ARTICLE:


- *Country: United Kingdom*

PURPOSE:

- *Research Question(s):*
  - What are the physiologic responses, specifically in the kidney and vascular system to 0.9% normal saline compared with a balanced crystalloid, Plasma-Lyte 148.

- *Hypothesis:* Animal models have suggested that hyperchloremia may have adverse effects on renal hemodynamics, and this could occur in humans as well.

DESIGN:

- *Study Design:*
  - Double blind crossover study:
    - Twelve healthy volunteers, male, avg age 22.7
    - Received 2L IV infusions over 1 hour of NS or plasma-lyte
    - Crossover studies performed 7-10 days later
    - Preinfusion urine samples for urea, sodium, potassium, neutrophil gelatinase-assoc lipocalin (NGAL)
    - 24H urine collected for CrCl
    - Body weight measurements
    - MRI scanning to measure renal artery blood flow velocity and renal cortical perfusion

- *Outcomes:*
  - Sustained hyperchloremia noted with saline, not plasma-lyte. Peaked at 109 mmol/L and stayed above physiologic normal of 105.
  - Blood volume changes identical, but NS had higher extravascular volume at 4h
  - H/H no difference
  - Could not detect change in renal artery diameter due to MRI limitations
  - Decrease in renal flow velocity, renal cortical tissue perfusion with NS
SUBJECTS:
- **Subjects:**
  - 12 subjects, healthy volunteers, mean age 22.7, all male.

METHODS:
- **Interventions:**
  - 12 healthy subjects, blood and urine studies for baseline values
  - Randomized to 2L of IV NS or IV plasma lyte over 1 hour
  - Crossover study done 7-10 days later
  - MRI scanning to determine renal artery blood flow and perfusion
  - Repeat blood work and urine studies

DATA ANALYSIS:
- **Statistics Used:**
  - Philips Q-flow
  - FMRIB software library for image motion correction
  - Mean renal cortical perfusion estimated by dividing kidney into tissue type by image and averaging values.
  - ANOVA testing between two groups with Bonferroni’s correction for multiple comparisons
  - P <0.05

RESULTS:
- **Brief answers to research questions:**
  - Sustained hyperchloremia noted with saline but not Plasma-Lyte.
  - Larger expansion of extracellular fluid with NS
  - Significant reduction in mean arterial flow velocity and renal cortical tissue perfusion compared with baseline after NS but not Plasma-lyte

IMPLICATIONS FOR PRACTICE:
- **Applicable to this clinical practice:**
  - NS may not be the ideal resuscitative fluid in patients with compromised kidney function
- **Feasibility (cost, resources, etc):**
  - Plasma-Lyte 148 is a novel crystalloid, and while the cost is not reported, likely more expensive than NS.
LEVEL OF EVIDENCE / DECISION FOR USE:

- Background

- *Level of Evidence: Ib*
  
  Ia  Evidence obtained from meta-analysis of randomized controlled trials
  
  Ib  Evidence obtained from at least one RCT
  
  IIa Evidence obtained from at least one well-designed controlled study without randomization
  
  IIb Evidence obtained from at least one other type of well-designed quasi-experimental study
  
  III Well-designed non-experimental studies
  
  IV Expert committee reports, opinions of experts