

## Sebumeter

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Excess oiliness or excess dryness affects cosmetic appearance of the skin. Hence, estimation of oiliness is important to decide on the correct regimen to achieve cosmesis. Besides, sebum affects the permeability of skin and absorptivity of water, protects against bacteria and fungi, limits evaporation and affects permeation of pharmaceutical preparations and other active or non-active substances.

Hence measurement of natural presence of sebum on human skin particularly facial skin is a matter of current interest amongst dermatologists and pharmaceutical and cosmetic manufacturers.

Heterogenous components of sebum are produced from secretion of sebaceous glands, fat of keratinous layer and remnants of perspiration.<sup>[1]</sup> Sebum is a complex and variable mixture of lipids like glycerides, free fatty acids, wax esters, squalene, cholesterol esters, and cholesterol.

### Methods of sebum estimation

Many methods have been used in the past for collecting lipids from human skin and measuring their production.<sup>[2]</sup> They include swabbing by pads soaked in organic solvents such as hexane or ether,<sup>[3]</sup> washing lipid solvents over areas of skin circumscribed by rings or caps.<sup>[4]</sup> Strauss and Pochi devised a simple, reproducible but time consuming method for measuring human sebaceous secretion. They placed a pad of absorbent cigarette papers for 3 hrs on a delimited area of forehead and then extracted the sebum with diethyl ether.<sup>[5,6]</sup>

Antoine invented the sebumeter, which when placed on the skin displays a qualitative or quantitative reading of skin oiliness.<sup>[7]</sup>

Facial skin is usually classified as dry, normal and oily. However skin type does not match the amount of sebum secreted. Thus, simple and subjective classification is of very limited use and it should be re-evaluated by using an objective and standardized measuring tool like sebumeter.<sup>[8]</sup> It is a device by which sebum can be quantified from any area of skin in an objective manner.<sup>[9]</sup>

Different types of apparatus exist for measuring the amount of sebum. They are based on the principle that when sebum is deposited on a translucent element, such as a frosted glass or plastic plate or strip, the element becomes increasingly transparent (greater the amount of sebum applied, the greater the transparency produced).<sup>[10]</sup> Light passing through this sebum covered

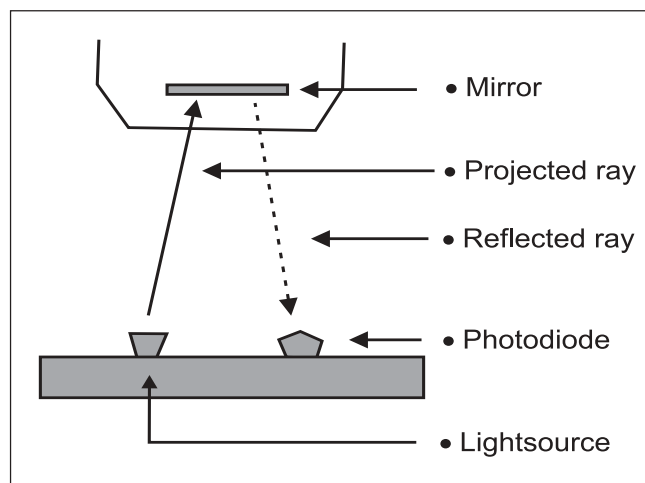


Figure 1: Optical diagram of sebumeter

**Table 1: Types of sebumeters**

| Instrument  | Sampling device   | Features   |
|---|---|--|
| <b>Sebutape</b> <sup>®[17,18]</sup><br><b>adhesive patches</b><br><b>Sebufix</b> <sup>®[19]</sup> | Adhesive, acrylic microporous polymeric film<br><br>Sebum collector foil without any glue | Measures sebum content of individual sebum-rich follicle, safe<br>Quick, no occlusion effects since no glue is used and thus avoids false positive results due to sweating. Live images of sebum flow can be stored with software provided |
| <b>Skin analyzer</b> <sup>®[20]</sup>   | Special tape in a sebumeter cassette and Corneometer probe                                | Corneometer plus sebumeter plus skin pH meter.   |
| <b>Skin Diagnostic SD 27</b> <sup>®[21]</sup>   | Special tape in a sebumeter cassette and corneometer probe                                | Corneometer plus sebumeter quick, portable (battery operated)  |

translucent element is then measured using photoelectric receiver.

### Mechanism of sebum measurement by sebumeter

The measurement is based on the principle of grease-spot photometry [Figure 1]. The measuring head of the cassette with its special tape is placed on the skin. It is then inserted into a slot of the device, where the transparency is measured by a light source passing through the tape. A photocell measures the transparency. A microprocessor calculates the result, which is shown on the display in mg sebum/cm<sup>2</sup> of the skin.

### Sebumeter probe (Cassette)

The Sebumeter-cassette contains a matt synthetic tape, 0.1 mm thick. The measuring head of the cassette exposes a 64 mm<sup>2</sup> section of the tape, which is transported forward by a trigger at the side of the cassette for the next measurement. The measuring time of 30 seconds is controlled by a clock set in the device. Sebum is then determined as explained in the measurement principle above. The instrument has an accuracy of  $\pm 5\%$ . The reading of sebum may be displayed as a number or as type of skin i.e. Dry; Dry/Normal; Normal; Normal/Oily; Oily.

### Uses of sebumeter

1. To classify skin type as dry, normal and oily in an objective manner
2. To prescribe pharmaceuticals/ cosmetics suitable to the patient's skin type to increase efficacy and minimize side effects
3. Pre-placement examination for correct analysis of

skin type in the field of occupational medicine e.g. person of dry skin type may not suitable to work in chemical industry involving use of acid and alkalies

4. To make early diagnosis of senile asteotosis
5. To measure skin-cleaning effects of soaps<sup>[11]</sup>
6. To do preliminary screening and follow up of patients with hyper-androgenic states<sup>[12]</sup>
7. To study the endocrine control of sebaceous follicle in women for assessing hormonal ageing<sup>[13]</sup>
8. To study the correlation between 'bad hair days' (days during which most women find their hair difficult to manage), sebum secretion, and menstrual cycle<sup>[14]</sup>
9. To study sebo-suppressive effects of certain anti-acne medications like retinoic acid in treatment of acne vulgaris<sup>[15]</sup>
10. To study the sebaceous gland activity in diabetics, in whom, the activity of the glands is decreased<sup>[16]</sup>

### Pros and cons of using a sebumeter

Sebumeter is a simple and quick (requires less than a minute) method of sebum estimation. The instrument is portable and its use requires little training. The only disadvantage is the cost of the instrument as well as the consumable viz., the cassette. Thus with increasing emphasis on skin enhancement, sebumeter is likely to become a common implement in dermatologist's office.

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