Interfaces Between Cardiovascular and Kidney Disease Among Aboriginal Australians

Stephen P. McDonald and Wendy E. Hoy

Rates of kidney disease among several indigenous groups have been shown to be substantially higher than corresponding non-indigenous groups. This excess has been clearly shown among Aboriginal Australians with respect to both end-stage kidney disease and early kidney disease. Rates of cardiovascular disease among Aboriginal Australians are also very high, as are rates of diabetes, smoking, and possibly overweight and obesity. These factors have been traditionally linked with cardiovascular and renal disease as part of a broader "metabolic syndrome." However, the links and interfaces between cardiovascular and kidney disease in this environment extend beyond these "traditional" factors. The factors associated with atherosclerosis have expanded in recent years to include markers of inflammation, some infection, antioxidants, and other "non-traditional" risk factors. Given the high rates of acute infection and poor living conditions endured by many indigenous people, one might expect these "non-traditional" risk factors to be highly prevalent. In this review, we explore the relationships between markers of inflammation, some serological markers of infection, and other selected markers and both cardiovascular and renal disease. In doing so, we demonstrate links between kidney and cardiovascular disease at a number of levels, beyond the "traditional" cardiovascular/renal risk factors. Many of these factors are beyond the control of the individual or even community; addressing these issues a broader focus and biopsychosocial model.
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One of the most important trends in nephrology over the past 2 decades has been the recognition of substantially higher rates of kidney disease among various indigenous and ethnic minority groups. This development has been seen among geographically and culturally diverse indigenous groups such as Australian Aborigines, New Zealand Maoris,[1] Native American Indians,[2] and Canadian First Nations people. Higher rates of kidney disease have also been observed among other racial and ethnic minority groups, such as people of Asian extraction in Britain[3] and Blacks in the United States.[2]

Parallel to these high rates of kidney failure has been the evolution of high rates of diabetes and of cardiovascular morbidity and mortality.[4] These high rates of kidney and cardiovascular disease might be linked not only by high rates of "traditional" cardiovascular risk factors, especially diabetes, but also by cigarette smoking, hypertension, dyslipidemia, and obesity. However, the menu of risk factors for atherosclerotic cardiovascular disease has broadened in recent years to include several "nontraditional" factors. Inflammatory markers, such as C-reactive protein (CRP),[5] white cell count,[6] and interleukin-6[7]; thrombotic markers, such as fibrinogen[8] and von Willebrand's factors[9]; antioxidants[10,11]; and homocysteine[12] have been shown to mark risk of cardiovascular event or death in studies in westernized urban settings. Some of these "nontraditional" factors are also associated with kidney disease; for example, increased concentrations of CRP[13] and homocysteine[14] have also been shown in people receiving dialysis treatment. Furthermore, links between a triad of malnutrition, inflammation and atherosclerosis appear to exist in those with end-stage renal disease.[15] These factors may also underlie the high rates of cardiovascular and kidney disease among indigenous people, in particular because of the common factors of poor living conditions and low socioeconomic status of indigenous groups.

From the ANZDATA Registry, The Queen Elizabeth Hospital, Woodville, Australia.

Address for correspondence to Stephen McDonald, MD, ANZDATA Registry, The Queen Elizabeth Hospital, 28 Woodville Rd, Woodville, SA 5011, Australia. E-mail stephenm@anzdata.org.au

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Table 1. Australian Resident Population by Indigenous Racial Origin, from 2001 Australian Census of Population and Housing

	Males	*Females*	*Persons*
Indigenous			
Aboriginal	180,147	186,282	366,429
Torres Strait Islander	13,111	12,935	26,046
Both Aboriginal and Torres Strait Islander	8,730	8,798	17,528
Total indigenous	201,988	208,015	410,003
Nonindigenous	8,683,938	8,907,551	17,591,489

Data from the Australian Bureau of Statistics.[98]

Such conditions suggest that these "nontraditional" vascular risk factors, which are largely influenced by diet and exposure to infections and inflammation, might be particularly important. Furthermore, they may help link the high rates of kidney disease and cardiovascular disease. In the remainder of this article, we draw on studies among Aboriginal Australians to examine the interface between kidney and cardiovascular disease among indigenous people from an epidemiologic perspective.

Aboriginal people currently number around 2% of the total Australian population and constitute the major indigenous group in Australia (Table 1). The environmental, economic, and social consequences of marginalization, common to many indigenous people, are widely seen among Aboriginal Australians living in remote communities.[16]

Kidney Disease and Cardiovascular Disease Among Aboriginal Australians

Mortality and morbidity among Aboriginal Australians are extremely high. The life expectancy for Aboriginal Australians of 57 years for males and 66 years for females, on average, and substantially less than the life expectancy for the overall Australian population.[17] The excess mortality is in part the result of high rates of cardiovascular disease. Cause-specific and age-specific rates of cardiovascular mortality range up to 10 times the national average.[18]

Kidney disease is extremely common among Aboriginal Australians. Rates of treated end-stage renal disease are 8-fold higher on a national basis (Fig 1).[19] This excess is especially marked among those aged 35 to 65 years (Fig 2) and has dramatically increased over recent decades.[20] Important geographic variation also exists. Higher rates of kidney disease exists among those living in remote areas such as most of the Northern Territory (NT).[21]

Cross sectional surveys of remote Aboriginal communities have shown high rates of early kidney disease.[22-25] Rates of pathological albuminuria (overt and microalbumin-

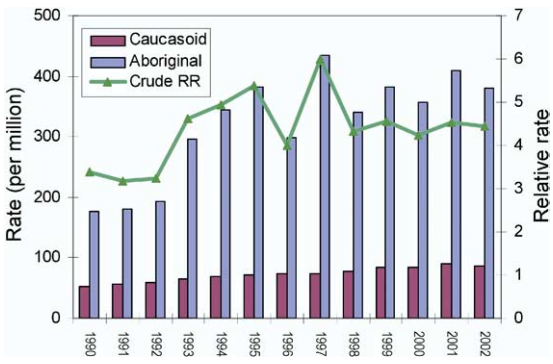

Figure 1. Incidence rates for treated ESRD in Australia by indigenous status. Rates are per million population per year.[99]

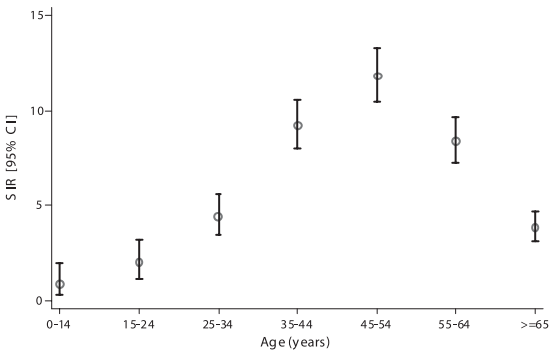

Figure 2. Age-specific ESRD incidence rates for Aboriginal Australians compared with non-Aboriginal people. SIR = standardized incidence rate ratio.

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