Commentary Article

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Serum Soluble Urokinase Plasminogen Activator Receptor as a Potential Biomarker

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Description

The kidneys are responsible for the clearance and elimination of drugs and waste products, as well as the regulation of vital physiological variables like blood pressure, acid–base, fluid, and electrolyte balance. The aging population and an increase in the prevalence of chronic diseases like diabetes and hypertension may be to blame for the rising incidence of chronic kidney disease. Among hospitalized patients, acute kidney injury is also becoming increasingly recognized. Prior to administering anesthesia, it is essential to comprehend and identify a patient's key signs of renal impairment in order to reduce the likelihood of complications that will increase perioperative morbidity and mortality. Whenever possible, serum urea and electrolytes should be compared to previous results. In cases of derangements that have the potential to be life-threatening, such as hyperkalaemia, immediate preoperative interventions or delays in surgery may be required.

Elimination of Drugs

The patient's acid–base status and the need for preoperative correction can be assessed through blood gas analysis using values for pH, bicarbonate, and base deficit. The level of sugar in the blood ought to be measured in diabetic patients. In the literature, there are only a few prospective data on ciprofloxacin's pharmacokinetic and pharmacodynamic target attainment in patients with adequate and impaired renal function. We wanted to find out if regular and reduced ciprofloxacin doses achieve the PK/PD goal in patients with adequate and impaired renal function. Adult patients receiving ciprofloxacin were included in this prospective observational cohort study. For the purpose of measuring the ciprofloxacin concentration, three blood samples were taken from each patient. A population PK model developed through non-linear mixed-effects modeling was used to calculate individual AUCs. Eight of the forty patients included had impaired renal function, so they received the reduced dose that was recommended by the guideline. using the most isolated bacteria's clinical breakpoint MIC. Regular doses are given to patients with adequate renal function, and reduced doses are given to one in eight patients with impaired renal function. Patients who are admitted to a hospital have a lower risk of dying if antibiotics are administered promptly and appropriately.

Overdosing may result in potentially harmful side effects, while underdosing may lead to treatment failure and the development of antimicrobial resistance. Gram-negative bacteria, especially Enterobacterales and Pseudomonas aeruginosa, are the most clinically relevant Gram-negative bacteria for which the fluoroquinolone antibiotic ciprofloxacin is frequently prescribed. When the pharmacokinetic/pharmacodynamic target is reached, antibiotic dosing is generally regarded as optimal. This target for ciprofloxacin is the ratio of the area under the concentration–time curve to the minimum inhibitory concentration (MIC), where MIC stands for the lowest antibiotic concentration that stops bacteria from growing *in vitro*. Clinical and microbiological cure of lower respiratory tract infections, bacteraemia, wound and soft tissue infections, and complicated urinary tract infections primarily caused by P. aeruginosa or other Gram-negative bacteria is associated with reaching the PK/PD target of AUC/MIC 125 for total ciprofloxacin exposure. However, it has been demonstrated that even when prescribed doses of ciprofloxacin are administered to critically ill patients or general ward patients, AUC/MIC 125 is frequently not achieved. The kidneys are where ciprofloxacin is mostly eliminated. Patients with an estimated glomerular filtration rate should take fewer doses as a result. These dose reductions are extrapolations from a few small studies, the majority of which focused on the pharmacokinetics of ciprofloxacin following a single, unadjusted dose in volunteers with impaired renal function but no infection. However, the biliary system is also responsible for ciprofloxacin metabolism and some excretion. In patients with impaired renal function, this alternative route of elimination might make up for less waste going through the kidneys.

Inactive Plasminogen

A second investigator independently checked the patient's characteristics, concurrent use of other antibiotics, and ciprofloxacin dose and administration time from the patient's electronic health record. Additionally, the patient and the responsible nurse were consulted regarding the ciprofloxacin administration schedule and time. Throughout the entirety of

the treatment with ciprofloxacin, laboratory measurements such as eGFR, creatinine, aspartate aminotransferase, and administration of co-medication influencing the oral absorption of the drug were recorded. The creatinine equation developed by the Chronic Kidney Disease Epidemiology Collaboration was used to estimate GFR. In patients treated for bacterial infections, adequate antibiotic drug exposure is critical because overexposure can result in toxicity while underexposure is linked to therapeutic failure and the emergence of antibiotic resistance. Standard of care in all clinical guidelines is to reduce the dose of antibiotics that have been cleared by the kidney for patients with impaired renal function. This is done to avoid drug accumulation and give patients with adequate renal function the same amount of antibiotics as the usual dose.

Both nephrologists and diabetologists face difficulties in managing DKD patients. DKD can progress despite adequate control of glycemic, blood pressure, and proteinuria, highlighting the need to investigate less well-known pathogenic pathways. There are no biomarkers available to evaluate the onset and progression of DKD and DN, despite the development of new therapeutic options for DM patients. Given that the standard markers albuminuria and estimated glomerular filtration rate based on serum creatinine have limited value and utility in assessing functional and morphological impairment in this pathology, the discovery and implementation of new markers associated with renal impairment is an area of interest in the research field of DN. Serine-protease urokinase-type plasminogen activator plays a crucial role in a variety of non-proteolytic processes and is involved in the conversion of inactive plasminogen to active plasmin.