

## **The Blood Urea Nitrogen to Creatinine Ratio as a Novel Prognostic Biomarker in Liver Failure Associated with Acetaminophen Toxicity**

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**Background:** A common cause of acute liver failure (ALF) is acetaminophen (APAP) toxicity, and patients with severe ALF may require liver transplantation to avoid death. The Kings College Criteria has been developed for prognostication, but is fraught with many limitations, necessitating additional prognostic tools for a bad outcome in APAP toxicity. Studies have found that a compromised liver will result in decreased urea synthesis in the presence of acute kidney injury, therefore we are investigating the value of the blood urea nitrogen to creatinine ratio (BUN/Cr) as a prognostic indicator of poor outcome in ALF after APAP toxicity.

**Hypothesis:** Patients who die or require liver transplantation from acetaminophen-induced hepatic toxicity will have significantly lower BUN/Cr than patients whose livers spontaneously recover.

**Methods:** This is a retrospective study utilizing pharmacy records of n-acetylcysteine administration for APAP toxicity at a single academic quaternary care center from January 2005–October 2012. A total of 230 patients were identified. Cases were excluded if the patient had preexisting liver or renal disease (n=10), and if AST never exceeded 1000 IU/L (n=113). Patients were then divided based on outcome: death (n=22), spontaneous survival (n=73), or transplant (n=12). BUN/Cr, along with other data (demographics, and concurrent lab tests) were collected on a standardized data collection sheet. We compared individual laboratory values on each day between groups using ANOVA. We performed logistic regression to account for repeated measurements within subjects in order to test for independent associations of each variable with outcome.

**Results:** When comparing subjects with death or transplanted (n=34) to subjects who survived (n=73), BUN/Cr did not differ (NS, ANOVA). However, pH (p<0.001, ANOVA), phosphorus (p=0.012, ANOVA), lactate (p<0.001, ANOVA), and INR (p<0.001, ANOVA) demonstrated significant difference between groups.

**Discussion:** There was a tendency for BUN/Cr to be lower in those who die or require transplantation, however this was not statistically significant. We did observe changes in biomarkers previously found to indicate a poor outcome in APAP-induced ALF, identified in previous studies.

**Conclusions:** A lower BUN/Cr was not related to worse outcome for subjects with acute liver failure in setting of APAP toxicity.