

## SEBUTAPE PATCH / INDICATOR IMAGE ANALYSIS

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### Equipment

**Hardware:** Cohu solid state B&W camera, 50mm lens/20mm extension, Coreco TCI ULTRA II frame grabber, IBM compatible Pentium III running under Windows.

**Software:** OPTIMAS, Microsoft EXCEL, StatSoft STATISTICA.

**Sample:** SEBUTAPE® sebum collection patches mounted on a storage card or indicators in 35mm slide preserver pages.

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

Prior to each analysis series the lighting conditions and system response are standardized to a reference gray target ensuring reproducible illumination response at the video frame grabber. The software automatically estimates the threshold level to include the region of the image representing the sebum spots. Each patch/indicator is measured under software control ensuring identical manipulation of every sample. If necessary, the threshold for each sample may be fine-tuned by the operator. The two pieces of information gathered from the dark areas on the SEBUTAPE patches/indicator representing trapped sebum are the number of spots and the total area of the spots detected in a fixed area (approx. 10mm x 8.2mm) in the center of the patch. The area of spots is converted to nominal volumetric units from the known pore volume of the SEBUTAPE material (38%) and the film thickness (0.0025cm). The Active Gland Count is expressed as counts/cm<sup>2</sup>, and the volumetric sebum output (or RELATIVE SEBUM DELIVERY RATE) as nanoliter/cm<sup>2</sup>. A data record for each patch analyzed is automatically written to disk for subsequent statistical analysis.

### General Guidelines for Results Interpretation

Changes in the count parameter indicate changes in the number of sebum producing sites detected during the sampling period (time the patch is on the skin or at the time indicator is touched to the skin). Note: variation in the sampling period will produce variation in the count—count initially increases with increased length of sampling period then decreases if adjacent sites "coalesce".

Changes in the volumetric sebum output level indicate overall changes in the amount of sebum collected during the sampling period. This is not the amount "produced" during the sampling period but the amount transferred or "delivered" from the gland openings to the SEBUTAPE® film. Note: variation in the sampling period will produce variation in the amount detected, increasing with increased length of sampling period.



## Bibliography

Does lipid sampling with the **SEBUTAPE**® technique disturb the skin physiology?, Clarys, Lambrecht, and Barel, *Skin Research and Tech. Vol 3, p169-172. (1997)*

SUMMARY: Describes results of various physiological measurements (Temperature, TWL, Surface Capacitance) comparing application of **SEBUTAPE**® film and other occlusive films. Concluded **SEBUTAPE**® film resulted in minor to NO disturbance of these measured parameters.

Two possible classifications of facial skin type by two parameters in Korean women: sebum excretion rate (SER) and skin surface relief (SSR). Park, Kim, Kim, and Kang, *Skin Research and Tech. Vol 5, p189-194. (1999)*

SUMMARY: Describes precisely calibrated method of assay of SER using **SEBUTAPE**® adhesive patches using image analysis technique.

Measurement of sebum output using a lipid absorbent tape. K. M. Nordstrum, H. G. Schmus, K. J. McGinley, and J. J. Leyden, *Journal of Investigative Dermatology, Vol. 87, p260 (1986).*

SUMMARY: Tested the reproducibility by serial measurement of sebum excretion rates (SER) of 10 individuals over a 6-week period, correlated this method with the conventional hexane extraction technique. Tapes gave consistent values for the SER's, and within subjects variation over the 6-week period was statistically non-significant. The amount of total lipid collected using this technique (n= 16) correlated well with the hexane extraction technique,  $r = 0.89$ . Free fatty acids ( $r = 0.87$ ), triglycerides ( $r = 0.92$ ), wax and cholesterol esters ( $r = 0.83$ ), and squalene ( $r = 0.88$ ) also showed good correlation.

Seborrhea in Acne-Prone and Acne-Free Patients. G.E. Pierard, C. Pierard-Franchimont, and T. Le, *Dermatologica Vol 175 p5 (1987).*

SUMMARY: Relationship between seborrhoea and acne studied using the Lipometre® and **SEBUTAPE**® films. Seborrhoea was more intense in acne-prone than in acne-free patients. For a given overall amount of sebum excreted, the individual activity of sebaceous follicles differs in the two groups of individuals tested. Seborrhoea in acne-prone patients is due to the presence of some highly active follicles that are almost never encountered in acne-free patients.

An improved procedure for quantitative analysis of sebum production using **SEBUTAPE**®. Pagnoni, Kligman, el Gammal, Popp, & Stoudemayer, *J. Soc. Cosmet. Chem. Vol. 45, p221-224 (1994)*

SUMMARY: Describes observations related to storage conditions of **SEBUTAPE**® which has been used to collect sebum samples. Makes recommendations for optimal storage and analysis conditions to enhance the accuracy and reliability of the the **SEBUTAPE**® method.

Handbook of Non-invasive Methods and the Skin, Serup, J., and Jemec, G.B.E., Eds., CRC Press, Boca Raton, 1995.

Chapter 24.1 Sebum-Absorbent Tape and Image Analysis

Bioengineering of the Skin: Methods and Instrumentation, Berardesca E, et al, Editors CRC Press, Boca Raton, 1995.

Chapter 8. Sebum

Bioengineering of the Skin: Skin Surface Imaging and Analysis, Wilhelm, K-P, et al, Editors CRC Press, Boca Raton, in press Fall 1996.

Part IIA Chapter 8. Use of **SEBUTAPE**® assessed by Image Analysis to Measure Sebaceous Gland Activity

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