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Men Grow Old, Pearls Grow Yellow...

Do today's super centenarians have different kidneys than the rest of the population? Maybe, maybe not. If their GFRs declined in accordance with the 4-variable Modification of Diet in Renal Diseases equation or the average annual decline predicted by the Baltimore Longitudinal Study of Aging, most would still retain sufficient residual renal function to sidestep the need for renal replacement therapy. However, in the Ovidian sense, "change" is the only absolute in life, and so the kidney function of these long-living individuals must have changed, biologically and physiologically, but to what extent?

In this timely issue of *Advances in Chronic Kidney Disease*, as the geriatric population continues to grow concordantly with the number of elderly persons entering the dialytic arena, Guest Editors, Linda Fried and Mark Unruh, coalesced a series of manuscripts by a group of authors with dedicated expertise in aging and in the kidney. Several themes have emerged from this coalesced series.

Ascertainment of CKD in the elderly population is important and involves estimation of GFR as well as albuminuria. Even so, creatinine-based measurements of GFR may be insufficient and consequently, improved methods must be used to diagnose the growing and already substantial proportion of older individuals with unknown CKD. The pathobiology of the aging process includes glomerular sclerosis, tubulointerstitial attrition, and alterations of the vessels and their endothelial underpinnings. Notably, the balance between damage to vessels and repair is tipped toward damage with advancing age. Age-associated alterations of sodium and water handling and

their mechanistic connections to CKD-related nocturia and hypertension are given their due.

The effect of hypertension in the elderly people, which is amplified, cannot be understated, in terms of either its effects on the kidneys or the cardiovascular system. The problems associated with overly aggressive antihyperglycemic and antihypertensive therapy, even when optimized (albeit rarely), are discussed. In simultaneity, the perspective of the patient undergoing therapy is also examined through the lens of quality-of-life metrics. Along this vein, patient-centered issues relevant to substitutive treatments for end-stage kidney disease, including kidney transplantation, are appraised. Moreover, non-substitutive therapies deserve equal mention and these include ethics, hospice care, and end-of-life issues.

With the overview that this issue of *Advances in Chronic Kidney Disease* provides, the reader will gain a greater appreciation of the difficulties imposed by the aging kidney at the patient- and provider-level. With this enhanced knowledge comes the realization that there is a substantial gap in knowledge in this area, and that scientific inquiry is absolutely necessary. Geriatric nephrology provides multiple opportunities for research to those so inclined and is available at foundation and federal levels. In fact, the T. Franklin Williams Scholars Program (supported by the John A. Hartford Foundation and Atlantic Philanthropies) has funded 4 of the authors

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of this unique volume through its American Society of Nephrology-Association of Specialty Professors Junior Career Development Award in Geriatric Nephrology: ML Unruh, WC Winkelmayr, LA Stevens, and EL Hartmann. Additionally, the National Institutes of Health has proffered a request for applications with regard to kidney disease research in the aged.¹ Furthermore, the multicenter NIH SPRINT (Systolic Blood Pressure Intervention Trial) study will explore the effect of 2 blood pressure targets in older adults on cardiovascular, kidney, and age-related cognitive outcomes. This trial will enroll a substantial proportion of CKD patients who have typically been excluded from large, cardiovascular outcomes-based, clinical trials.

In summary, kidneys age and are accompanied by substantial physiological and pathophysiological alterations of structure and function. The burden of cardiovascular disease that accrues with aging and accelerates as GFRs decline below 45 mL/min/1.73 m² must be recognized.² There is an old Chinese proverb: "Men grow old, pearls grow yellow, there is no cure for it." But we must never abet the aging process of the kidneys. Thus, all means to preserve kidney function in the expanding elderly population must be recognized and implemented. Success mandates

careful clinical assessments of kidney function and collaborative and integrated treatment of the multiple domains of CKD and its associated co-morbidities. Primary care physicians' geriatric core must appreciate CKD-related issues more greatly, as nephrologists must increasingly integrate geriatric principles into their models care. At all times, acute kidney injury must be avoided, and preventive measures where applicable must always be employed. The end result of this give-and-take is a dedicated, holistic approach to the elderly patient with CKD, one that is potentially modeled by the Patient-Centered Medical Home.³

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Editor

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