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DR. PIETRANGELO REPLIES: MRI can undoubtedly be a useful noninvasive alternative to liver biopsy for quantifying the hepatic iron concentration. It may make it possible to avoid performing so many liver biopsies, such as those performed for workups of unexplained hyperferritinemia without clear evidence of liver disease¹ (often encountered in non-hemochromatotic hereditary iron overload²), or for the follow-up of known iron-overload disorders. However, the purpose of the biopsy in the proposed algorithm in my article is not for the detection or quantification of hepatic iron overload but for the diagnosis of hereditary hemochromatosis. My definition of this disease may be at variance with that

adopted by Dr. Castiella and colleagues.³ In my view, in patients with nondiagnostic genetic tests and persistent biochemical signs of iron overload, confirmation of clinically suspected hereditary hemochromatosis requires documentation not only of the presence but also of the typical cellular-distribution pattern of excess iron in hepatic tissues.⁴ Both can be assessed with biopsy, whereas current MRI techniques provide only the quantitative data.

Antonello Pietrangelo, M.D., Ph.D.

University of Modena
41100 Modena, Italy
pietrangelo.antonello@unimore.it

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Was Rembrandt Stereoblind?

TO THE EDITOR: Stereopsis is an important cue for depth perception, yet it can be a hindrance to an artist trying to depict a three-dimensional scene on a flat surface. Art teachers often instruct students to close one eye in order to flatten what they see. Therefore, stereoblindness might not be a handicap — and might even be an asset — for some artists. Stereopsis requires precise alignment of the two eyes. We examined a number of self-portraits of Rembrandt, an artist known for his astute powers of observation, and noticed that many of them show his eyes as exotropic, some to a degree that would be incompatible with normal stereopsis. We wondered whether the gaze angle of the eyes in Rembrandt's self-portraits was random or whether the gaze deviation was systematic, as it would be if he were accurately portraying a feature of his physiognomy.

We examined high-resolution images of the oil paintings and etchings listed in a comprehensive catalogue of self-portraits spanning Rembrandt's career.¹ Most show one eye gazing directly at the viewer and the other eye deviating laterally (Fig. 1). We quantified this pattern in all the Rembrandt self-portraits in which both eyes can be seen well enough to estimate the position of the pupil (or the center

of the iris) within the opening between the eyelids (24 oil paintings and 12 etchings). For each portrait, we aligned an ellipse with the eye contour, then



Figure 1. Self-Portrait Leaning on a Stone Wall (Detail).

The etching was done by Rembrandt in 1639. Reprinted with the permission of the British Museum.

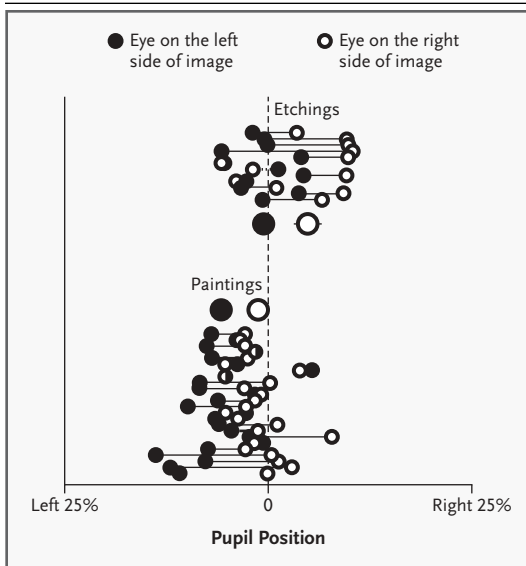


Figure 2. Position of the Iris within the Eye.

The deviation from straight ahead is expressed as a percentage of the width of the visible part of the eye. Zero represents a gaze direction of straight ahead, with the pupil centered in the eye contour; if the center of the iris deviated all the way to the edge of the visible part of the eye, the deviation would be 50 percent. If the eyes were orthotropic, the symbols would be superimposed and the deviation would reflect the gaze direction. Solid lines connect divergent eyes, and the dotted line connects convergent eyes. Means (\pm SEM) are indicated by large circles. The symbol pairs from bottom to top correspond to the following catalogue numbers: 18, 26, 33, 35, 36, 37, 39, 40, 51, 54, 57, 59, 60, 65, 68, 69, 71, 73, 74, 79, 80, 81, 84, and 86 for the paintings, and 3, 11, 20, 27, 38, 41, 42, 44, 49, 53, 62, and 64 for the etchings.

aligned a circle with the circumference of the iris, and then measured the horizontal position of the circle along the eye contour. We found that Rembrandt portrayed his eyes as exotropic in 35 of the 36 self-portraits. In 23 of the 24 paintings, the eye on the right side of the painting tends to look straight ahead and the other eye deviates outward, whereas in all 12 etchings, this asymmetry is reversed (Fig. 2).

Because an etching is made by scratching lines on a metal plate that is used to make a print, what you see in the print is reversed, left to right, from what the artist drew on the plate. The fact that the eye that deviates outward in the etchings is the opposite eye from the one that deviates outward in most of the paintings suggests that Rembrandt actually did have a unilateral strabismus — otherwise, the deviating eye would be random. One oil self-portrait² shows an asymmetry in the eyes that contradicts the pattern, so we wonder whether Rembrandt painted it from an etching, or whether it was painted by a student looking directly at Rembrandt, and not at a mirror image.

Margaret S. Livingstone, Ph.D.

Bevil R. Conway, Ph.D.

Harvard Medical School
Boston, MA 02115

1. White C, Buvelot Q, eds. Rembrandt by himself. London: National Gallery, 1999.
2. Rembrandt HR. Self-portrait. Berlin: Staatliche Museen, 1634 (oil painting).

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