Variant Creutzfeldt–Jakob disease and the Quebec blood supply

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In the mid-1980s bovine spongiform encephalopathy (BSE) was recognized as an emerging prion disease of epidemic proportions in the United Kingdom. In April 1996, researchers in the UK announced that they had identified 11 patients with a new form of spongiform encephalopathy, now called variant Creutzfeldt–Jakob disease (vCJD).[1] Since then, more than 70 definite or probable cases of vCJD have been identified, all of them in the UK, except 1 in Ireland and 3 in France (1 of which has not been officially confirmed).[2] Although definite proof is still lacking, current evidence indicates that these human cases were infected with the same strain of prion that causes BSE. In all likelihood the infections resulted from the ingestion of BSE-contaminated food. Because of the very long incubation period of transmissible spongiform encephalopathies, the true epidemic potential of vCJD in humans exposed to BSE is still unknown.[3] Furthermore, the potential for transmission of vCJD through transfusion has not been defined,[4] simply because the relevant laboratory and epidemiologic data are not yet available for this emerging disease. However, all the available data strongly suggest that classic CJD is not transmissible by transfusion.

In the midst of such uncertainty, the Bayer Advisory Council on Bioethics made the specific recommendation,[5] in October 1998, that "persons who [...] have resided in a geographic area with a significant incidence of BSE or [vCJD] [should] not be permitted to contribute blood or plasma until the hypothetical risk of accepting donation from such persons can be evaluated." This recommendation did not take into account the potential impact of such a measure on the availability of donors, and the resulting effect on the blood supply. To address this issue, Héma-Québec conducted a survey in collaboration with the Canadian Blood Services and Health Canada to determine the proportion of donors who had travelled to countries affected by BSE (Table 1).

The choice of a specific deferral criterion

A history of travel or residence in BSE-affected countries is currently the only practical manner by which potential exposure to the BSE agent can be characterized. Since there are no data to suggest the existence of a threshold for duration of exposure below which exposure to BSE is inconsequential, one could assume that the risk of exposure is directly proportional to the cumulative amount of time spent in BSE-affected areas. Based on such premises, the

Table 1: Time spent by Héma-Québec blood donors in BSE-affected countries*

Total duration of travel/ residence since 1980	BSE-affected countries; % of donors		
	United Kingdom	France	Any†
Any duration	12.9	25.0	31.0
≥ 1 mo	3.3	7.3	11.1
≥ 6 mo	1.1	2.3	5.8
≥ 1 yr	0.6	1.7	2.9

Note: BSE = bovine spongiform encephalopathy.
*As determined by responses to a survey from 5513 donors during the week of Jan. 25–30, 1999.
†United Kingdom, France, Switzerland, the Netherlands, Portugal, Belgium, Luxembourg, Liechtenstein, Germany.

ideal precautionary measure would exclude all donors who had spent any time in BSE-affected countries. As shown by the survey, this would have severe adverse consequences on the availability of donors and blood products, and clearly this would not be acceptable.

Justice Krever recommended[6] the following:

> Preventive action should be taken when there is evidence that a potentially disease-causing agent is or may be blood borne, even when there is no evidence that recipients have been affected. If harm can occur, it should be assumed that it will occur. If there are no measures that will entirely prevent the harm, measures that may only partially prevent transmission should be taken.

Based on this recommendation, a safety measure aimed at reducing the theoretical threat of vCJD should also try to minimize other potential risks, including those associated with a severe shortage of blood products. Past experience suggests that the blood system can absorb a sudden loss of about 3%–5% of its current blood donors without any significant impact on the availability of blood products. A loss of 3% of Quebec donors because they had travelled to the UK since 1980 corresponds to a cumulative duration threshold of 1 month or more in that country. This was the rationale for choosing the new deferral criterion that became effective at Héma-Québec on Sept. 30, 1999.

Héma-Québec and the rest of Canada

At the same time as Héma-Québec implemented the 1-month deferral criterion for travel to the UK, the Canadian Blood Services began deferring donors who had spent 6 months or more in the UK since 1980. Based on the donor survey, this exclusion criterion also translates into about a 3% loss of blood donors for the Canadian Blood Services, similar to the impact of the 1-month criterion for the Quebec donor pool. Therefore, both agencies applied the same rule for defining eligibility, namely, the maximum tolerable impact on the blood supply. Since Quebec donors travel less often to the UK compared with donors elsewhere in Canada, this resulted in a smaller threshold of time spent in the UK for Héma-Québec donors.

The new paradigm for dealing with theoretical risks

Until recently it was generally possible to predict and quantify the benefit that would result from the addition of a new measure to improve the safety of blood products. Fairly reliable scientific data existed that allowed experts to make these estimates. In contrast, there are no relevant scientific data to help us predict the gain in safety, if any, that will result from the exclusion of blood donors who have travelled to the UK. On the other hand, more stringent measures than that adopted by Héma-Québec could achieve a higher level of safety, if sufficient time and resources were allocated for their implementation. For example, deferral of all donors who had ever travelled to BSE-affected countries would reduce the Quebec donor pool by 31%. Massive efforts would obviously be required to replace these donors in a timely fashion. Finally, the evolving situation of the vCJD epidemic outside the UK, particularly in France, should be followed carefully. As new information becomes available and depending on the availability of blood donors, it is quite possible that the current criterion will need to be amended.

Collinge[3] has argued that the choices concerning the extent of the precautionary measures that should be taken today to address the theoretical threat of vCJD cannot be based on science alone and that ultimately these issues need to be debated in the political arena. The challenge for transfusion agencies, regulatory bodies and public health in general is to ensure that all the relevant information is made available to the interested parties in order to facilitate these complex and difficult societal decisions.

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