Unique Risk Factors for Thiamine Deficiency in ED Patients without Alcohol Dependence

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Unique Risk Factors for Thiamine Deficiency in ED Patients without Alcohol Dependence

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Disclosures

Disclosures? Lol, good one.
Okay, so what does thiamine do again?
Beriberi? Sounds fake.
Okay, why should I care?

- Acute critical illness → stress response → increased metabolic demand → which can lead to...
- ...yup, you guessed it: THIAMINE DEFICIENCY
  - Septic Shock: Donnino et. al., J Crit Care, 2010
  - Post-CABG: Donnino et. al., Nutrition, 2011
  - Major trauma: McConachie et. al., Intensive Care Med, 1988
  - ESRD on dialysis: Jankowska et. al., Blood Purif, 2017
  - DKA: Moskowitz et. al., J Crit Care, 2014
  - Pediatric DKA: Rosner et. al., Ped Crit Care, 2015
  - Cancers: Lu'o'ng et. al., Cancer Genomics Proteomics, 2013
Alright, get to the point, bub

PRIMARY OBJECTIVE:

To determine risk factors for thiamine deficiency in severely ill ED patients without a history of alcohol dependence
Methods, stats, math, etc.

Setting and Design

- Multi-pronged, prospective observational study
- Urban, academic ED with wide variation of critically ill patients

Population

- *Inclusion criteria:* patients with diabetic ketoacidosis, severe sepsis, and/or oncological emergencies, aged matched control
- *Exclusion criteria:* patients that had known alcohol dependence or for whom the ED clinicians planned B1 treatment
Methods, stats, math, etc.

Data Collection

- Whole blood levels which measure thiamine-diphosphate on all ED patients
- Demographic and clinical characteristics that could contribute to nutritional deficiencies.
- Data specific to metformin (pre-clinical data suggests that metformin may interfere with intestinal B1 transporters)

Analysis

- Univariate comparisons and multivariable logistic regression
- Elucidate significant risk factors for the primary outcome of B1 deficiency, defined as a whole blood level below the normal reference range.
Cool science, bro. But so what?

Demographics

N = 342 patients

Average age 57 (SD 17) years

47% Female

80% African American
Cool science, bro. But so what?

- Univariate analysis, associated with B1 deficiency:

![Risk factors associated with B1 deficiency (* = p < 0.05)](chart)

- Metformin use (%)*
- Female (%)*
- BMI
- Mean albumin (g/dL)*
- Mean age (years)*

Control B1 deficiency
Cool science, bro. But so what?

- Univariate analysis, associated with B1 deficiency:

<table>
<thead>
<tr>
<th></th>
<th>Cancer</th>
<th>DKA</th>
<th>Sepsis</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal % (n)</td>
<td>72.41 (63)</td>
<td>91 (91)</td>
<td>73.17 (60)</td>
<td>88.73 (63)</td>
</tr>
<tr>
<td>Low B1 % (n)</td>
<td>27.59 (24)</td>
<td>9 (9)</td>
<td>26.83 (22)</td>
<td>11.27 (8)</td>
</tr>
</tbody>
</table>
Cool science, bro. But so what?

- Multivariate analysis (OR, 95% CI), associated with B1 deficiency:
Discussion

- Cancer is an independent risk factor of thiamine deficiency
- Thiamine and Metformin use the same intestinal transporter
- Thiamine is bound to albumin in the bloodstream where it is transported to the liver for storage
- Female predominance
Limitations

- Narrow subset of diagnoses included
- Secondary analysis of study aimed at analyzing prevalence data
- Clinical implications yet to be elucidated
What do you mean you are not done yet?

- Future directions
  - Utility of thiamine levels in critically ill patients to guide therapy
  - Outcomes of empiric thiamine repletion in patients with associated risk factors
  - Thiamine as a part of a resuscitative bundle in all critically ill patients in addition to Vitamin C and steroids