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Science commentary

Renal function—and how to assess it

The gold standard test for assessing renal function is the glomerular filtration rate.[1] Measuring this rate is a laborious process but is most useful for assessing renal function in patients whose serum creatinine concentration is at the upper limit of normal or in patients who develop early renal impairment secondary to treatment with non-steroidal anti-inflammatory drugs, lithium, or angiotensin converting enzyme inhibitors. The normal range is 80-120 ml/min.

A useful and practical surrogate marker for the glomerular filtration rate is creatinine clearance. Creatinine clearance measures the ability of the kidneys to clear creatinine from the circulation into the urine over a period of 24 hours. This is a much more accessible measure of renal function, but because the serum creatinine concentration is influenced by muscle mass and age (it increases with muscle bulk and decreases with age), creatinine clearance rates must be interpreted for the individual patient. Body builders have a tendency for high creatinine concentrations while frail elderly women may have misleadlingly low concentrations.

Most clinicians use serum creatinine concentrations as the most practical measure of renal function. Normal creatinine concentrations can be obtained even when the glomerular filtration rate has dropped by 50%, however, so it is fairly insensitive as an indicator of early renal insufficiency. Once serum creatinine concentrations are abnormal it can be assumed that there is measurable renal impairment (that is, more than half the filtering capacity of the kidneys has been lost).

Measuring the blood urea concentration alone also has limitations because it is influenced by protein metabolism, the state of dehydration, and the use of steroids, in addition to renal function. Thus patients with renal impairment can have relatively normal blood urea concentrations if they are grossly malnourished and not eating.

The Cockroft-Gault formula (mentioned in the paper) is a way of calculating the glomerular filtration rate without undertaking a 24 hour urine collection. The formula factors in age and body mass together with serum creatinine concentrations in an attempt to standardise the serum results and to be able to compare one person's renal function with another. It tends to be used more in research settings than in routine clinical practice as a way of improving the quality of data on renal function.

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Endpiece

Youth, day, old age and night

Youth, large, lusty, loving—youth full of grace, force, fascination,
Do you know that Old Age may come after you with equal grace, force, fascination?
Day full-blown and splendid—day of the immense sun, action, ambition, laughter,
The Night follows close with millions of suns, and sleep and restoring darkness.

Walt Whitman, 1881