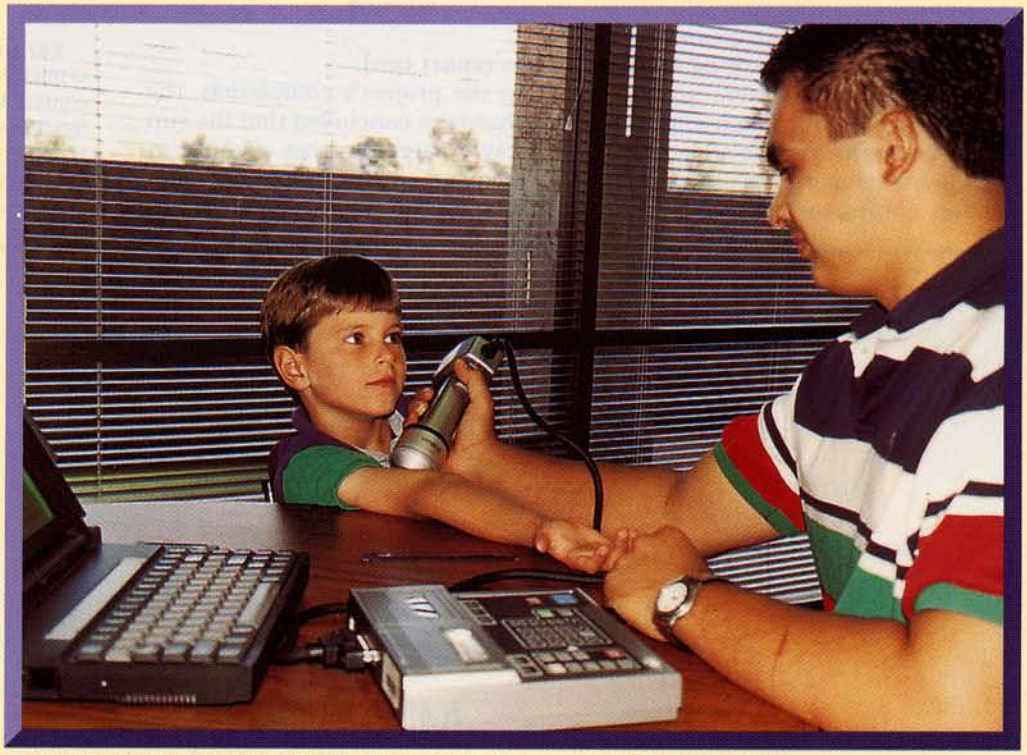
MEDICINE

Colorimeter Can Detect Incipient Skin Cancers

by Mary Klein Buller

Ultraviolet radiation, a major risk factor for skin cancer, is also the most avoidable; yet, skin cancer has become the most common malignancy in the US. Researchers agree that because exposure in childhood may increase the risks, primary prevention must start early in life, when habits, attitudes and lifestyle patterns are still being formed.

At the Arizona Cancer Center, a National Cancer Institute-designated center at the University of Arizona Health Sciences Center, researchers evaluated the effectiveness of a prevention curriculum for children in Grades 4 through 6. The goal was to increase the youngsters' knowledge of skin cancer prevention and to decrease their sun exposure. Called Sunny Days, Healthy Ways, the two-year study — funded by the Arizona Disease Control Research Commission — involved 447 pupils from four public elementary schools in southern Arizona. The study was directed by David B. Buller, the principal investigator on the project.



Field interviewer Dominic Marchetti measures the sun's effects on a child's arm.

Measured tanning

A key element of the study was obtaining an objective assessment of skin reflection as a measure of sun tanning. That information was gained by employing a **Minolta tristimulus colorimeter**, providing what the researchers describe as reliable and valid data that helped determine whether the sun safety and skin cancer prevention curriculum was successful in decreasing sun exposure.

The researchers hypothesized that children exposed to the curriculum would have greater knowledge about the sun, skin, skin cancer and skin cancer prevention; hold more favorable attitudes toward skin cancer prevention behavior and less favorable attitudes toward sun exposure; exhibit more skin cancer prevention behaviors; and show less sun exposure than pupils who were not.

As part of the study's comprehensive experimental methods, a baseline sun tanning measurement was obtained from all students. The children were then divided into two groups: an intervention group that received the five-week sun safety curriculum and a control group that did not.

To obtain the baseline measurements, the tristimulus colorimeter was placed noninvasively on the skin with minimal pressure to avoid blanching error (whiteness caused by cutting off blood flow). It flashed a strobe light and recorded the wavelength reflected by the skin surface. To reduce variations in readings, five measures were made on the underside of each student's upper arm (an unexposed control area), and five were made on the lower outer side of the same arm (an exposed area). A BASIC software

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program accepted, averaged and stored the five measurements on each of the two skin sites.

Readings were averaged at each measurement site for analysis. At each testing, distance was measured from the elbow and/or wrist to the site to ensure that pretest and posttest measures were taken at the same spots.

Operating in the field

The colorimeter consists of a lightweight, handheld measuring head, a compact, battery-operable data processor, a built-in thermal printer and a microprocessor. Sid Bowen, the research specialist on the project who measured the children's skin tones at their schools, noted that versatility of programming and easy accommodation of various situations and settings are the two greatest benefits of the color-measuring instrument. "The children were quite intrigued by the unit, which improved subject compliance," he added.

Data was transferred directly to a laptop computer using the colorimeter's RS-232C terminal port. This facilitated storage of all primary records and use of the data in a variety of ways, such as in specialized calculations, creating data files or combining data from multiple instruments. The terminal port also allowed all functions of the colorimeter to be controlled through the laptop.

The colorimeter offers several color measurement display systems, including L*a*b*; Yxy; L*C*h*; Hunter Lab, or tristimulus values XYZ. The L*a*b* scale was used to measure three primary color elements. These measures of changes in skin color are highly reproducible, are not influenced by ambient lighting and are independent of skin pigmentation and dermal optical scattering.

The report card

At the project's completion, the researchers concluded that the sun safety curriculum was effective in increasing skin cancer prevention in elementary school children. Assessment of sun exposure using the color-measuring instrument indicated eight weeks later that pupils receiving the curriculum were less tanned than those in the control group.

The instrument has since been put to use in a four-year study called the Family Sun Safety Project, a National Cancer Institute-funded skin cancer prevention education program at the Arizona Cancer Center. □

Meet the author

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For information on tristimulus colorimeters or any of Minolta's products, contact Minolta Corporation, Instrument Systems Division, 101 Williams Drive, Ramsey, NJ 07446; call (888) ISD-COLOR, fax (201) 825-4374, or browse Minolta's website at www.minoltausa.com