Inflammatory Proteins and the Severity of Dilated Virchow-Robin Spaces in the Elderly

Claudia L. Satizabal\textsuperscript{a,b}, Yi-Cheng Zhu\textsuperscript{c}, Carole Dufouil\textsuperscript{d} and Christophe Tzourio\textsuperscript{a,d,∗}

\textsuperscript{a}INSERM U708 “Neuroepidemiology”, Bordeaux, France
\textsuperscript{b}Université Pierre et Marie Curie, Paris, France
\textsuperscript{c}Department of Neurology, Peking Union Medical College Hospital, Beijing, China
\textsuperscript{d}Université Victor Segalen Bordeaux-2, Bordeaux, France

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MRI EXAMINATION

Exclusion criteria for scans were: 1) presence of an internal electrical/magnetic device; 2) history of neurosurgery or aneurysm; 3) presence of metal fragments in the eyes, brain, or spinal cord; and 4) claustrophobia. MRI acquisition was performed on a 1.5-Tesla Magnetom (Siemens; Erlangen, DE). A three-dimensional high-resolution T1-weighted brain volume was acquired using a three-dimensional inversion recovery fast spoiled-gradient echo sequence (repetition time = 97 ms; echo time = 4 ms; inversion time = 600 ms; coronal acquisition). The axially reoriented three-dimensional volume matrix was $256 \times 192 \times 256$ size with a $1.0 \times 0.98 \times 0.98$ mm$^3$ voxel size, yielding 124 slices covering the whole brain. T2- and proton density-weighted brain volumes were acquired using a two-dimensional dual spin echo sequence with two echo times (repetition time = 4,400 ms; echo time 1 = 16 ms; echo time 2 = 98 ms). T2 and proton density acquisitions consisted of 35 axial slices 3.5 mm thick (0.5 mm spacing), having a $256 \times 256$ matrix size, and a $0.98 \times 0.98$ mm$^2$ in-plane resolution.

\textbf{dVRS RATING}

In basal ganglia, the degree of severity was defined according the slice containing the greatest number of dVRS as 1st: ≤5 dVRS; 2nd: 5 to 10 dVRS; 3rd: >10 dVRS but still numerable; and 4th: innumerable dVRS resulting in a cribriform change in basal ganglia. In white matter, the degree of severity was defined as 1st: ≤10 dVRS in total white matter; 2nd: >10 dVRS in total white matter and <10 dVRS in the slice containing the greatest number of dVRS; 3rd: 10 to 20 dVRS in the slice containing the greatest number of dVRS; and 4th: >20 dVRS in the slice containing the greatest number of dVRS (see Supplementary Table 1). The intra-rater agreement was of $κ = 0.77$ for basal ganglia and $κ = 0.75$ for white matter.
Supplementary Table 1
Severity classification of dVRS in basal ganglia or white matter

<table>
<thead>
<tr>
<th>Degree</th>
<th>Basal ganglia</th>
<th>White matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>≤5 dVRS</td>
<td>≤10 dVRS in total white matter</td>
</tr>
<tr>
<td>2nd</td>
<td>5 to 10 dVRS</td>
<td>&gt;10 dVRS in total white matter and &lt;10 in the slice containing the greatest number of dVRS</td>
</tr>
<tr>
<td>3rd</td>
<td>&gt;10 dVRS, still numerable</td>
<td>10 to 20 dVRS in the slice containing the greatest number of dVRS</td>
</tr>
<tr>
<td>4th</td>
<td>Innumerable dVRS with cribriform change</td>
<td>&gt;20 dVRS in the slice containing the greatest number of dVRS</td>
</tr>
</tbody>
</table>

dVRS, dilated Virchow-Robin Spaces.

*In the slice containing the greatest number of dVRS.