Section Two

**DIABETES MEDICATION-ORAL AGENTS AND OTHER HYPOGLYCEMIC AGENTS**

**This section will:**
- Describe oral agents (pills) are specific for treating type 2 diabetes.
- Describe other hypoglycemic agents used for treating diabetes.
- Describe the different ways that hypoglycemic agents work to help control diabetes.

**DIABETES PILLS**

- Diabetes pills are used by people with type 2 diabetes.

- Some people with type 2 diabetes can control their diabetes with exercise and diet alone, while others may take diabetes pills and/or insulin.

- Diabetes pills may be added to the treatment plan when meal planning and exercise don’t control the blood glucose.

- The only way to know if your blood glucose is within your target range is to check your blood glucose with your monitor. This way you will also know if the medication you are on is working.

- Your physician may stop your medication if you lose weight and no longer need the medication.

- Diabetes pills are **not** insulin. Insulin cannot be given as a pill.

- Diabetes pills are classified into 6 different classes. Each class of pills works differently in the body.

- Oral agents may be combined with each other or combined with insulin if necessary to control your blood glucose.

- Pregnant women should not take most diabetes pills.
1. **Sulfonylureas** – stimulate the pancreas to make and release more insulin (these drugs can cause low blood sugar)
   A. First Generation Sulfonylureas (older agents)
   B. Second Generation Sulfonylureas (less side effects than first generation)

2. **Meglitinide** – stimulates pancreas to produce more insulin (can cause low blood sugar but the risk is lower than sulfonylureas)

3. **Biguanide** – helps body to better use insulin and helps limit the release of glucose that has been stored by the body in the liver
   This class of diabetes pills should not be used if you have kidney failure.
   Talk with your doctor before taking this pill, if you have:
   - Kidney disease
   - Liver disease
   - Congestive heart failure
   - A history of alcohol abuse
   - Been scheduled for dye studies or for surgery

4. **Thiazolidinediones** – Helps your muscles to make better use of the insulin you release
   This class of pills should not be used if you have liver problems. A lab test to check your liver function should be done prior to taking this type of medication and periodically for as long as you stay on this pill.

5. **Dipeptidyl peptidase-IV inhibitors** – increases insulin production from the pancreas, lowers glucagon secretion
   This class of pills is usually used along with other medications. It can cause low blood sugar, especially when used with a sulfonylurea. This medicine may help protect beta-cell function in the pancreas (the cells in the pancreas that make insulin).

6. **Combination Pills** – a combination of 2 drug classes.

(See the medication chart for more detail at end of section)
Other Hypoglycemic Agents

7. Incretin Mimetic (Byetta®)
   A class of type 2 diabetes drugs that "mimic" the effects of naturally occurring hormones from the intestines and can help the body make more of its own insulin.

8. Synthetic Amylin (Symlin®)
   A neuroendocrine hormone that is co-secreted by the beta cells of the pancreas in response to food intake.

What you need to know about your diabetes medication:

- The name of your diabetes pills (what) ________________________________
  ________________________________

- The dose of your diabetes pills (how much) ________________________________
  ________________________________

- The time of day to take your diabetes pills (when) ________________________________
  ________________________________

- Side effect of your diabetes pills ________________________________
  ________________________________

- Whether or not they can be combined with other medications you usually take ________________________________

- What to do if you become ill ________________________________
### ORAL HYPOGLYCEMIC AGENTS IN TYPE 2 DIABETES MELLITUS

<table>
<thead>
<tr>
<th>Medication</th>
<th>Class</th>
<th>Primary Use</th>
<th>Mode of Action</th>
<th>Targeted Organ(s)</th>
<th>Contra-indications</th>
<th>Side effects/ Special concerns</th>
<th>Starting dose</th>
<th>Maximum daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diabinese®</strong></td>
<td>*1&lt;sup&gt;st&lt;/sup&gt; generation sulfonylurea</td>
<td>Adjunct to diet</td>
<td>Stimulates secretion of insulin by the pancreas</td>
<td>Pancreas</td>
<td>Significant hypoglycemia</td>
<td>Hypoglycemia Skin rash Upset stomach Weight gain</td>
<td>100 – 250 mg</td>
<td>750 mg</td>
</tr>
<tr>
<td><strong>Tolinase®</strong></td>
<td>*1&lt;sup&gt;st&lt;/sup&gt; generation sulfonylurea</td>
<td>Adjunct to diet</td>
<td>Stimulates secretion of insulin by the pancreas</td>
<td>Pancreas</td>
<td>Significant hypoglycemia</td>
<td>Hypoglycemia Skin rash Upset stomach Weight gain</td>
<td>100 – 250 mg</td>
<td>1000 mg</td>
</tr>
<tr>
<td><strong>Orinase®</strong></td>
<td>*1&lt;sup&gt;st&lt;/sup&gt; generation sulfonylurea</td>
<td>Adjunct to diet</td>
<td>Stimulates secretion of insulin by the pancreas</td>
<td>Pancreas</td>
<td>Significant hypoglycemia</td>
<td>Hypoglycemia Skin rash Upset stomach Weight gain</td>
<td>1 – 2 g</td>
<td>3 g</td>
</tr>
<tr>
<td><strong>Amaryl®</strong></td>
<td>*2&lt;sup&gt;nd&lt;/sup&gt; generation sulfonylurea</td>
<td>Adjunct to diet</td>
<td>Stimulates secretion of insulin by the pancreas</td>
<td>Pancreas</td>
<td>Significant hypoglycemia</td>
<td>Hypoglycemia Skin rash Upset stomach Weight gain</td>
<td>Once daily 1 – 2 mg with breakfast or first main meal.</td>
<td>8 mg</td>
</tr>
<tr>
<td><strong>Glucatrol®</strong></td>
<td>*2&lt;sup&gt;nd&lt;/sup&gt; generation sulfonylurea</td>
<td>Adjunct to diet</td>
<td>Stimulates secretion of insulin by the pancreas</td>
<td>Pancreas</td>
<td>Significant hypoglycemia</td>
<td>Hypoglycemia Skin rash Upset stomach Weight gain</td>
<td>5 mg before breakfast.</td>
<td>40 mg</td>
</tr>
</tbody>
</table>

This product was developed by the Jordan Valley Community Health Center’s Better Self Management of Diabetes Program, with grant support from the Missouri Foundation for Health.
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<th>Side effects/Special concerns</th>
<th>Starting Dose</th>
<th>Maximum daily dose</th>
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<tbody>
<tr>
<td>Avandia® (Rosiglitazone)</td>
<td>Thiazolidinedione</td>
<td>In combination with insulin</td>
<td>Directly decreases insulin resistance, increases glucose disposal.</td>
<td>Liver, peripheral tissues, skeletal muscle, and adipose tissue.</td>
<td>Type 1 DM, Patients on Birth Control Medications, Patients with Liver damage.</td>
<td>Possible liver damage. Do periodic liver function tests. Nausea Diarrhea</td>
<td>4-8 mg single or divided dose</td>
<td>8 mg</td>
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<td>Actos (Pioglitazone)</td>
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<td>15-45 mg once daily</td>
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<tr>
<td>Glucophage® (Metformin)</td>
<td>Biguanide</td>
<td>Adjunct to diet</td>
<td>Decreases hepatic glucose production and intestinal glucose absorption. Improves insulin sensitivity.</td>
<td>Liver, small intestine and peripheral tissues.</td>
<td>Kidney disease, Iodine IV dyes, metabolic acidosis, liver failure, shock, heart failure.</td>
<td>Nausea, vomiting, diarrhea (usually transient). Do kidney function tests prior to starting patient on medication.</td>
<td>500 mg twice daily or 850 mg once daily with meal.</td>
<td>2550 mg</td>
</tr>
<tr>
<td>Januvia® (sitagliptin)</td>
<td>DPP-IV inhibitor</td>
<td>Adjunct to diet or in combination with other oral pills</td>
<td>Increases insulin production, decrease glucagon production</td>
<td>Pancreas</td>
<td>Patients with kidney disease.</td>
<td></td>
<td>100 mg once daily</td>
<td>100 mg</td>
</tr>
<tr>
<td>Medication</td>
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<tr>
<td>Starlix® (Nateglinide)</td>
<td>Meglitinide</td>
<td>Adjunct to diet</td>
<td>Increases release of insulin from beta cell of pancreas</td>
<td>Pancreas</td>
<td>People with liver problems may experience higher blood levels of nateglinide</td>
<td>Weight gain Hypoglycemia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Prandin® (Repaglinide) | Meglitinide | Adjunct to diet | Increases release of Insulin from beta cell of the pancreas | Pancreas | Type 2 DM. Diabetic ketoacidosis, hypersensitivity to drug. | Hypoglycemia Do liver function tests prior to starting patient on medication. | 0.5 mg before meals | 16 mg  

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### Other Hypoglycemic Agents

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<tr>
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<tbody>
<tr>
<td>Byetta® (exenatide injection)</td>
<td>Incretin Mimetic</td>
<td>Adjunct to diet</td>
<td>Stimulates 1st and 2nd phase insulin response. Delays gastric emptying. Decreases hepatic glucose production</td>
<td>Pancreas, stomach, liver</td>
<td>Severe problems with stomach or food digestion; severe kidney disease. Caution for those on oral contraceptives.</td>
<td>Nausea, vomiting, diarrhea, dizziness, headache, feeling jittery, and acid stomach.</td>
<td>5 mcg</td>
<td>10 mcg</td>
</tr>
<tr>
<td>Symlin® (amylin)</td>
<td>Synthetic amylin</td>
<td>Adjunct to insulin</td>
<td>Slows gastric emptying, suppresses postprandial glucagon secretion leading to suppression of endogenous glucose output from the liver.</td>
<td>Stomach, liver</td>
<td>A1C levels &gt;9%, history of recurrent severe hypoglycemia, hypoglycemia unawareness, gastroparesis, using medications that stimulate gastrointestinal motility</td>
<td>Insulin-induced severe hypoglycemia, nausea, vomiting; Mealtime insulin should be reduced by 50% when starting Symlin</td>
<td>60 mcg (type 2)</td>
<td>120 mcg (type 2)</td>
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