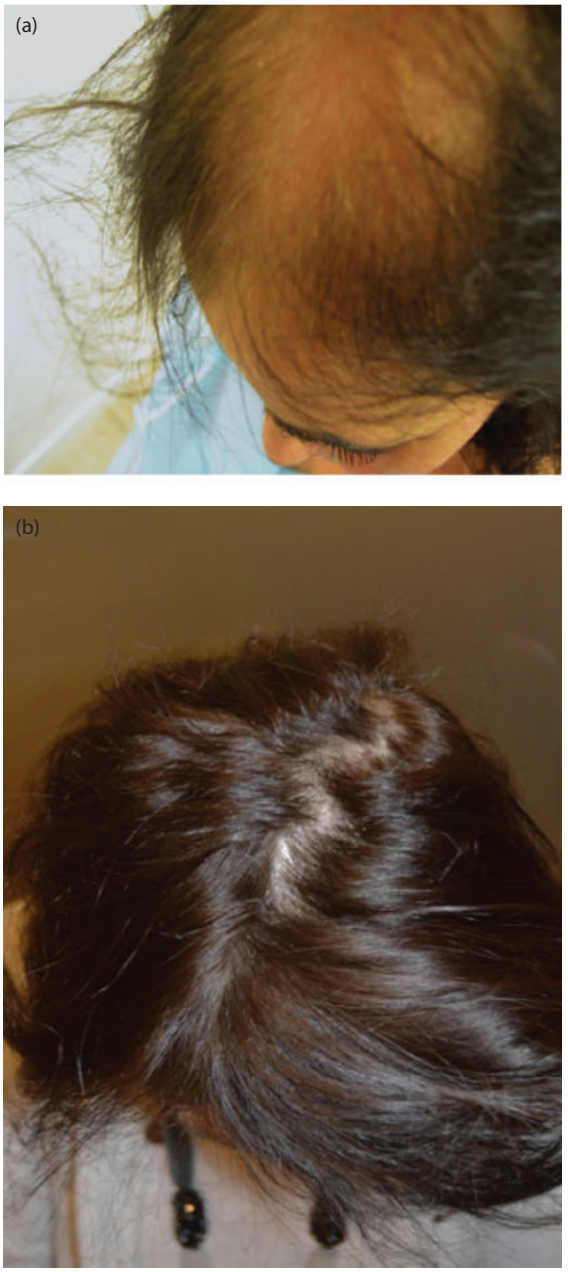

Figure 17.22 **Female androgenic alopecia. (a) Before and (b) result with stem cells treatment SVF.**

the United States) appears to be a competitive inhibitor of DHT-receptor binding.

The medical treatment has to be daily, and if the patient stops, the enhancement soon disappears. Also, many dermatologists do not agree to long-term prescriptions with hormonal therapy. New interest in preventing hair loss and baldness has been stimulated by cellular therapy, which normalizes hair loss and reverses hair miniaturization of male and female baldness. The actual protocol is two sessions with 3 months between them and then once every year.

We have to keep in mind that the PRP does not generate new follicles, it just helps to recover and stimulate follicles in apoptosis. It allows us to save a heritage that seemed lost and keep it. This is the reason why this treatment must be started early (at stage 3 for men and stage 2 for women).

The PRP is an interesting alternative for patients who cannot benefit from classical treatment (side effects) or do not want to take long-term hormonal therapy.

During the past 7 years, the authors have performed over 5000 surgical and nonsurgical treatments utilizing autologous PRP in hair loss treatments and have not incurred any adverse side effects. In the final analysis, the use of biologic cellular therapy may be the safest, most versatile, promising paradigm in hair restoration. While this may, or may not be true, only time and critical review will tell.

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18 Adjuvant therapy for alopecia: Synthetic hair implant, dermopigmentation, hair prosthesis, and hair camouflage

Pierre Bouhanna and Sophie Casadio

In modern times, wigs, hairpieces, extensions, and scalp-covering cosmetics are used either to change the appearance of a hairstyle or to camouflage hair loss. Scalp prostheses enable patients to maintain the normal appearance of hair. Alternatively some patients choose to wear a wig or hairpiece in lieu of medical or surgical treatment. Wigs or hairpieces can be very useful in helping patients cope with various forms of alopecia, such as chemotherapy for cancer. Hair prostheses can be introduced while outlining medical and surgical options for therapy. Synthetic hair implants actually have few to no indications due to complications. Perhaps in the future synthetic implants will be better tolerated. Hair cosmetics may be an option to camouflage the areas of thinning. The dermopigmentation, and more precisely micropigmentation, is a good option for definitive and stabilized hair and body hair alopecia.

HAIR PROSTHESIS

Hair types

The type of hair used in wigs and hair extensions is of two categories: human and synthetic.

Human hair

Human hair is most expensive, but also the most durable and versatile material for good construction. Human hair comes from all over the world: China, India, Indonesia, and European countries.

Synthetic hair

Synthetic hair fibers offer the advantage of limitless supply, low cost, and great texture and color diversity. The newest man-made fibers are lightweight, durable, color and fade resistant, and have excellent curl retention properties.

Wigs

Full human-hair wigs are the most like natural scalp hair, and with proper care can last for years. However, realism and durability come at significant expense. For people with permanent scalp hair loss, a full custom designed scalp prosthesis may be required. For people with thinning hair due to androgenetic alopecia or stable patches of hair loss due to scarring alopecia, a hairpiece or a partial wig may be appropriate.

Hand-tied wigs are labor intensive and pricey but offer the most natural appearance because the hair can be parted or blown in different directions. Wefts are multiple hairs that are machine-sewed together at one end to make a long curtain of hair.

Machine-sewed wigs and hairpieces are less expensive than hand-tied versions but have a less natural appearance (Figure 18.1a and b).

Caps are the base to which strands or wefts of hair are attached to make a wig. A properly sized wig should fit securely on the head and be able to withstand normal head movement and a reasonable amounts of wind. The choice of wig attachment depends on comfort, style, and the amount of hair underneath.

Removable wigs may be attached with clips and combs to underlying natural scalp hair. Other attachment options include adhesives, double-sided tape, silicone strips, snaps, and Velcro (Figure 18.2a and b).

For patients with total scalp-hair loss, a vacuum-attached wig may be a consideration. This type of wig can only be attached to the scalp if it is completely bare, as in alopecia totalis or universalis. Patients that suffer from medical hair-loss conditions may qualify for public and private health insurances for the purchase of a hair prosthesis.

Hairpieces

Hairpieces are not designed to cover the entire scalp. They may be made out of human or synthetic hair.

The base is then clipped, pinned, taped, or glued to the scalp, and the natural scalp hair is styled under or around the piece.

The result gives the appearance of a thicker, fuller head of hair. A small hairpiece that covers a specific area of thinning due to cicatricial alopecia can be color-matched and integrated with the natural growth hair.

Modern hairpieces and toupees offer a natural-appearing option for men who want to camouflage hair loss. Toupees are constructed in the same way as hairpieces, and the natural occipital hair is left free. Toupees can be attached to the scalp with clips, combs, bonding agents, or double-sided tape. The wearer can shampoo and style the hairpiece as he or she would his or her own hair. Bonding agents may cause irritation, pruritus, or a contact allergy.[1]

HAIR EXTENSIONS

Hair extensions add length and volume to an existing style. Hair extensions are attached to natural scalp locks. There must be a sufficient and stable amount of natural growth hair to attach the extensions. Hair extensions can be either human or synthetic. Depending on the method

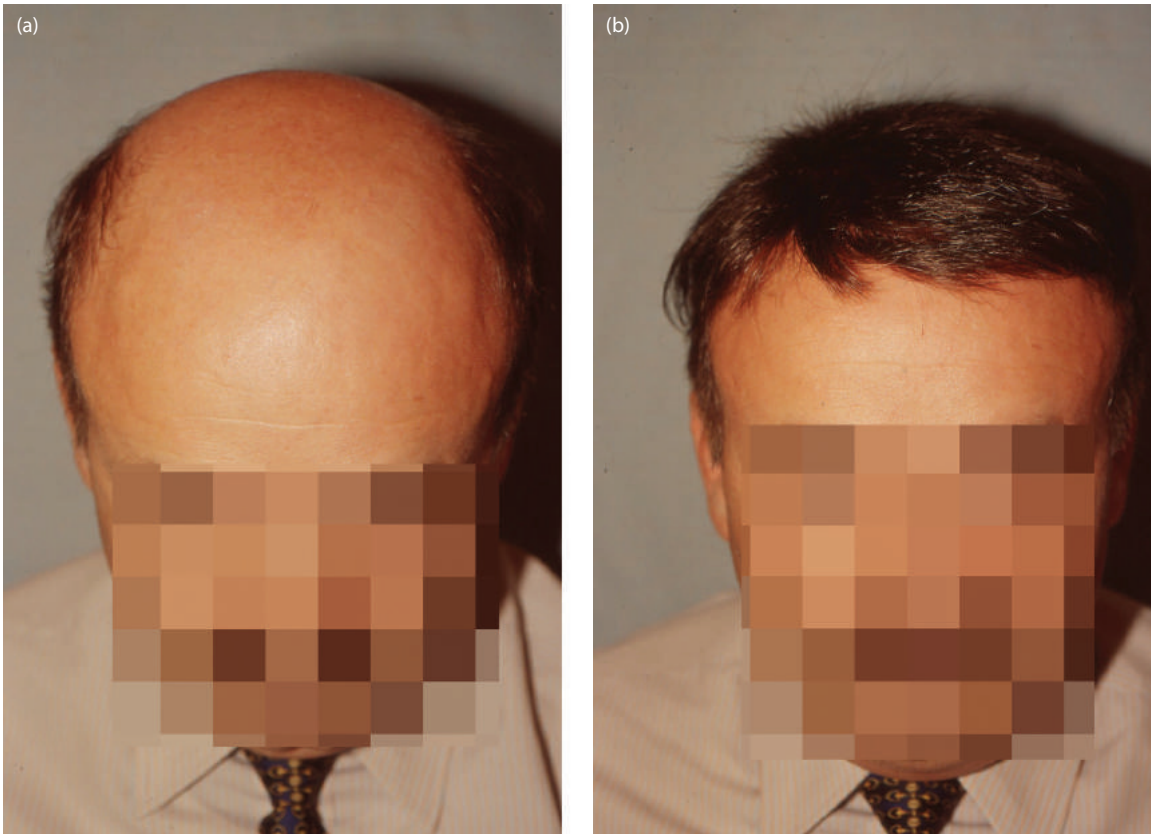

Figure 18.1 **Male androgenetic alopecia (a) before and (b) after wearing a wig.**

of attachment, human-hair extensions can be washed and styled along with the natural scalp hair.

The simplest hair extensions have plastic or metal clips. When the natural scalp hair grows past a few millimeters, the weaved-in hair tracks need to be tightened or replaced. Hair can be glued in close approximation to the corn-rowed scalp hair. A newer method of attaching hair extensions involves strand-to-strand hair bonding. A heated instrument, similar to a glue gun, melts and fuses the extension strands onto the scalp hair.

Braids

Braided hair extensions ensure that all braids are of a uniform width and length. A variety of braided styles are available, and different materials are used to achieve specific looks.

Problems associated with hair extensions

Traction alopecia has been associated with extensions attached to relaxed hair. Braiding can cause breakage, irreversible traction alopecia (Figure 18.3), and traction folliculitis.[2,3]

SYNTHETIC HAIR IMPLANT (HIS)

Different types of synthetic implant hair have been proposed for many years by American, Japanese, and Italian laboratories. Nearly all have been abandoned by most experts because of the extent of side effects.

The material most often used is polyester fiber of 80–100 mm in diameter. The root or knot of the synthetic hair may be of very varied appearance. The scalp area destroyed around each implant varies from 0.05 to 0.9 mm^2 depending on the procedure used.

Bouhanna[4,5] carried out a follow-up on 16 selected patients implanted as a test of 60 Japanese Nido synthetic hairs with clinical and macrophotographic assessment for 6 months.

The fiber was made of polyethylene terephthalate, 0.09 mm in diameter, with an alpha-type loop at its end (Figure 18.4). This fiber was implanted on the galea after traversing the epidermis, dermis, and hypodermis with a special 0.23 mm needle (Figure 18.5).

The synthetic hairs were implanted on four areas of 0.25 cm^2 localized by tattooing in each of the 16 patients (Figure 18.6a and b). They were counted in three successive macrophotographs on days 90 and 180. Tolerance

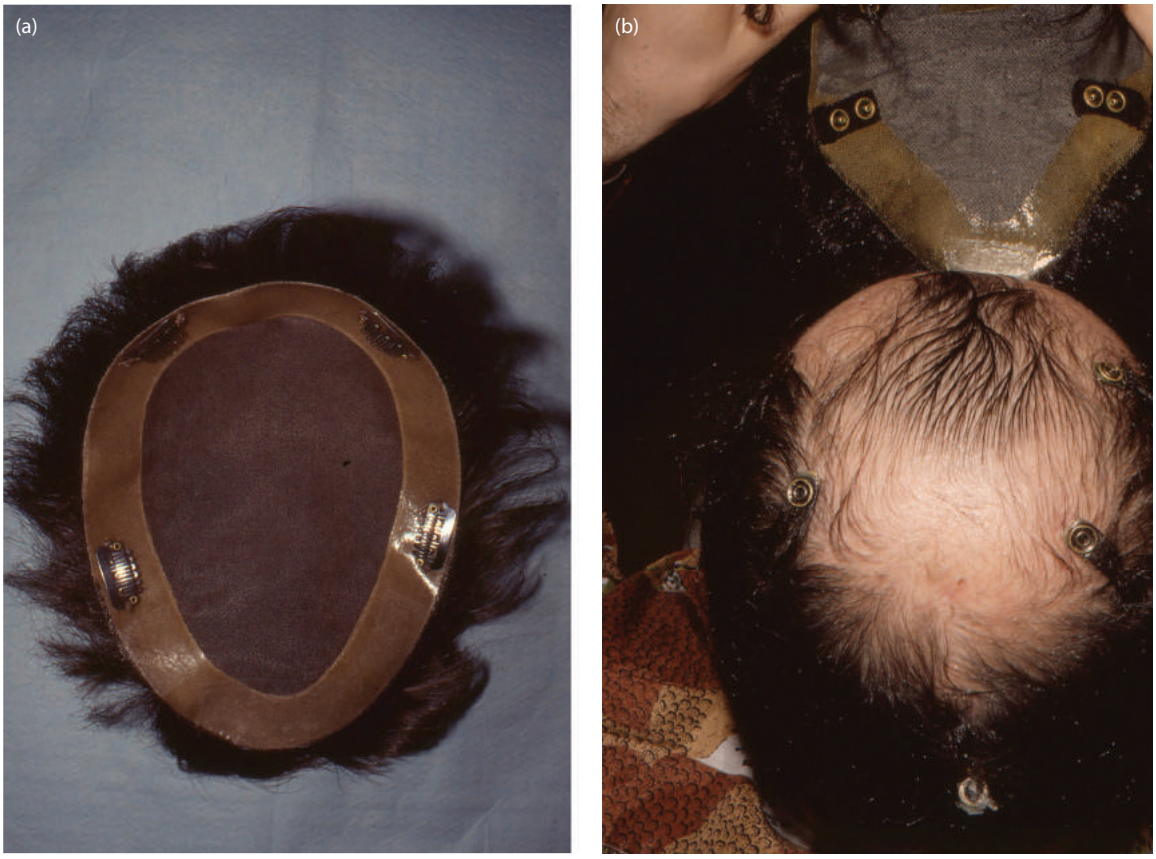

Figure 18.2 **(a) Wig. (b) Wig attached with clips.**

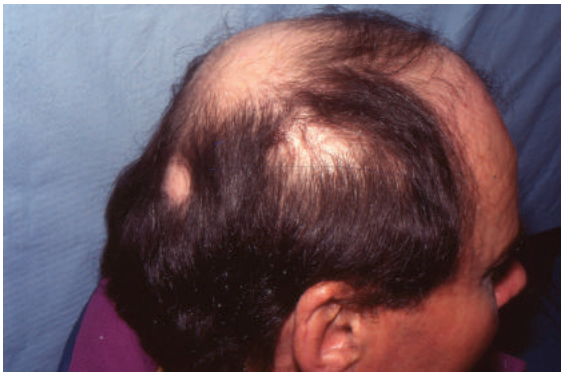

Figure 18.3 **Traction alopecia due to the clips of the wig.**

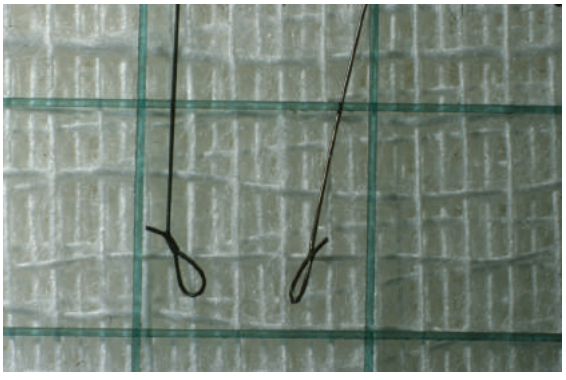

Figure 18.4 **Synthetic fiber with an alpha loop at the end to allow retention.**

was assessed as poor, moderate, good, or excellent. Complications such as folliculitis, seborrhoic dermatitis, follicular seborrhoic deposits (Figure 18.7), and scar pits (Figure 18.8) were assessed.

Results

- A mean density per square centimeter of implanted hairs varying from 137.48 at day 0 to 116.64 at day 90 and 90.5 at day 180.

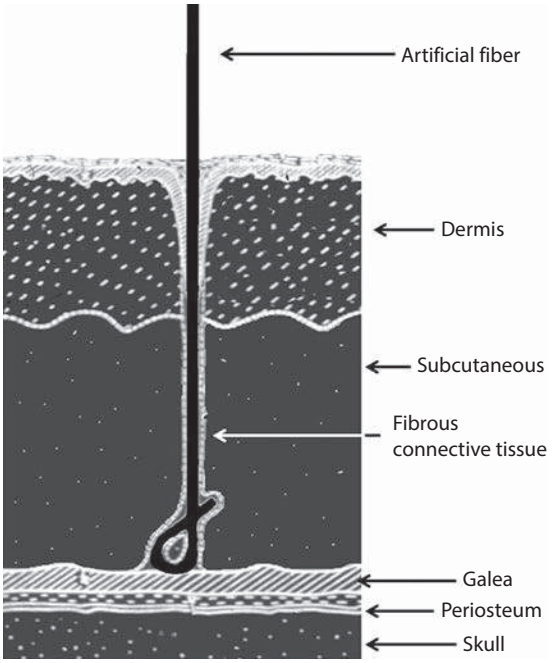

Figure 18.5 **Implantation of a synthetic fiber deep to the galea.**

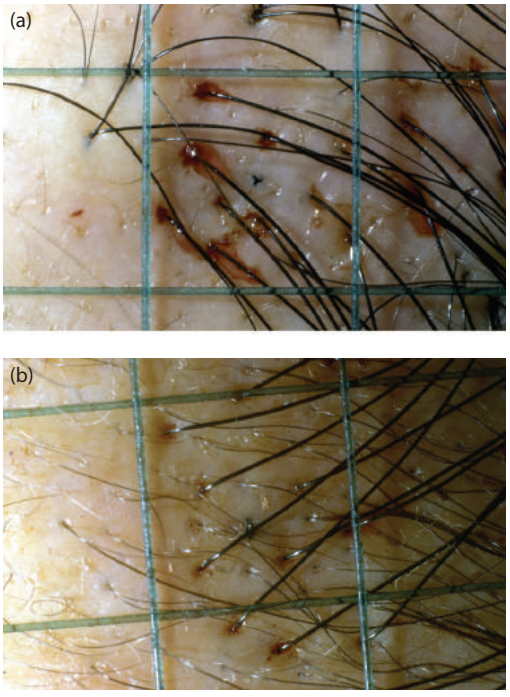

Figure 18.6 **(a) Synthetic hair fibers immediately after the implantation on a 0.25 cm² area. (b) Same implanted area 3 months later.**

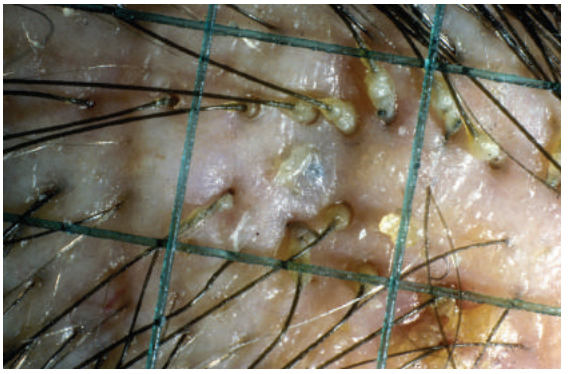

Figure 18.7 **Seborrheic deposits at the emergence of the fiber.**

- A mean percentage of fixation of 84.84% at 2 months and 65.82% at 6 months.
- A mean incidence of complications of 31.25% for folliculitis, 6.25% for seborrhoic dermatitis, 6.25% for scar piting and 43.7% for follicular seborrhoic deposits, due essentially to inadequately repeated local care using shampoo.

The mean percentage of tolerance was excellent in 31.25% of cases, good in 25% and moderate in 43.75%; there were no bad results. During the 6 month of follow-up of this study, no foreign body granuloma reaction was found (Figures 18.9 and 18.10a and b). The study was too short to provide a complete assessment of this procedure, as we have reported various complications such as foreign body granuloma outside this series.

According to Di Gregorio,[6] Hanke,[7] Lepaw,[8] and Schwartz,[9] different synthetic hairs gave different degrees of complications after implantation: foreign body granulomas, secondary infective pustules, residual scars, etc.

Apart from the local and general contraindications to this treatment, we advise a preliminary test with few

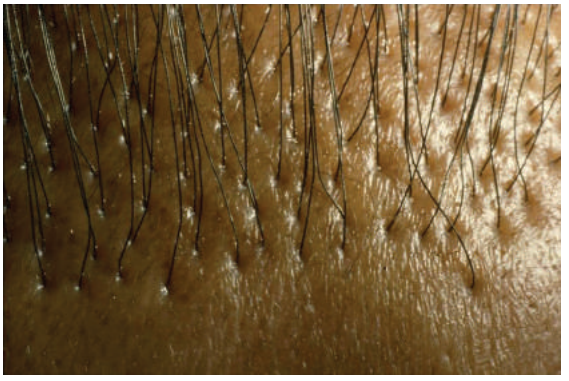

Figure 18.8 **Scar pits at the emergence of the fiber.**

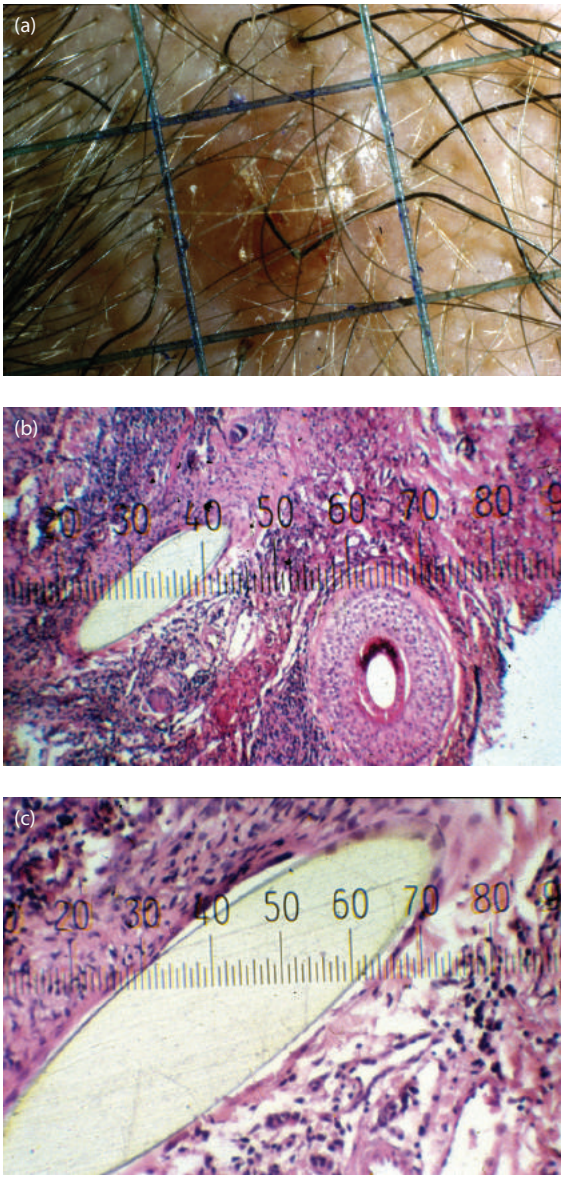

Figure 18.9 **(a) Foreign body granuloma around a synthetic hair fiber. (b,c) Histological aspect of the foreign body granuloma around the synthetic hair fiber and a normal hair on the right.**

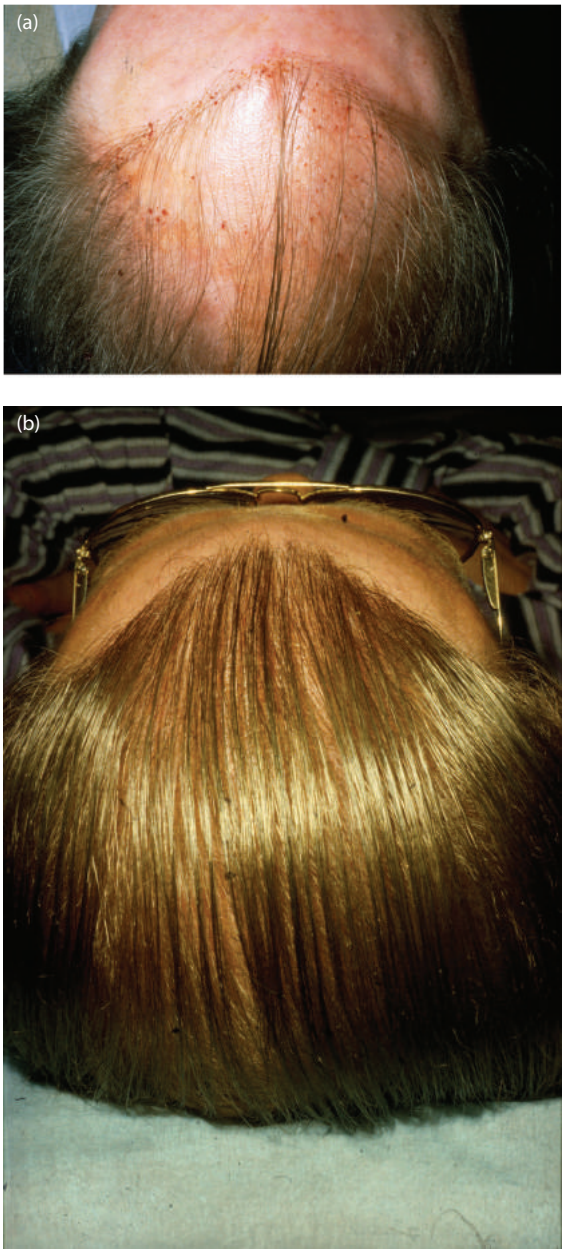

Figure 18.10 **(a) Immediate aspect after implantation of 500 synthetic hairs on a male with androgenetic alopecia. (b) Immediate aspect after implantation of 2000 synthetic hairs on the same patient.**

synthetic hairs (10–20) over a monitoring period of 6 months.

Conclusion

Synthetic hairs are of variable reliability, durability, and tolerance depending on the procedure selected. The indications for this treatment seem to be contraindications to surgical techniques using the patient's own hair, which alone guarantees a definitive and unconstrained result. The patient applying for this treatment must be told of the different complications and of the inevitable rejection of the implanted synthetic hairs in the near or long term. In the near future we are looking for a new synthetic hair implant with perhaps a better tolerance and less rejection.

HAIR CAMOUFLAGE

For many patients with thinning hair due to androgenetic alopecia, the most noticeable areas are the frontal and vertex scalp. As the hair density decreases, spaces between individual hairs increase and the scalp becomes more apparent. Hair cosmetics may be an option to camouflage the areas of thinning so that the area appears less noticeable (Figure 18.11a and b). Several products are available, including powder (Dermatch, synthetic fibers, cotton fibers, etc.) Toppik Hair Building Fibers that sprinkle out of a can and cover the thin areas and Good Looking Hair (GLH) Thickener Spray (Ronco, Inc.). Some clinicians recommended using camouflage makeup, such as Dermablend (L'Oreal). Hair cosmetics are relatively easy to apply. Most products are safe to use and rarely cause irritation. They can be used in post-op after hair transplantation during the delay of regrowth.

SCALP DERMOPIGMENTATION: DR. SOPHIE CASADIO

For the last 20 years, we have been using dermography to rebuild areas of damaged skin caused by accidents or pathologies.[10]

Now, the technique can be removed from reconstructive surgery (in particular in breast cancer and scars caused by burns) and moved to hair and body hair.

The dermopigmentation is a medicosurgical act of an implant into the mid-dermis.[11] The micropigmentation is a specialized treatment especially suited to hairy areas. It reproduces the appearance of body/head hair and requires a precise pigment implant specification as well as use of microneedles, which also have to comply with a precise and particular specification.

Tools and materials

Pigment implants

They are nontoxic, nonallergenic, biocompatible, made in a special "white room," sterilized following a very strict validated industrial method used only for this particular purpose, and certified by the CEIIb's standards and medical directives (Figure 18.12).[12,13]

They are minerals or organics but in any case they are made up of a chromophore (colorant), a dispersant, and an additive (Figure 18.13).

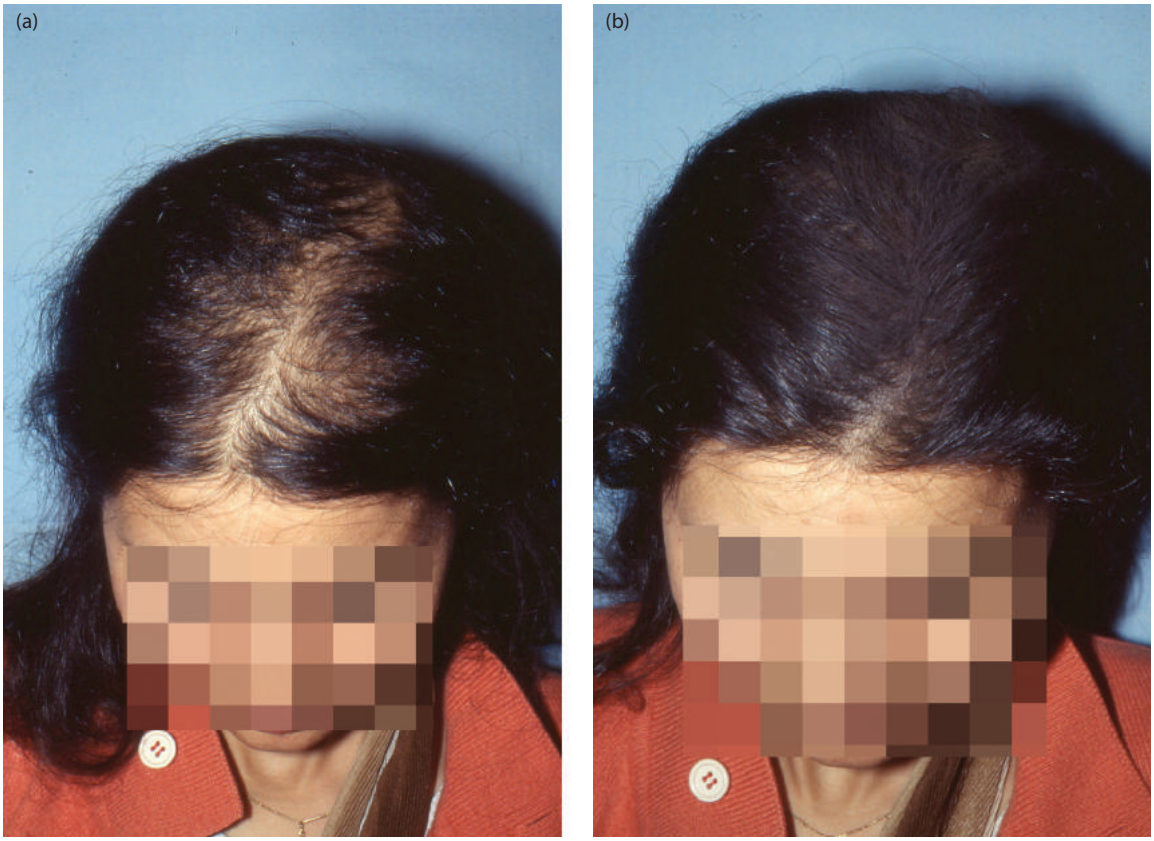

Figure 18.11 **(a,b) Female androgenetic alopecia immediately after a hair powder camouflage.**

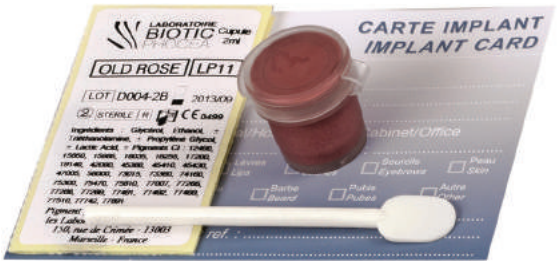

Figure 18.12 **Dermopigmentation implant card.**

Figure 18.13 **Mineral or organic pigments for dermopigmentation.**

Their progressive fading out allows us to foresee the bleaching of the hair or the change in hair color in women in particular (Figure 18.14).

The dermograph

It is made of two pieces: one hand tool and a regulator (Figure 18.15).

1. The one hand tool is a very practical "pen" which leans against the anatomical snuffbox. It is composed of a sealed sterilized sleeve with a cog ring which allows the control and the setting of the needles' depth.
2. The regulator (Figure 18.16) is made of electronic components with a dual display offering security, quality, and ease of use.

The speed can be easily regulated: it can go from 50 to 180 shots per second.

Needles

Specific needles are used for specified tasks. Only used once, they are put together in a "disposable cartridge," and their number and layout depend on the work to be achieved: dots, lineage, and topping (coloring).

Technique and particularity of the skin

While the pigmentation is in the hairy area and if we want to reproduce the dotting effect of a hair, we need to obey specific technical rules. The penetration of the dermis must be perpendicular to the surface of the skin. It will therefore give a dotted aspect; however, if the angle of penetration is less than 90°, the needle will go through all dermo-epidermal layers and print on its way a line rather than a dot (Figure 18.17).

Another technique can be applied in order to give a high or low light effect by reproducing a multiple hair aspect: one can use different colored pigments in order to give a "scratch" look.

The lineage can be used for a line; one can use its density to realize the required gradient.

One can use (Figure 18.18):

- Dots.
- Lineage or hint used for eyeliners and masking scars.
- The "scratch impression" will give a gradual spread of color aspect if only used superficially: a high or low light effect is often used for eyebrows.
- Coloring or "topping" is used for the mammary areola.

The present contributors are dermatological criteria as discussed below.

MINERALS	ORGANIC
Opaque, high covering power	Transparent, with natural aspect
Dull and broken (off) colours	Bright colours
Unstable colours	Stable colours
Persistant	Fade away

Figure 18.14 **Pigments characters.**