian children. The use of sun-protective clothes, finding more opportunities for children to stay in the shade, and protecting them from exposure to the sun during the day times of most intense UV exposure should most likely play a more important role in the prevention of MN.

The present study demonstrates that the total number of common acquired MN increases with age in children. Atypical MN were more frequently detected in 14- to 15-year-old adolescents compared with children in other age groups. There was a positive association between severe sunburns, the tendency of the children’s skin to burn rather than tan (skin type I), and the number of common acquired MN, irrespective of the size of the MN. These findings showed that the principle of avoiding heavy sun exposure is also valid for the northern latitude of Lithuania. The results of the study should have a direct impact on the concept of the governmental preventive strategies in the Baltic States in the near future.

Accepted for Publication: October 6, 2004.

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Funding/Support: This study was supported by Kaunas University of Medicine, Kaunas, Lithuania, and Otto-von-Guericke-University Magdeburg, Magdeburg, Germany.

Previous Presentation: The data from this article were presented in a poster report at the International Epidemiological Association European Regional Meeting; August 24-26, 2000; Kaunas, Lithuania.

Acknowledgment: We thank Andreas Stang, MD, MPH (Institute of Medical Epidemiology, Biometry, and Informatics, Martin-Luther-University of Halle-Wittenberg, Halle, Germany), for his participation in the data analysis, interpretation of the results, and writing the manuscript.

REFERENCES

21. Coombs BD, Sharples KJ, Cooke KH, Skegg DC, Elwood JM. Variation and co-