Geography and Diabetes
IMSC Retreat March 8, 2012

Dr. Wei-An (Andy) Lee
Director, Diabetes and Metabolism Clinic
LAC+USC Medical Center
Keck Medical Center of USC
Division of Endocrinology and Metabolism
weilee@usc.edu
• Can spatial technology provide clinically meaningful information that can influence health outcomes?
Number (in Millions) of Civilian, Noninstitutionalized Adults with Diagnosed Diabetes, United States, 1980–2010

From 1980 through 2010, the number of U.S. adults aged 18 years or older with diagnosed diabetes has more than tripled (from 5.5 million to 20.7 million).
Diabetes
<table>
<thead>
<tr>
<th>MEDICATIONS*</th>
<th>Metformin (MET)</th>
<th>DPP4 Inhibitor</th>
<th>GLP-1 Agonist (Incretin Mimetic)</th>
<th>Sulfonylurea (SU)</th>
<th>Glinide**</th>
<th>Thiazolidinedione (TZD)</th>
<th>Colesevelam</th>
<th>Alpha-glucosidase inhibitor (AGI)</th>
<th>Insulin</th>
<th>Pramlintide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BENEFITS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postprandial Glucose (PPG) - lowering</td>
<td>Mild</td>
<td>Moderate</td>
<td>Moderate to Marked</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Mild</td>
<td>Mild</td>
<td>Moderate to Marked</td>
<td>Moderate to Marked</td>
<td></td>
</tr>
<tr>
<td>Fasting glucose (FPG) - lowering</td>
<td>Moderate</td>
<td>Mild</td>
<td>Mild</td>
<td>Moderate</td>
<td>Mild</td>
<td>Moderate</td>
<td>Mild</td>
<td>Neutral</td>
<td>Moderate to Marked</td>
<td>Mid</td>
</tr>
<tr>
<td>Nonalcoholic fatty liver disease (NAFLD)</td>
<td>Mild</td>
<td>Neutral</td>
<td>Mild</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>RISKS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate to Severe</td>
<td>Neutral</td>
</tr>
<tr>
<td>Gastrointestinal Symptoms</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Moderate</td>
</tr>
<tr>
<td>Risk of use with renal insufficiency</td>
<td>Severe</td>
<td>Reduce Dosage</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Mild</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Unknown</td>
</tr>
<tr>
<td>Contraindicated in Liver Failure or Predisposition to Lactic Acidosis</td>
<td>Severe</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Heart failure / Edema</td>
<td>Use with caution in CHF</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Mild</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Weight Gain</td>
<td>Benefit</td>
<td>Neutral</td>
<td>Benefit</td>
<td>Mild</td>
<td>Mild</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Mild to Moderate</td>
<td>Benefit</td>
</tr>
<tr>
<td>Fractures</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Drug-Drug interactions</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>
The elephant in the room
Residence
Violence
Fast food
Exercise
Access to transit
Emotional support
Immigration
Education
Etc…
County-level Estimates of Diagnosed Diabetes among Adults aged ≥ 20 years: United States 2008

Age-adjusted ranks based on age-adjusted percent of diabetes:
- Above median rank
- Below median rank
- Not above median rank or below median rank
County Level Estimates of Diagnosed Diabetes — State Maps

<table>
<thead>
<tr>
<th>Indicator</th>
<th>State</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosed Diabetes</td>
<td>California</td>
<td>2008</td>
</tr>
</tbody>
</table>

Data Type: Age-Adjusted % of Adults Classification: Trends

2008 Age Adjusted Estimates of the Percentage of Adults with Diagnosed Diabetes in California

Map of California showing prevalence of diagnosed diabetes by county.

Color codes:
- > 10.2
- 8.5-10.1
- 7.0-8.4
- 0-6.9

Options & Tools:
- Data Dictionary
- Download data table (XLS)
- Methodology
Metabolic disease
Geocoded data
Spatial significant nodes with Metabolic disease
Predict disease
Influence health outcomes
