The Accuracy of Carboplatin Area Under the Plasma Concentration Time Curve (AUC) Estimated by Calvert Formula Using Cockcroft-Gault formula and Thai eGFR in Thai Cancer Patients

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Background: In current practice, carboplatin dose is calculated by Calvert’s formula. Although, originally measured glomerular filtration rate (GFR) was used in the formula, creatinine clearance (CrCl) estimation by Cockcroft-Gault (CG) formula is widely accepted. The estimated GFR (eGFR) based on serum creatinine level has been established and endorsed to apply in clinical practice. We conducted a cross sectional study to compare the accuracy of estimated carboplatin AUC by Calvert formula using CG formula and Thai eGFR.

Method: Patients receiving carboplatin based regimens at King Chulalongkorn Memorial Hospital were enrolled. The doses of carboplatin were calculated by Calvert formula using CG formula. The reference carboplatin AUC was estimated by Ghazal-Aswad formula using measured plasma free carboplatin level at 24 hours after infusion. Based on the reference carboplatin AUC, we compared the accuracy of estimated carboplatin AUC by CG formula and Thai eGFR.

Results: Of total 45 enrolled patients, 62% were male and the mean age was 60.5 years. The mean BMI was 21.9 (14.64 - 32.27) kg/m² and mean plasma creatinine levels was 0.82 (0.4 - 1.51) mg/dl. 95.6% received combination chemotherapy. The mean reference carboplatin AUC was 4.94 (±1.26) mg/ml·min. The mean estimated carboplatin AUC by CG and Thai eGFR were 4.07 (±1.17) and 3.73 (±1.17) mg/ml·min, respectively. The mean percentage error (MPE) of the estimated mean carboplatin AUC by CG and Thai eGFR were -16.1 (±22.5) % and -23.1 (±22.5) %, respectively, p<0.001. In 24 patients with available 24-hour urine collection, the mean calculated carboplatin AUC based on urine creatinine clearance and MPE was 4.47 (±1.70) mg/ml-min and -8.54%, respectively, the most accuracy method compared to CG, Thai eGFR and CKD-EPI.

Conclusion: The calculated carboplatin dose by Calvert’s formula using CG formula is more accurate than using Thai eGFR in Thai patients.