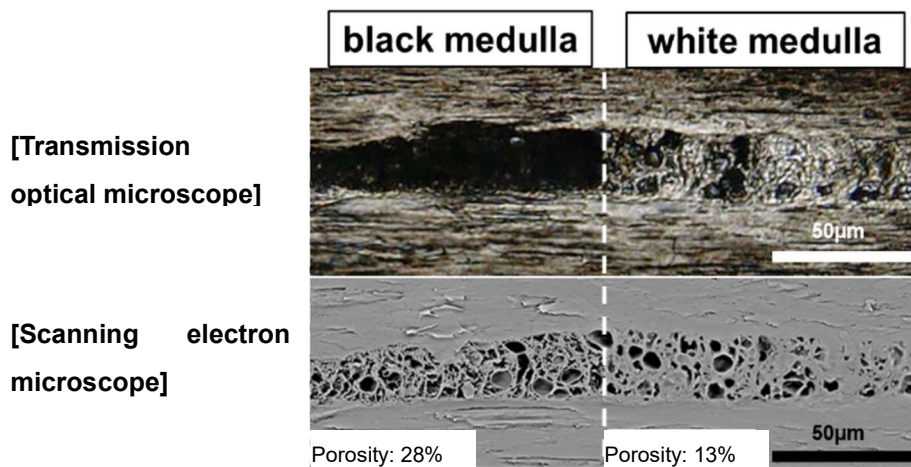


## Research outline

### (i) Discovery that two types of medulla exist: black medulla and white medulla

Firstly, we made longitudinal hair sections of the black hair of a Japanese woman using our original sectioning technology and observed the structures of their medulla with a transmission optical microscope and a scanning electron microscope. We found two different types of hair medulla: the black medulla scattering transparent light and appearing black and obscure, and the white medulla resembling the surrounding cortex and appearing white - a new discovery of this study. Furthermore, we found that white medulla had a thicker fibrous structure with fewer pores than black medulla and this different porosity affects hair appearance. (see Figure 1). This is a world-first discovery that will advance hair research, and it is expected that application of this new technology will stimulate the hair cosmetics market.

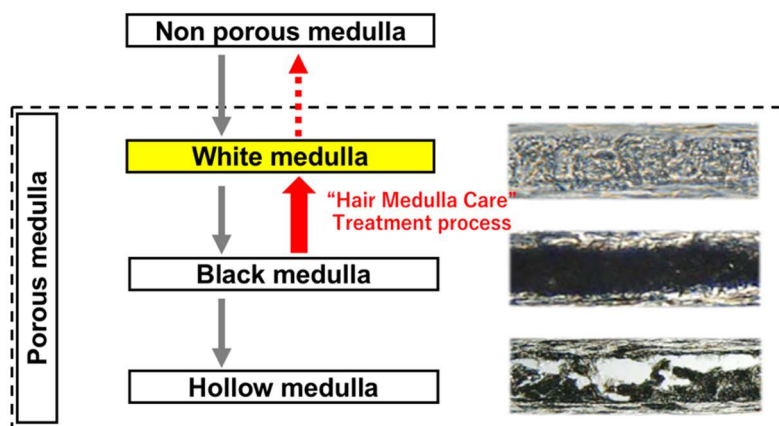
Figure 1: Two types of medulla: black medulla and white medulla



### (ii) A novel concept of hair care, Hair Medulla Care Investigation of changes at hair medulla

To examine the relationship between the white medulla and the black medulla, we directly applied a variety of chemical treatments to the medulla and observed any changes. In this examination, many types of damaging treatments caused change from white medulla to black medulla. Furthermore, when the damage progressed further, the pores in the black medulla increased, turning the medulla hollow, sparse or absent (see Figure 2).

Figure 2: Summary of medullary change process



## Investigation of treatment the method for filling pores in the medulla

Then, we investigated treatment methods for improving the porous condition of the medulla and found a way of filling the pores in the black medulla, changed them into a white medulla-like condition consistently. We achieved this by combining a certain type of polypeptide with a specific penetrating agent, giving the combination further reductiveness. In other words, we succeeded in developing a new technology that drastically and sustainably improved the porous condition of the medulla. We named this innovation as “Hair Medulla Care”.

When we examined the condition of the medulla in Japanese hair, we found a large number of grey hairs with black medulla, especially in conspicuous, whitish grey hairs. When we applied Hair Medulla Care to hair bundles of whitish and conspicuous grey hairs containing only black medulla, their transparency improved, giving a more beautiful appearance (see Figure 3a). We then mixed these grey hairs with black hair in a ratio of 5%. The hair bundle of mixed Hair Medulla Care-treated grey hairs had increased transparency and reduced whiteness; hence, their appearance assimilated to that of the surrounding black hairs and became almost inconspicuous (see Figure 3b).

Figure 3: Effect of Hair Medulla Care on grey hair appearance



Hair Medulla Care is proven to be a successful new hair care technology that fills porous black medulla and beautifies the appearance of hair by improving its structure and transparency. We are proud to be able to present this technology for the first time in the field of hair science.