Data:

- Data was obtained from two IVGTT studies in healthy subjects [3, 4].

Methods:

- Both the Integrated Glucose Insulin model (IGI) and the Integrated Minimal Model (IMM) have been proposed to characterize simultaneously glucose-insulin regulation system following intravenous glucose tolerance test (IVGTT) [1, 2].
- Though with different structure, these models provide full simulation capabilities that allow their use as a platform to quantify disease status as well as analysis of treatment effects in clinical drug development.

**Introduction**

- To investigate the models’ ability to simulate real-world-like data and the translation of information between the two models in terms of parameters’ identifiability, bias and precision.
- To map the two key parameters for clinical diagnosis, glucose effectiveness and insulin sensitivity available in IMM with parameters in the IGI model.

**Mapping parameters**

**Objective**

**Methods:**

- Real data
- Estimated IMM
- Simulate 1200 ID
- Empirical Bayes Estimates
- Estimated IGI
- GAM

**Results:**

<table>
<thead>
<tr>
<th>IMM Parameter Description</th>
<th>IGI Parameter Description</th>
<th>$\Omega$ before inclusion</th>
<th>$\Omega$ After inclusion</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose effectiveness</td>
<td></td>
<td>0.142</td>
<td>0.005</td>
<td>96%</td>
</tr>
<tr>
<td>Insulin sensitivity</td>
<td></td>
<td>0.276</td>
<td>0.086</td>
<td>68%</td>
</tr>
<tr>
<td>Insulin dependent glucose clearance</td>
<td></td>
<td>0.277</td>
<td>0.0044</td>
<td>98%</td>
</tr>
<tr>
<td>Insulin effect rate constant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion**

- When analyzed with the IMM, real data and data simulated with the IGI model gave similar results. When analyzed with the IGI model, real data and data simulated from the IMM gave different results.
- The poor estimation of the rate constant related to suppression of endogenous glucose production may indicate a model misspecification in the implicit description of hepatic glucose production in the IMM.
- The clinically important parameters in the IMM were successfully mapped to the expected IGI model parameters.