

**Shiseido Makes Scientific Breakthrough Regarding Unique  
Features of Skin Pores  
–Discovery of the Role Unsaturated Fatty Acids Play in Visible Pores–**

Shiseido conducted scientific analysis in relation to conspicuous pores, one of the most prominent skin problems in Japan or elsewhere, and thereby brought to light the following three characteristics:

Visible pores are caused by the formation of a cone-shaped hollow in the area around the pore opening.

The cells in the horny layer of these pore openings retain their nucleus, which should normally be absent, a condition otherwise known as parakeratosis<sup>\*1</sup>.

The visibility of pores coincides with the amount of sebum secreted, with the proportion of unsaturated fatty acids in sebum being particularly high in those persons with conspicuous pores, which acts as one of the factors in inducing parakeratosis.

While many elements of the detailed mechanism of visible pores have remained unexplained until now, Shiseido was able to scientifically elucidate the unique features of skin pores and in turn discovered new knowledge involving the role of unsaturated fatty acids. In conjunction with these findings, it was discovered that “AQUA INPOOL,” a Shiseido-original moisturizing ingredient, helps to inhibit parakeratosis brought about by unsaturated fatty acids. Shiseido will accordingly pursue the development of skincare products containing AQUA INPOOL that are designed to keep visible pores in check.

**What are Visible Pores?**

Visible pores are a skin problem common to a wide range of age groups in which the pores on such areas as the face and nose become readily visible due to excessive sebum in the case of younger people, while conversely, pores tend to become more apparent with age due to the skin's lower moisture content and loss of firmness.

According to a Shiseido survey, over 50% of women in their 20s and 30s experiencing some type of skin problem are concerned about highly visible pores and blackheads (conducted in 2002; sample=1,781 participants). At the same time, however, academic research and reports concerning the structure and skin physiology of pores are still extremely rare on a worldwide basis as well, with remedies for visible pores mainly consisting of applying skincare treatments that have astringent (skin tightening) effects after washing the face or concealing pores with base makeup.

### **Cause of Visible Pores**

To scientifically illuminate the characteristics of skin pores, Shiseido took and enlarged still photos of the pores on women's cheeks and finely scrutinized the images to determine how skin having visible pores and smooth skin having no visible pores were structurally different. In conclusion, not only was it discovered that pore-clogging impurities blocking the pore opening (plug)<sup>\*2</sup> caused conspicuous pores, but also that the cone-shaped hollow that formed around the pore opening was a leading factor in the visibility of pores. (Refer to illustration.)

To examine how the pore openings of those persons with visible pores differed from those without, Shiseido assembled roughly 100 Japanese and Caucasian women in their 20s and 30s and carried out tests to scientifically determine the relationship between the degree of conspicuous pores and skin conditions around the pore opening as well as sebum. These tests identified irregular cases in which numerous nuclei of cells in the horny layer in the cone-shaped hollow portion found around the pore opening remained intact, and in which the process of keratinization of the cone-shaped hollow was abnormal for some reason, a state known as parakeratosis.

In addition, analytical results of sebum concluded that those persons with visible pores were statistically more likely to have higher levels of sebum, and that their level of unsaturated fatty acids were especially higher (known unsaturated fatty acids with a single unsaturated bond typically found within sebum include oleic acid and palmitoleic acid.) The findings were the same for both Japanese and Caucasian test subjects.

Consequently, a marked increase in the number of nucleated cells in the pore opening was recorded upon application to the face of oleic acid, present within sebum, demonstrating that unsaturated fatty acids within sebum were the primary cause of parakeratosis of the cone-shaped hollow.

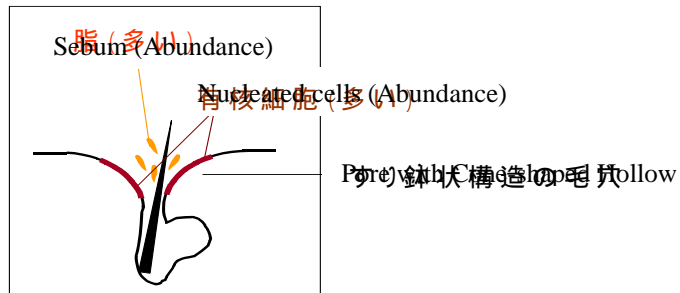
### **Treatment to Combat Visible Pores**

By searching for effective ingredients that reverse parakeratosis specifically found in the pore opening to a normal condition, Shiseido discovered that its moisturizer AQUA INPOOL (POE/POP dimethyl ether), a Shiseido-original ingredient, was able to inhibit parakeratosis caused by unsaturated fatty acids in sebum. While Shiseido has proven the superb moisturizing effects of AQUA INPOOL as well as its excellent versatility in dissolving in both water and oil, this was the first discovery that it could actually control parakeratosis caused by unsaturated fatty acids. At the conclusion of a four-week trial in which 34 women applied a skincare formula containing AQUA INPOOL to their cheeks, it was confirmed that the formula inhibited parakeratosis, improved skin texture<sup>\*3</sup> and kept visible pores in check, as determined through a visual examination.

Through application of these findings, Shiseido will proceed with the development of skincare products containing AQUA INPOOL that control visible pores.

1. Parakeratosis: When skin cells divide and multiply normally, the cells of the upper horny layer lose their nucleus, or become anuclear. However, when this process functions improperly, the cells retain their nuclei due to the abnormal acceleration of keratinization.

2. Plug: Sebum cannot be smoothly excreted when fine facial hair (vellus hair) and pore-clogging impurities cannot be removed, thus blocking the pore opening.
3. Skin texture: Skin texture is representative of the condition of ridges, furrows and pores on the skin surface, whereby smooth skin texture is characterized by evenly balanced ridges and furrows on the skin surface.



< Illustration: Skin Conditions of Visible Pores >