INDICATION AND USE OF ICODEXTRIN IN PD PATIENTS

Shweta Bansal, MBBS, MD
Assistant Professor Of Medicine
Medical Director, Home Dialysis Program
University Of Texas Health Science Center
San Antonio, TX, USA

CASE
60 y/f with ESRD sec to Diabetes Mellitus, CAD, TIA and PVD.
- On PD x 18 months, one episode of peritonitis
- PET: 0.56
- CCPD prescription
- 2 L x 3 exchanges over 8 hours, and last fill of 2 L. Mostly uses 1.5%
- Now almost no RRF and having issues with
  - Volume overload (increasing weight and hypertension). Total Kt/V 1.65
- Increase volume to 2.5 L and additional exchange over night x 9 hours, more often 2.5% dialysate
- Over next 18 months
  - 2 more episodes of peritonitis – treated successfully
  - Presents to clinic with dyspnea on exertion x 3 weeks
    - BP: 150/90 mmHg, Weight: 178 lb, O2sat: 96% on RA, 1+ b/l pedal edema
    - A1C: 10.0, Kt/V: 1.85, neg UF of 500-700 ml with last fill.
- No constipation or catheter malfunction
- Repeat PET: 0.80, <200 ml UF after 4 hours
- Refuses for mid-day drain or exchange due to work conflict

PRINCIPALS OF SOLUTE AND VOLUME CLEARANCE

Blood osmolarity
285-295 mOsm/L

Dialysate Osmolarity
1.5%: 346 mOsm/L
2.5%: 398 mOsm/L
4.25%: 486 mOsm/L

Diffusion: along concentration gradient
Ultrafiltration: along osmotic gradient

STRUCTURE OF PERITONEAL MEMBRANE

FACTORS AFFECTING THE OSMOTIC GRADIENT

- Blood glucose concentration
- Transport Characteristics of peritoneal membrane
  A. Inherited
  B. Acquired

Mujais et al. PDI 2001 vol 21. suppl 1 Abstract
FACTOR CAUSING INCREASE IN SOLUTE TRANSPORT

Bioincompatible fluids

HISTOPATHOLOGICAL CHANGES: TYPE I UFF

CLINICAL CONSEQUENCES OF MEMBRANE CHANGES

Increase in transport status of membrane
Rapid dissipation of osmotic gradient
Not much UF or negative UF after longer dwell

Therapeutic agent to support convection
- Maintain sustain osmotic gradient
- Nonabsorbable
- Prevent damage to peritoneal membrane
- Systemically better tolerated
  - Hyperglycemia
  - Hyperlipidemia

ICODEXTRIN

- High molecular weight (16.8 Kda) polymer of glucose
- Iso-osmotic, Oncotic pressure
- Reflection coefficient of 0.76 as compared to 0.03 of glucose

ABSORPTION OF CARBOHYDRATE (CHO)

- Patients with PET >0.7
- After a 12-Hr long dwell of 2 L fluid

EFFECT ON ULTRAFILTRATION

- Patients with PET >0.7
- After a 12-Hr long dwell of 2 L fluid
### COMPOSITION OF ICODEXTRIN CONTAINING DIALYSEATE

<table>
<thead>
<tr>
<th></th>
<th>1.5% (9g)</th>
<th>2.5% (9g)</th>
<th>4.25% (9g)</th>
<th>Icodextrin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrose</td>
<td>1.5 (g/dL)</td>
<td>2.5 (g/dL)</td>
<td>4.25 (g/dL)</td>
<td>7.5</td>
</tr>
<tr>
<td>Icodextrin</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7.5</td>
</tr>
<tr>
<td>Sodium</td>
<td>132 (mEq/L)</td>
<td>132 (mEq/L)</td>
<td>132 (mEq/L)</td>
<td>132 (mEq/L)</td>
</tr>
<tr>
<td>Chloride</td>
<td>96 (mEq/L)</td>
<td>96 (mEq/L)</td>
<td>96 (mEq/L)</td>
<td>96 (mEq/L)</td>
</tr>
<tr>
<td>Calcium</td>
<td>2.53 (mg/dL)</td>
<td>2.53 (mg/dL)</td>
<td>2.53 (mg/dL)</td>
<td>2.53 (mg/dL)</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.5 (mg/dL)</td>
<td>0.5 (mg/dL)</td>
<td>0.5 (mg/dL)</td>
<td>0.5 (mg/dL)</td>
</tr>
<tr>
<td>Lactate</td>
<td>35 (mg/dL)</td>
<td>35 (mg/dL)</td>
<td>35 (mg/dL)</td>
<td>35 (mg/dL)</td>
</tr>
<tr>
<td>Creatinine</td>
<td>346 (mg/dL)</td>
<td>338 (mg/dL)</td>
<td>346 (mg/dL)</td>
<td>328 (mg/dL)</td>
</tr>
<tr>
<td>pH</td>
<td>7.3</td>
<td>7.3</td>
<td>7.3</td>
<td>7.3</td>
</tr>
</tbody>
</table>

### INSULIN RESISTANCE IN ESRD

**ESRD**
- Insulin resistance

**Non-diabetic patients**
- Hyperinsulinemia
- Weight gain
- Hyperlipidemia
- \[\uparrow\] in HgA1C with in normal range associates with high CV disease

**Diabetic patients**
- Worsening of sugar control

**IMPENDIA and EDEN Trials**


### EFFECT OF ICODEXTRIN ON INSULIN SENSITIVITY IN NON-DIABETICS

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control (95%CI)</th>
<th>Icodextrin (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting glucose (mg/dL)</td>
<td>94.5 (88.7-110.2)</td>
<td>92.8 (87.5-99.2)</td>
</tr>
<tr>
<td>HbA1C (%)</td>
<td>4.6 (4.4-4.8)</td>
<td>4.7 (4.5-4.9)</td>
</tr>
<tr>
<td>HOMA Index</td>
<td>1.58 (1.3-1.8)</td>
<td>1.49 (1.3-1.7)</td>
</tr>
<tr>
<td>Insulin (mmol/L)</td>
<td>7.9 (6.8-8.9)</td>
<td>6.8 (5.3-7.3)</td>
</tr>
</tbody>
</table>

**EFFECT OF ICODEXTRIN ON ADIPOCYTOKINES**


### ICODEXTRIN IS NOT ASSOCIATED WITH LONGITUDINAL CHANGE IN MEMBRANE FUNCTION

Davies SJ et al. Kid Int 67:1009, 2005

### ICODEXTRIN INCREASES TECHNIQUE SURVIVAL RATE

EFFECT ON SURVIVAL: RETROSPECTIVE ANALYSIS

SURVIVAL EFFECT: RETROSPECTIVE STUDY

ADVERSE EFFECTS: SKIN RASH

INTERFERENCE WITH ASSAYS

- Glucose monitoring system utilizing glucose dehydrogenase pyrroloquinolinequinone-based method
  - Glucose oxidase or hexokinase based method
  - Effect can last up to 2 weeks
- 4,6-ethylidene(G7)-p-nitrophenyl(G1)-α,D-maltoheptaside-based assay for plasma α-amylase
  - Falsely Low amylase

INDICATIONS FOR USE OF ICODEXTRIN

THANK YOU!

QUESTIONS??

If cost is not an issue
- All the long dwells
Cost-prohibiting
- UFF associated with high transport
- During acute peritonitis
- Maintenance of volume even without UFF
- Difficult to control glucose