

The Future of Beauty: From Cosmetics to Genetic Profile

Nima Sadeghi¹, Samira Talebi², Fatholah Ahmadpour^{3*}

¹ Maxillofacial surgeon, private practice, Tehran, Iran.

² National Institute of Genetic Engineering and Biotechnology, Tehran, Iran.

³ Trauma Research Center, Clinical Sciences Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran.

***Corresponding Author:** Fatholah Ahmadpour, Trauma Research Center, Clinical Sciences Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran, Email: ahmadpour66@yahoo.com, Phone: +989120198101.

Received 2025-10-02; Accepted 2025-12-10; Online Published 2026-06-01

Citation: Sadeghi N, Talebi S, Ahmadpour F. The Future of Beauty: From Cosmetics to Genetic Profile. Int J Travel Med Glob Health, 2026;14(2):89-90. Doi:10.30491/ijtmgh.2025.563728.1513

Dear Editor

The ideal of beauty is undergoing a significant shift. It is shifting from surface-level cosmetic application to a deeper understanding of our individual genetic profile. The beauty industry has worked on a general model, but the emerging field of personalized medicine is poised to revolutionize how we improve our health.

Science increasingly demonstrates that the bases of what we sense as a beautiful face (balance, ratio, skin transparency, and even hair fullness) are heavily influenced by our individual genetic profile ^{1,2}. Genes dictate our collagen production, skin's exposure to sun damage and aging, and the entire structure of our facial bones ^{3,4}. To neglect this genetic fact is to wage a severe battle with generic tools.

This is where the future lies in the junction of genetics and cosmetology. Visualize a world where your skincare regimen is not chosen from a shelf of a hundred options, but is specifically formulated based on a DNA test. This test determines your precise skincare needs for hydration, antioxidant protection, and collagen synthesis⁵. Also, cosmetic procedures will develop from standardized methods into personalized interventions. A cosmetic surgeon could use a 3D model of a patient's face, informed by their genetic biases to tissue healing and aging, to organize a uniquely tailored, natural-looking outcome ^{6,7}.

This change towards genetically based beauty is more than a luxury. It is a move towards efficacy, safety, and sustainability. It promises to decrease the experimental cost of product purchases, minimize

unfavorable reactions, and provide results consistent with our biology.

However, this new frontier is not without its ethical challenges. We must carefully navigate issues of data privacy and genetic discrimination ^{8,9}. The goal should not be to create a homogenized, idealized notion of beauty, but to help people look and feel their best based on their own genetic potential.

Researchers, ethicists, and regulators must work alongside the beauty industry. The conversation must move beyond simply shielding up marks to understanding and working with our genetic individuality.

Beauty is influenced by multifactorial lifestyle and genetic factors. Studies demonstrated specific genes that powerfully influence physical characteristics. These genes mainly control facial structure, skin quality, and hair features.

The foundation of facial beauty is often linked to balance, proportion, and specific three-dimensional structures. Genome-wide association studies (GWAS) have begun mapping the genetic architecture of these features.

The EDAR gene (Ectodysplasin A Receptor) is a key player in Facial Structure and Symmetry. Variants of this gene, such as the EDAR V370A allele, influence multiple facial features, including chin protrusion, hair thickness, and tooth morphology ¹⁰. This gene is an excellent example of how a single genetic variant can have pleiotropic effects on multiple aspects of appearance.

Another crucial gene is *PAX3* (Paired Box 3). Research has consistently linked *PAX3* to the morphology of the nasal bridge and the surrounding area¹¹. This gene is crucial for embryonic craniofacial development, and its common variants contribute to normal variation in facial shape.

Healthy, young skin is a universal element of beauty, and its features are deeply implanted in our DNA.

The *MC1R* (Melanocortin 1 Receptor) gene is the most famous beauty gene related to pigmentation. Variants of *MC1R* are responsible for red hair, fair skin, and freckling, but also influence the skin's response to UV radiation and its propensity to age¹². Specific *MC1R* variants are strongly associated with visible photoaging.

Genes involved in antioxidant defense are critical for protecting skin from environmental damage. Key players include *SOD2* (Superoxide Dismutase 2) and *GPX1* (Glutathione Peroxidase 1). Genetic polymorphisms affect how effectively the skin neutralizes free radicals, a major driver of extrinsic aging⁵.

Luxurious hair is a potent symbol of beauty and vitality across cultures.

As mentioned, the *EDAR* gene profoundly affects hair follicle density, leading to thicker, coarser hair shafts in individuals carrying specific variants¹⁰. The *AR* (Androgen Receptor) gene, located on the X chromosome, plays a dual role. Its variants are critically involved in androgenetic alopecia (pattern hair loss) in both men and women. It is making a significant focus for genetic testing and therapeutic development¹³.

The genes listed above represent just a fraction of the genetic puzzle. Beauty is a highly polygenic feature; thousands of genetic variants influence it, each with a minimal effect. The hot area of research now focuses not just on identifying more genes, but on understanding how these genes interact with lifestyle, environment, and the skin's microbiome.

This knowledge forms the bedrock of the next generation of personalized cosmeceuticals and aesthetic medicine. The future points toward interventions (from topical formulations to preventive lifestyle plans) tailored to an individual's genetic profile.

References

- Hu B, Shen N, Li JJ, Kang H, Hong J, Fletcher J, Greenberg J, Mailick MR, Lu Q. Genome-wide association study reveals sex-specific genetic architecture of facial attractiveness. *PLoS Genetics*. 2019 Apr 4;15(4):e1007973. <https://doi.org/10.1371/journal.pgen.1007973>
- Mitchem DG, Purkey AM, Grebe NM, Carey G, Garver-Apgar CE, Bates TC, Arden R, Hewitt JK, Medland SE, Martin NG, Zietsch BP. Estimating the sex-specific effects of genes on facial attractiveness and sexual dimorphism. *Behavior Genetics*. 2014 May;44(3):270-81. <https://doi.org/10.1007/s10519-013-9627-5>
- Poon F, Kang S, Chien AL. Mechanisms and treatments of photoaging. *Photodermatol Photoimmunol Photomed*. 2019 Jan;35(1):22-9. <https://doi.org/10.1111/phpp.12145>
- Langton AK, Sherratt MJ, Griffiths CE, Watson RE. A new wrinkle on old skin: the role of elastic fibres in skin ageing. *International journal of cosmetic science*. 2010 Oct;32(5):330-9. <https://doi.org/10.1111/j.1468-2494.2010.00574.x>
- Ng HY, Wu YS, Biswas M, Sim MS. Deciphering the molecular clock: exploring molecular mechanisms and genetic influences on skin ageing. *Biogerontology*. 2025 Aug;26(4):153. <https://doi.org/10.1007/s10522-025-10296-x>
- Markiewicz E, Idowu OC. Personalized skincare: from molecular basis to clinical and commercial applications. *Clinical, Cosmetic and Investigational Dermatology*. 2018 Apr 11:161-71. <https://doi.org/10.2147/CCID.S163799>
- Claes P, Liberton DK, Daniels K, Rosana KM, Quillen EE, Pearson LN, et al. Modeling 3D facial shape from DNA. *PLoS Genet*. 2014 Mar 20;10(3): e1004224. <https://doi.org/10.1371/journal.pgen.1004224>
- May T, Fullerton SM. Ethical considerations in the use of Direct-to-Consumer genetic testing for adopted persons. *Adoption Quarterly*. 2021 Jan 2;24(1):89-100. <https://doi.org/10.1080/10926755.2020.1833391>
- Kaye J. The regulation of direct-to-consumer genetic tests. *Human molecular genetics*. 2008 Oct 15;17(R2):R180-3. <https://doi.org/10.1093/hmg/ddn253>
- Adhikari K, Fuentes-Guajardo M, Quinto-Sánchez M, Mendoza-Revilla J, Camilo Chacón-Duque J, Acuña-Alonzo V, et al. A genome-wide association scan implicates *EDAR*, *TGFBR3*, and *DKK2* in human facial variation. *Nat Commun*. 2016 Feb 19; 7:11616. <https://doi.org/10.1038/ncomms11616>
- Claes P, Roosenboom J, White JD, Swigut T, Sero D, Li J, et al. Genome-wide mapping of global-to-local genetic effects on human facial shape. *Nat Genet*. 2018 Mar;50(3):414-423. <https://doi.org/10.1038/s41588-018-0057-4>.
- Jacobs LC, Hamer MA, Gunn DA, Deelen J, Lall JS, van Heemst D, et al. A Genome-Wide Association Study Identifies the Skin Color Genes *IRF4*, *MC1R*, *ASIP*, and *BNC2* Influencing Facial Pigmented Spots. *J Invest Dermatol*. 2015 Jul;135(7):1735-1742. <https://doi.org/10.1038/jid.2015.62>.
- Hagenaars SP, Hill WD, Harris SE, Ritchie SJ, Davies G, Liewald DC, et al. Genetic prediction of male pattern baldness. *PLoS Genet*. 2017 Feb 14;13(2): e1006594. <https://doi.org/10.1371/journal.pgen.1006594>.