should be solved by science, not by rhetoric. Therefore, our answer to the question posed in their last sentence is a resounding “Yes!”

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Confusing Stroke Terminology: Watershed or Borderzone Infarction?

We would like to add further comment to the article by van der Zwan and Hillen1 on the variability of the cerebral arterial territories. There has been much confusion of late regarding the location and terminology used to describe cortical and subcortical infarcts situated between two adjacent vascular territories. These regions have reduced perfusion and are prone to low-flow infarction as a result of either thromboembolic or hemodynamic events. Terms currently used include (among others) watershed, borderzone, borderland, end zone, boundary zone, and terminal zone, with the first two being the most common. To further highlight the current confusion, it was even proposed at a recent international stroke conference that subcortical borderzone infarcts may in fact be different from subcortical watershed infarcts.2 This descriptive uncertainty can only hinder, not help, recent attempts to establish a uniform classification of stroke.

The two issues in question here are first, where exactly do the watershed/borderzone regions lie, and second, what is the most appropriate term to describe them? There are a number of journal articles and radiology atlases in current use giving the location of the cerebral vascular territories, but as van der Zwan and Hillen1 correctly point out, there is in fact considerable variability both in the cerebral vascular anatomy (e.g., circle of Willis) and the territories they supply. This will then be reflected in the anatomic location of the watershed/borderzone regions and in the patterns of infarction seen on CT/MRI. The terminology used to describe these regions therefore needs to take into account both the anatomic variability and the susceptibility to hypoperfusion.

The original terminology came from the German literature,3 using the analogy of an irrigation system, such that “die letzten wiesen” (“the last field”) was the area with the least supply of water and hence most vulnerable to any reduction in flow. The label watershed first appeared in English medical literature in 19544 (although the German equivalent, “wassersiede,” never appeared in the German literature). Unfortunately, this term is a somewhat erroneous translation from the German, as the term watershed is a geographical description of the drainage (not perfusion) basin of a river or water course.5 However, in keeping with its vascular counterpart, the precise location of a watershed is variable, dependent on factors such as the influence of adjoining rivers, the presence of nearby mountains, etc. The term watershed may also be used more figuratively to describe a crucial dividing point or factor leading to a significant change in the course of events. “Borderzone infarction” (along with other such terms) came into use in the 1960s and is a clear description of infarcted tissue at the junction between two vascular territories, with no special emphasis on hemodynamic properties or functional significance of the area in question.

At present, common preference appears to be for the term watershed infarct; it conveys the variable location and hemodynamic nature of the region, in addition to emphasizing the critical effects of hypoperfusion. Whichever term is used, however, it is clear that to fully understand the pathophysiology of stroke we must establish consistency in both description and classification. It would appear that we are on the threshold of achieving this with the current impetus and advances in stroke research taking place during this Decade of the Brain. Or, as Longfellow put it, we are standing at “Midnight! . . . The outpost of the advancing day. The watershed of time from which the streams of yesterday and tomorrow make their way.”

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References

Response

Drs. Bladin, Chambers, and Donnan are correct in emphasizing the need of establishing consistency in both the description and classification as a first step to fully understanding the pathophysiology of stroke. We agree that there is much confusion in stroke terminology describing lesions as watershed infarctions, borderzone infarctions, and hemodynamic and thromboembolic infarctions. In clinical practice, these terms suggest that the pathogenesis of a lesion, visible on computed tomographic (CT) scans or magnetic resonance imaging (MRI) results of a particular patient,
Confusing stroke terminology: watershed or borderzone infarction?
C F Bladin, B R Chambers and G A Donnan

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