

The Estimation and Isometric Development of Glomerular Filtration Rate and Bladder Capacity

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ABSTRACT

PURPOSE: To present the finding that glomerular filtration rate (GFR) and bladder capacity (BC) develop isometrically and to provide graphs and equations for conveniently estimating GFR and BC for specific individuals of any age, sex, height and weight with normal urinary tracts.

METHODS: GFR and bladder capacity data were collected from the literature. A computerized curve-fitting technique that minimizes the 1.1 power of the absolute error was used to obtain estimating equations relating GFR and BC to age, sex, height and weight. Then GFR and BC were compared using various methods and the best relationship selected. This showed BC and GFR to be proportional.

RESULTS: The estimating equation for GFR as a function of height in cm, weight in kg, sex and age in years and the estimating equation for BC is presented. The comparisons of BC and GFR given show the proportional development of GFR and BC. Graphs based on these equations are shown for individuals of 10th, 50th, and 90th percentile height and weight as a function of age and sex.

CONCLUSIONS: A finding of this work is that BC and GFR develop isometrically with a proportionality constant of 4.56 minutes except in the first year of life. Also the proportionality constant is the same for both sexes independent of sex). The estimating equations and graphs are useful tools for customizing the cystometric infusion rate and BC for individual patients, analyzing the results, and preparing an easily interpreted report.