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Four- and six-hour urinary albumin excretion is a valuable alternative to 24-h urinary albumin excretion in male db/db mice

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Abstract

*In mouse (*Mus musculus*) models of diabetic nephropathy (DN), one of the most important read-outs is the 24-h urinary albumin excretion (UAE). The 24-h urine collection is usually performed by single housing mice in metabolic cages on wire mesh without enrichment. This is known to be stressful for the mice. Therefore, it was investigated if shorter urine collections would be sufficient to get reliable assessments of albuminuria. Twenty-one diabetic (C57BLKS-Lepr$^{db/db}$) and ten non-diabetic mice (C57BLKS-Leprd$^{b/+}$) were placed in metabolic cages at 15 and 20 weeks of age (WoA) for 24 h. Urine samples were taken at 4, 6, 18 and 24 h and albumin and creatinine concentration were measured. Four- and 6-h UAE was found to correlate significantly with 24-h UAE. Furthermore, a significant correlation was found between 24-h UAE and albumin:creatinine ratio (ACR) in the 4-h sample. However, the strength of the correlation between ACR and 24-h UAE was weaker than between the 4- and 24-h UAE. This suggests that normalising to creatinine may not provide additional value to the 4-h urine collection. In conclusion, the strong correlation between 4- and 6-h UAE and 24-h UAE indicates that the collection period can be considerably reduced. This refinement could reduce stress and increase welfare of the db/db model and potentially be applied to other DN models.*

Keywords: *albuminuria, animal welfare, db/db mice, diabetic nephropathy, metabolic cages, refinement*