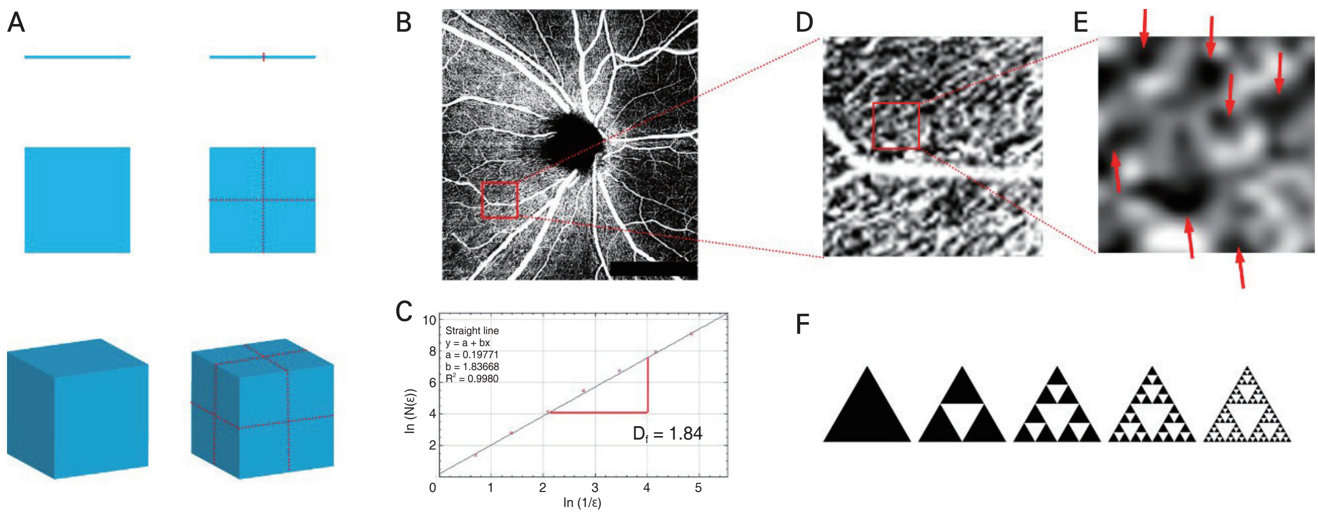

Supplementary Fig. 1. Fractal dimension analysis. (A) A line (one-dimensional shape), a square (two-dimensional shape), and a cube (three-dimensional shape). If we divide each shape by the scaling factor (ε), the number of objects (N) equals to ε^D; if $\varepsilon = 2$, a line is divided into 2 lines, a square into 4 ($=2^2$) squares, and a cube into 8 ($=2^3$) cubes. More generally, the fractal dimension (D_f) could be defined as follows: $D_f = \log N / \log \varepsilon$. (B,C) Retinal vasculature has a noninteger fractal dimension between 1 and 2. It implies that the vascularity is more complex than a simple line (one-dimensional shape), but it does not fill the entire plane (two-dimensional shape) with some lacunarity. To calculate the fractal dimension (D_f), boxes of different scales (ε) were used for counting. A log–log plot clearly shows that the roughness of retinal vascularity persists at many different scales, and the fractal dimension equals to 1.84 regardless of a scaling factor. (D,E) The strength of fractal dimension over density. When calculating vessel density, vessels smaller than the resolution limit of the machines were ignored (arrows), while they were still much larger than the microvasculature. The fractal dimension is less affected by this magnification problem, since it is defined by the slope of complexity changes within a wide range of magnification. (F) Difference between density and fractal dimension. The rightmost triangle (Sierpinski triangle) is more complex even though its density is smaller than in the leftmost simple triangle.