vitamin D therapy from dialysis patients, a situation that would last for years.

4. We also strongly disagree with the design of future RCTs, which was suggested by Dr M. Tonelli in his editorial [3], where he stated that ‘the most useful way to start would be a trial comparing injectable paracalcitriol with placebo in patients receiving dialysis.’ Such an industry-like type of design (why paracalcitriol? and not the genuine hormone, calcitriol?) would for years leave a population of uraemic patients untreated with severe hyperparathyroidism and renal osteodystrophy (the placebo group) in an effort to examine for hard endpoints, such as mortality.

Conflict of interest statement. None declared.

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1. Olgaard K, Lewin E. Use (or misuse) of vitamin D treatment in CKD and dialysis patients: a recent meta-analysis on vitamin D compounds in chronic kidney disease [1] and an editorial comment [2] accompanying this meta-analysis have already been published. We believe that these papers deserve some comments in the interest of the NDT readership. Nephrol Dial Transplant 2008; 23: 1786–1789


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Presence of chronic kidney disease stages 3 and 4 in patients with low trauma fracture

Sir,

Patients with chronic kidney disease (CKD) are at an increased risk for fractures, and low bone mineral density (BMD) is a common finding in the CKD population, but management may be different than that recommended in the general population [1,2]. Use of serum creatinine (SCr) to identify patients with CKD is misleading as its generation is determined primarily by muscle mass and dietary intake, so many patients with reduced renal function may have SCr concentrations within the ‘normal’ laboratory range, especially the elderly, women and patients with reduced muscle mass [3]. This is the same population in which there is an increased risk for osteoporosis, and therefore, it is essential to use equations that estimate glomerular filtration rate (eGFR) in this group of patients.

We assessed the presence of CKD stage 3 or higher, in all female patients aged 50–80 and male patients aged 60–80 years presenting with a low trauma fracture (defined as a fracture of the upper or lower limb sustained from a fall from standing height or less) to the Outpatient Fracture Clinic, Department of Trauma and the Orthopaedics Department. Patients with hip fractures were not included as they are normally hospitalized and this study required an outpatient setting. Nottingham serves a population of about 675 000 with all acute trauma admitted to this single unit. SCr was determined at presentation at the hospital by an enzymatic assay using creatinine amidohydrolase (VITROS dry-slide method), and the laboratory reference ranges were 60–120 μmol/l for men and 50–100 μmol/l for women. As an enzymatic creatinine method was used, the GFR was estimated using the re-expressed IDMS traceable form of the Modification of Diet in Renal Disease (MDRD) equation: eGFR = 30 849 × SCr−1.134 × age−0.203 × 0.742 (if the subject is female) × 1.212 (if the subject is African American) [4]. Patients also underwent BMD measurement at the lumbar spine (LS), total hip (TH) and femoral neck (FN) and the results were expressed as T-scores.

Over a 12-month period, 736 patients were evaluated (75 males and 661 females) and their characteristics are shown in Table 1. Using the MDRD equation for the estimation of GFR, we found that 185/736 (25.1%) of the patients had CKD stage 3 (eGFR: 30–59 ml/min/1.73 m2), 13/736 (1.8%) had CKD stage 4 (eGFR 15–29 ml/min/1.73 m2), and none had CKD stage 5. SCr, however, was within the normal range in 128/175 (73%) of women with CKD stage 3 and in 4/10 (40%) of the men with CKD stage 3. All of the patients with CKD stage 4 had SCr levels above normal.

In the present study, we found that one in four patients with a low trauma limb fracture had CKD stages 3 and 4, as this was estimated using the MDRD formula. However, in the range of eGFR of 30–59 ml/min/1.73 m2, 71% of them had SCr within the normal for the reference range of our laboratory. The reduced muscle mass often associated with women and older individuals, the population at risk for osteoporosis, could explain the misidentification by using the SCr alone for the determination of CKD. A previous study described the prevalence of renal dysfunction in patients with osteopaenia and osteoporosis, using the Cockcroft–Gault formula to estimate creatinine clearance (ClCr) as the measure of renal function [5]. They estimated the prevalence of mild to moderate compromise of kidney function (defined as ClCr ≤ 60 ml/min) to be 85% in osteoporotic women and for severe compromise of ClCr < 35 ml/min to be 24%, with lower prevalence estimates for osteoporotic men [5]. The prevalence that they reported is much higher than in our study, although the differences in the study population, patient numbers and methodology used may explain part of the diversity of the results.

An accurate assessment of renal function and identification of CKD in patients with low trauma fractures is important for several reasons. Firstly, during the acute phase, potentially nephrotoxic drugs such as non-steroidal anti-inflammatory drugs should be avoided or used with caution, and the knowledge of renal function may affect the choice of medication and dosage for renally excreted drugs. Additionally, regarding the necessity of long-term osteoporosis management, this should not be based on low BMD alone,
but should take into account renal osteodystrophy [1]. The pathophysiologic alterations responsible for the renal osteodystrophy, such as increased parathyroid hormone, low vitamin D status and disorders of mineral metabolism, are evident at stage 3 of CKD, and evaluation of such a patient should include these parameters that must be treated accordingly [3]. Furthermore, the use of standard therapies for osteoporosis in the CKD population is highly controversial [1]. Finally, the most precise method and the appropriate site to measure BMD are also to be determined in CKD patients because dual energy X-ray absorptometry (DXA) spine measurements can be falsely elevated due to aortic calcifications, another frequently observed feature in CKD patients [1].

Based on our findings, we propose the routine use of eGFR in patients with a low trauma fracture. Use of the MDRD equation by the laboratories is easy; it requires only minimal clinical information (age, gender and race) and is also already corrected for body surface area, thus the height and the weight of the patient are not required.

**Conflict of interest statement.** None declared.


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**Table 1.** Characteristics of the patients included in the study. *P*-values are for comparisons between patients with CKD stages 3 and 4 versus those with eGFR ≥ 60 ml/min/1.73 m²

<table>
<thead>
<tr>
<th></th>
<th>All patients (n=736)</th>
<th>eGFR ≥ 60 (n=538)</th>
<th>eGFR &lt; 60 (n=198)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>69 (59–80)</td>
<td>67 (50–80)</td>
<td>72 (51–80)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male/female (n)</td>
<td>75/661</td>
<td>61/477</td>
<td>14/184</td>
<td>ns</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>27.8 ± 5.2</td>
<td>27.7 ± 5.2</td>
<td>28.3 ± 5.2</td>
<td>ns</td>
</tr>
<tr>
<td>eGFR (ml/min/1.73 m²)</td>
<td>71 ± 20</td>
<td>76 ± 13</td>
<td>49 ± 10</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LS T-score (SD)</td>
<td>−1.7 (−7.1 to 5)</td>
<td>−1.7 (−7.1 to 5)</td>
<td>−1.7 (−4.7 to 5.0)</td>
<td>ns</td>
</tr>
<tr>
<td>FN T-score (SD)</td>
<td>−1.6 (−5.3 to 2.7)</td>
<td>−1.6 (−5.3 to 2.7)</td>
<td>−1.7 (−3.9 to 2.2)</td>
<td>ns</td>
</tr>
<tr>
<td>TH T-score (SD)</td>
<td>−1.3 (−5.2 to 3.3)</td>
<td>−1.3 (−5.2 to 3.3)</td>
<td>−1.4 (−3.7 to 3.3)</td>
<td>ns</td>
</tr>
<tr>
<td>Osteoporosis, n (%)</td>
<td>298 (40.5)</td>
<td>214 (40)</td>
<td>84 (42)</td>
<td>ns</td>
</tr>
<tr>
<td>Osteopenia, n (%)</td>
<td>303 (41)</td>
<td>222 (41)</td>
<td>81 (41)</td>
<td>ns</td>
</tr>
<tr>
<td>Normal BMD, n (%)</td>
<td>135 (18.5)</td>
<td>102 (19)</td>
<td>33 (17)</td>
<td>ns</td>
</tr>
<tr>
<td>Fracture site h/w/a</td>
<td>177/423/136</td>
<td>126/315/97</td>
<td>51/108/39</td>
<td>ns</td>
</tr>
</tbody>
</table>

a: ankle; BMD: bone mineral density; BMI: body mass index; CKD: chronic kidney disease; eGFR: estimated glomerular filtration rate; FN: femoral neck; h: humerus; LS: lumbar spine; n: number; ns: not statistically significant; TH: total hip; w: wrist.

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