Modelling Glomerular Filtration Rate in patients with cancer.

Background: Accurate estimation of renal function is important for clinical decision making processes, including the prescription of platinum based chemotherapy for patients with cancer. The glomerular filtration rate (GFR) is the best measure of renal function. Methods are available to estimate GFR based on readily accessible clinical measurements, however, these methods have been developed on data from non-cancer patients. We performed a regression analysis to find a new model for GFR using data from a cancer patient population.

Methods: Data on age, sex, height, weight, serum creatinine, and for GFR from 51Cr-EDTA excretion measurements (51Cr-EDTA GFR) were obtained from patients aged 18 years or older with histologically confirmed cancer diagnoses. Modelling was originally performed on data from a single centre subset of 2471 patients, and the results published [1]. Since publication, data from an additional 5557 patients from one Swedish and six UK centres were used to validate and expand the model. Particular attention was given to differences resulting from two different methods to measure serum creatinine that are currently in use, as a consequence of the introduction of isotope dilution mass spectrometry (IMDS) traceable serum creatinine.

Results: Different regression methods were explored including linear, generalised linear and segmented regression. Using the original data, the most appropriate model found was a linear model including a transformed response variable. Both the original model and the adjusted model fit the data well with R-squared values in the range of 0.7 to 0.75 and both were shown to be more accurate than previously published models in all the validation datasets. This directly translates to a more accurate carboplatin dose, if estimated GFR in conjunction with the Calvert formula was used, which is common in clinical practice.

Conclusion: In a large multicentre dataset of patients with cancer, we developed a new model for GFR which results in more accurate estimation and thus more accurate carboplatin dose calculations when compared with commonly used published models.

[1] Janowitz T and Williams EH et al., J Clin Oncol. 2017 Aug 20;35(24):2798-2805. doi: 10.1200/JCO.2017.72.7578