

EQUIPMENT

PC: IBM compatible Pentium III with 256 mb memory running under Windows 2000.

Video: Cohu solid state B&W camera, 50mm lens/20mm extension,
Coreco TCI ULTRA II frame grabber.

Software: OPTIMAS v6.2, Microsoft EXCEL 2000, StatSoft STATISTICA 6

Lighting: Fluorescent "Flood Lamps" appropriately positioned for even lighting.

METHOD

The image capture system was set to "flat" response i.e. the contrast and brightness were adjusted to 50% of their variable range. The camera lens aperture was adjusted to give a mean gray level of 130 units when the target was a standard brightness reference surface.

Under the selected magnification, the **D-SQUAME®** disc fills the entire monitor screen and a typical disc with scales on it exhibits both black background in areas not covered by scales and bright areas where there are dense flakes.

The gray level histogram of the captured image was obtained by the software program. 4 reported parameters were derived from the histogram which reports the sample area percentage observed at each of 256 levels of brightness.

1. Average brightness of the sample under standardized lighting conditions: ranges from 0 to 255, increasing with the overall amount and thickness of dry skin scales*.
2. Percent (times 10) of the sample area covered by fine flakes. This is the sum of the histogram values from level 10 to level 128 representing the thinnest flakes.
3. Percent (times 10) of the sample area covered by coarse flakes. This is the sum of the histogram from level 129 to 255 representing the highly reflective thick flakes.
4. The desquamation index (Shatz et al) derived from the formula:

$$DI = (2A + \sum_{n=1}^{n=5} [T_n \cdot (n-1)]) / 5$$

A = Percent area covered by all scales

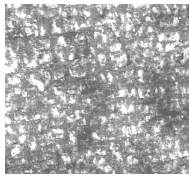
T_n = Sum of percent of scale area in histogram range assigned to thickness level n

n = Thickness level ranging from 1 to 5 (5 equal sized ranges of the histogram)

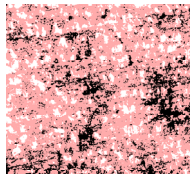
*Recorded but not used in statistical analysis.



GENERAL GUIDELINES FOR RESULTS INTERPRETATION



Original Image



- Fine Flakes
- Coarse Flakes

The typical analysis interpretation in our experience is

- The **FINE** flakes value may not vary much as it is the general "background" of normal desquamating cells. It might be thought of as the desquamation potential, as it frequently increases in skin treated with mild keratolytics. The value may also be decreased by the emollient action of treatment products.
- The **COARSE** flakes value will be most sensitive to treatment effects, increasing with irritancy (hyperkeratosis), and decreasing with emolliency. Small and large flake values will always add up to less than 1000 which is 10 times 100%, the total area of the sample.
- **D.I.**, the desquamation index provides a good overall measure of dryness and compares well with typical clinical grades: Shatz et al give the following approximate correspondence between clinical grading and the desquamation index.

Non-Dry	8
Moderately dry	37
Severely dry	60

Reference

Schatz, Kligman, Manning and Stoudemayer "Quantification of dry (xerotic) skin by image analysis of scales removed by adhesive discs (**D-SQUAME**®)". Contribution from U of P School of medicine and Biosearch, Inc. JSCC 44:53

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EXFOLIATION STUDIES USING D-SQUAME® SKIN SAMPLING DISCS

Exfoliation refers to the natural process of losing stratum corneum surface cells, which are in the “equilibrium condition” replaced by younger cells from the deeper layers of the skin. Exfoliation and *desquamation* are similar terms.

D-SQUAME® discs are a means of forced exfoliation: most surface cells that are “ready” to exfoliate are removed at once. The advantage over natural exfoliation is that one can determine the extent of the process from observing the **D-SQUAME®** disc and quantify it using image analysis.

Two kinds of experiments are possible:

1. Exfoliate then measure. In this protocol paired sites are selected (e.g. lower legs), one is treated with the test exfoliation procedure, then some time later both control and treated sites are sampled with **D-SQUAME®** discs. A reduction in scaling at the treated site measures the efficacy of the treatment.
2. Treat with keratolytic substance over time then measure. In this protocol paired sites are selected (e.g. forearms), one site is treated on a schedule with an exfoliation inducing substance, a keratolytic, the other is an untreated control. Some time after the last treatment both control and treated sites are sampled with **D-SQUAME®** discs. An increase in fine flake scaling is an indication of the loosening of the surface scales, measuring the efficacy of the test substance.

In both experiments, the influence of the vehicle can be strong. In protocol 1 the vehicle might mask poor performance of the exfoliant substance. In protocol 2 the vehicle might mask good performance of the keratolytic substance. Vehicle controls are advisable. The phrase “some time later” used above is also an effort to separate the effects of the vehicle (short-term) from the test substance. Measurements should be made no less than 8 hours after final application of the test substance.

