**AIM**

To develop a reproducible rating system for sun-protective clothing that incorporates the % of the body surface covered by the garment, in addition to the ultraviolet protection factor (UPF) of the fabric.

**BACKGROUND**

Skin cancer is the most common form of cancer and typically affects sun-exposed body sites. Number of pigmented moles is a major phenotypic risk factor for melanoma. Mole development is related to sun-exposure in Caucasian children. Clothes provide a barrier that reduces the amount of UV reaching the skin.

In 1996, Australia pioneered the relative rating of the sun-protective capabilities of clothing based on the transmission of UV through fabric. UPF measurement and labelling specifications are documented in the Australian and New Zealand Standard, AS/NZS 4399:1996, which has been adopted almost universally by the textile industry.

Fever moles develop in children on body sites routinely covered by high UPF clothing thereby reducing future risk of melanoma (see figure 1, below).

**THE ALGORITHM**

Comparison of bands marked on the mannequin body surface determine the total surface area covered by the garment being tested. The protection provided by a garment may be expressed by the ratio:

\[
\text{GPF} = \frac{C}{U}
\]

- \(C\) = Number of horizontal lines visible on the clothed mannequin
- \(U\) = Number of horizontal lines visible on the unclothed mannequin.

**METHODS**

Mannequins matching median height of 1-10 year-old children (see Figure 5) were sourced. Each mannequin was fixed to an optical bench and marked with horizontal lines at intervals separated by 1 cm with the aid of a laser level (see images 6 & 7).

An image processing algorithm was developed to count the number of marked lines on clothed and unclothed mannequins.

**CONCLUSIONS**

GPF is able to be calculated for both upper and lower garments separately. Further work will determine whether it is more useful to report the GPF for garments separate to the UPF of the fabric, or whether a composite measure of the two quantities and a new rating system for sun-protective clothing should be developed.