Cytomegalovirus and Cardiovascular Disease—The Importance of Covariates

To The Editor—I read with interest the article by Courivaud et al about cytomegalovirus (CMV) exposure and the risk of cardiovascular disease among transplant recipients [1]. Their study is to be commended, especially given their large cohort, characterization of CMV exposure, and precise definition of atherosclerotic events. Despite inclusion of common covariates of cardiovascular disease, their statistical analysis revealed that the Hosmer-Lemeshow test had a high $\chi^2$ value, indicating that their model did not account for all of the variability seen among the observed cardiovascular events [2]. This may be explained by missing covariates of cardiovascular disease.

Two important covariates of cardiovascular disease that are recognized in the general population are anemia and renal dysfunction. Anemia has been shown to be an independent predictor of atherosclerosis in a large prospective study and is believed to exert its effect through ventricular remodeling [3]. Renal dysfunction and uremia may also increase cardiovascular risk via nontraditional mechanisms, including oxidative stress, endothelial dysfunction, and increased vascular calcification [4].

There are other cardiovascular disease covariates specific to the transplantation population. One study of a cohort of renal transplant recipients showed that impaired fasting glucose levels 1, 4, and 12 months after transplantation were associated with a higher incidence of cardiovascular events [5]. This is likely explained by the diabetogenic nature of the posttransplantation immunosuppressive regimen, including calcineurin inhibitors and steroids [6]. Therefore, the importance of including cardiovascular disease risk factors after transplantation should not be underestimated. Finally, hypertension as a covariate needs to be more clearly defined in the renal transplantation population. A study of patients undergoing preoperative evaluation for renal transplantation showed that electrocardiographic detection of left ventricular hypertrophy with strain pattern was associated with a higher mortality [7].

Courivaud et al make a convincing argument for the role of CMV exposure and cardiovascular events and are able to ground their findings at a basic science level. Addition of the covariates listed above may help strengthen the epide- miological basis of their case and increase our understanding regarding the role of CMV in cardiovascular risk.

Note

Potential conflict of interest. Author certifies no potential conflicts of interest.

The author has submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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References


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