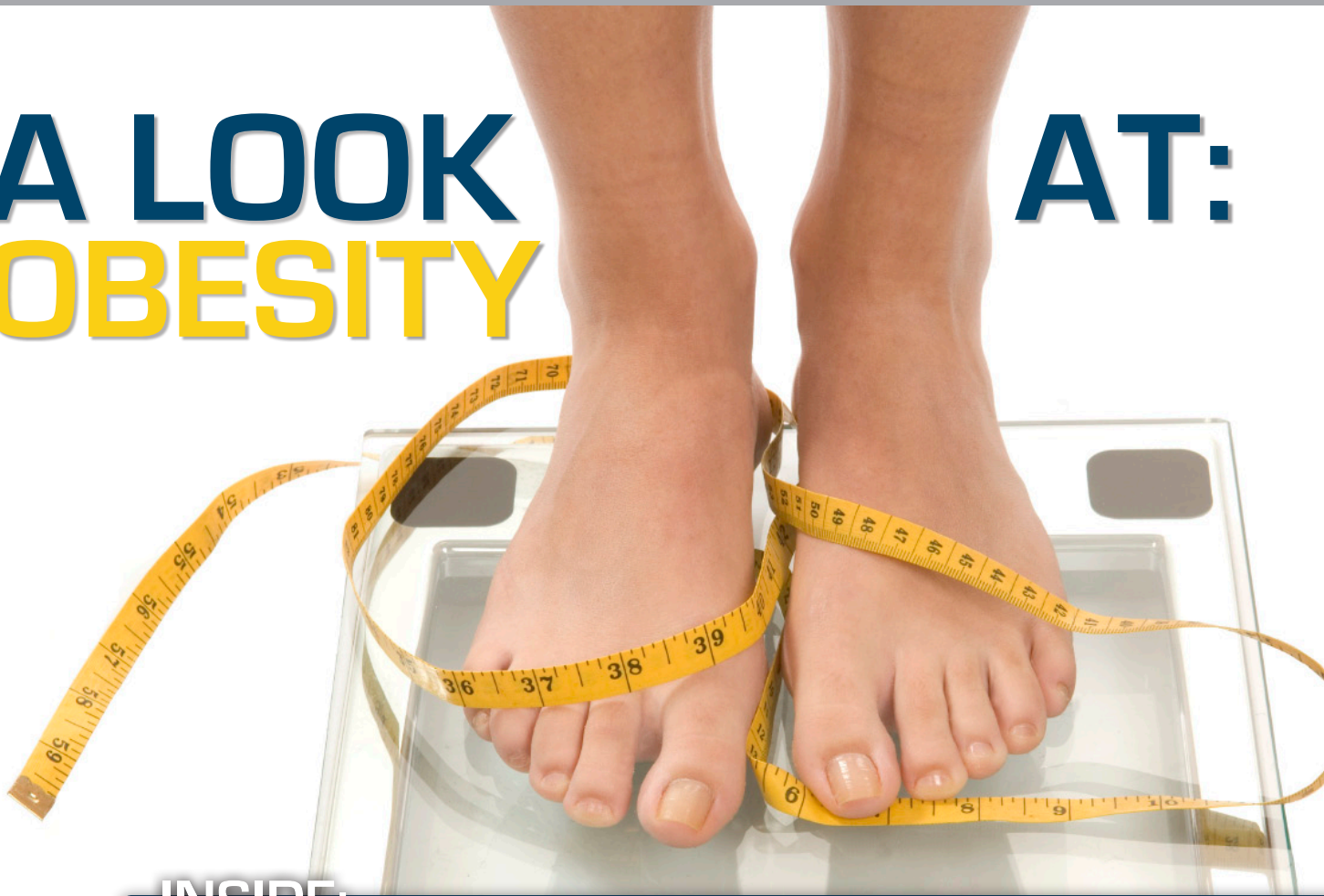


PHARMACY INSIGHTS

BROUGHT TO YOU BY MICHIGAN PHARMACISTS ASSOCIATION

A LOOK AT: OBESITY



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Source: www.migrelief.com/wp-content/uploads/2011/06/weightloss-scale.jpg



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See page 16 for a continuing education home study article on obesity!



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Upcoming Events

May 19

Genesee County Pharmacists Association (GCPA) Running Team: Healing Hands 5K to Benefit the Genesee County Free Medical Clinic
Mott Community College, Flint

May 23

Pharmacy Services Inc. Board of Directors Meeting
MPA Family of Companies Headquarters, Lansing

May 25

GCPA Legislative Coffee Hour
Valley Family Restaurant, Flint Township

May 28

MPA Office Closed - Memorial Day

May 31

Immunization Update 2012
Webinar

June 2

Southeastern Michigan Society of Health-System Pharmacists Annual Pharmacy Technician Breakfast Seminar
Embassy Suites Hotel
Detroit-Southfield, Southfield

June 4

Seventh Annual Michigan Society of Health-System Pharmacists (MSHP) Residency Conference
Lexington Lansing Hotel, Lansing

June 7

Pharmacy-Based Immunization Delivery Program
MPA Family of Companies Headquarters, Lansing

June 12

Pain Management Webinar

Michigan Pharmacy Foundation (MPF) Board of Trustees Meeting
Conference Call

June 14

MPA Third Party Committee Meeting
MPA Family of Companies Headquarters, Lansing

June 27

MPF and Pharmacy PAC Golf Classic
Hawk Hollow Golf Course, Bath



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PHARMACY

INSIGHTS



Obesity in Michigan

Overview of Obesity in Michigan

In September 2011, Michigan Gov. Rick Snyder released a special message to the state legislature and its citizens focusing on health and wellness. One of Snyder's key messages is building a healthier Michigan, because he believes that this, in turn, will create a stronger Michigan. A main focus of this special message is what we can do to combat obesity, a major public health concern.



Developments

FDA Panel Recommendations and Recent Study on the Cost of Obesity

Back in March, a U.S. Food and Drug Administration (FDA) panel recommended more rigorous clinical trials for obesity medications, particularly to better assess heart risks. A recent report also indicates the true cost of obesity in America.



Pharmacist's Role

The Pharmacist's Role in Weight Loss

Because of their accessibility to patients, pharmacists are in a perfect position to assist with weight loss. In fact, by using a step-wise approach you will be able to equip your patients with the information they need for a successful lifestyle transformation.



Continuing Education

Obesity: A Weighty Problem for Type 2 Diabetics

This article has been developed to assist pharmacists in their efforts to support overweight and obese type 2 diabetic patients in their weight-loss efforts. Lifestyle modifications are discussed as well as current and investigational pharmacological weight-loss tools.

In addition to receiving *Michigan Pharmacist* on a quarterly basis, members will be e-mailed a publication containing printed issues of the journal, in February, May, August and November. *Pharmacy Insights* will feature articles and resources on one topic of interest and importance to pharmacy professionals. Each edition will also include a continuing education home study article or presentation! If you have any topic suggestions or pieces you would like to share with the Association, please contact MPA Director of Communications Leah Godzina at Leah@MichiganPharmacists.org.



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Overview of OBESITY IN MICHIGAN

By LEAH GODZINA

MPA Director of Communications

In September 2011, Michigan Gov. Rick Snyder released a special message to the state legislature and its citizens focusing on health and wellness. One of Snyder's key messages is building a healthier Michigan, because he believes that this, in turn, will create a stronger Michigan.

well as adoption of healthier nutrition standards. Snyder also directed the Michigan Department of Agriculture and Rural Development to focus on ways that farmers in the state could help alleviate obesity, such as through partnerships with food corporations to promote healthy lifestyles by encouraging citizens to purchase local products. This is why at some grocery stores you'll see signs that say "Buy Michigan," or a related message.

Snyder also encouraged the legislature to review

Michigan ranks eighth in the nation with an adult obesity rate of 31.7 percent and a combined rate of obese and overweight adults of 67 percent

A main focus of this special message is what we can do to combat obesity, a major public health concern. At the time, Michigan ranked eighth in the nation with an adult obesity rate of 31.7 percent and a combined rate of obese and overweight adults of 67 percent.

In Michigan, there are also 12.7 percent of youths who are obese, and are getting an unhealthy head start on developing some of these conditions and risk factors for cardiovascular disease.

Because obesity is a significant contributor to major health conditions, including diabetes, heart disease, cancer, stroke and circulatory disease, it's important for health care providers to be aware of what they can do to help combat this disorder.

So, What is the State Doing?

To help alleviate concerns surrounding obesity, the governor made several recommendations and calls to action. In relation to childhood obesity, he stated that collaboration with the Michigan Department of Education will help facilitate participation in physical activity and health education, as

and update the Michigan Food Law of 2000 to adopt the current U.S. Food and Drug Administration model Food Code, which would also adopt a number of federal regulations for food processing establishments.

The Michigan Department of Community Health (MDCH) was directed to incorporate body mass index information (height and weight measurements) into the Michigan Care Improvement Registry, which is used to track immunization records.

MDCH also held the Michigan Call to Action to Reduce and Prevent Obesity Summit shortly after the governor released his special message in September 2011. During the day-long summit, more than 500 participants from across the state gathered and presented strategic priorities to MDCH. They were also given some background information as to why reducing and preventing obesity is so important (see Table 1). Some common themes did emerge from the diverse group of participants, including the need for local and community coalitions, a statewide and consistent marketing campaign, data collection, and education for all

Table 1. Obesity Background Information*Michigan Call to Action to Reduce and Prevent Obesity Summit*

<p>Why Reducing and Preventing Obesity is Important</p> <ul style="list-style-type: none"> • Health is the foundation for Michigan's economic transformation and overall quality of life. • We must become a healthier Michigan if we are to become a stronger Michigan. Good health and wellness improves the lives of Michiganders, and reduces health care costs to taxpayers and job providers. • Obesity is a major public health problem nationally and in Michigan. It is a key contributor to other ailments such as diabetes, heart disease, cancer, stroke and dementia. • The increasing cost of health care is one of the most significant economic challenges facing our state and nation. These costs impact employees, job providers and all taxpayers. • Social stigmatization and discrimination in employment and academic situations decreases the likelihood that a person will make individual behavior decisions that promote a healthy lifestyle. • There are already programs in place to prevent and reduce obesity but government cannot move the needle alone. People need to make personal decisions that will change their lifestyles in order for the prevalence of obesity in Michigan to decline.
<p>Health Costs</p> <ul style="list-style-type: none"> • Obesity contributes to major chronic conditions such as heart disease, hypertension, stroke, type 2 diabetes, asthma, breast and colon cancer, arthritis and depression. • Hispanics and African-Americans have a higher prevalence of obesity. • Individuals with a body mass index (BMI) of 30 or greater are considered obese. • Weight and height are used to calculate BMI, which provides a reasonable indicator of body fat and weight categories that may lead to health issues. • In 2010, 31.7 percent of Michigan adults were considered obese and 35.1 percent were considered overweight. Two-thirds of Michigan's adult population is at an unhealthy weight. • Currently in Michigan, some 800,000 children and 5 million adults have a weight problem. • Childhood obesity is significantly under-diagnosed, and of special concern is the 12.4 percent of Michigan youths who are obese. • Nationally, approximately 60 million adults are obese. • Three out of every 10 Michigan adults were obese in 2009.
<p>Economic Costs</p> <ul style="list-style-type: none"> • In 2008, Michigan spent an estimated \$3.1 billion in obesity related medical costs. • It's projected Michigan will spend \$12.5 billion in obesity related medical costs in 2018 if rates continue to increase at their current levels.
<p>Obesity Summit</p> <ul style="list-style-type: none"> • Stakeholders from across Michigan will participate in workgroups the day of the summit to create recommendations on strategies that Michigan should utilize to prevent and reduce obesity. • The recommendations from the summit will be used to craft a work plan which the state will implement to start "moving the needle" and reduce obesity in Michigan. • The stakeholders were brought in based on those who care about and work on preventing and reducing obesity. • It is the hope that by bringing attention to this issue we can mobilize organizations and individuals to create their own plan to reduce and prevent obesity in their lives and their communities. • The state cannot move the needle on obesity on its own. This summit is the starting point for getting Michiganders to work together at creating a healthier Michigan.

segments of society about the roles that individuals can play to reduce and prevent obesity.

A final report from the summit can be viewed [online](#). In addition, presentations were given by Olga Dazzo, director of MDCH; Karen Peterson, professor of environmental health sciences at the University of Michigan; and Michael Hamm, professor of sustainable agriculture at Michigan State University (MSU) and head of the C.S. Mott Group for Sustainable Food Systems at MSU. Their presentations, as well as a media kit from the summit, can also be accessed [online](#).

Furthermore, Michigan has a Nutrition, Physical Activity, and Obesity (MiNPAO) Program designed to prevent and control obesity and other chronic diseases through healthful eating and physical activity. The long-term success of the program will rest on its ability to leverage resources and coordinate interventions with multiple partners to address the program's six principle targets:

- *Increase physical activity*
- *Increase the consumption of fruits and vegetables*
- *Decrease the consumption of sugar-sweetened beverages*
- *Increase breast feeding initiation, duration and exclusivity*
- *Reduce the consumption of high-energy, dense foods*
- *Decrease television viewing*

The group frequently releases program updates. In 2011, they released a surveillance update (available [online](#)) and a general program update (available [online](#)). In addition, a 10-year [healthy eating and physical activity strategic plan](#) was developed

in 2010. The piece includes an overview of the plan, how to implement it, tracking progress, sustaining the effort and more.

In the surveillance update, MiNPAO cites many coalitions that are creating policy and environmental changes to support healthy eating and physical activity throughout the state. Michigan's Healthy Communities Program, which is comprised of several nationally recommended initiatives, including the Building Healthy Communities Project, Michigan Nutrition Network: Local Advisory Group Network, and Complete Streets Policy Initiative is changing social norms around unhealthy behaviors by making healthy lifestyles easier for residents to pursue. For more information, please visit www.MIHealthTools.org/MIHC.

Among Michigan's youth, there are also several programs in place, including Healthy Kids, Healthy Michigan; Safe Routes to School; and Shaping Positive Lifestyles and Attitudes through School Health. The State Board of Education also passed the Michigan Nutrition Standards in October 2010, which cover both U.S. Department of Agriculture (USDA) funded school meals and snacks AND all food and beverages sold or available outside of the USDA program (cafeterias, vending machines, concession stands, a la carte snack lines, school parties, school stores and during after-school events).

So, What Can You as a Pharmacist Do?

Pharmacists can assist in obesity management by serving as an essential resource for helping patients manage weight. They can also monitor patient medication profiles to detect prescribed agents that have the potential for weight gain.

It's also important to provide information about proper weight-loss programs and assist patients with developing appropriate long-term weight-loss goals. Pharmacists can encourage patients to utilize long-term weight-management goals rather than just some of the quick-fix over-the-counter products. The use of herbal supplements associated with weight loss can lead to many adverse effects, and they have little evidence of efficacy, so they should be assessed on a case-by-case basis.

Pharmacologic therapy with Food and Drug

Administration-approved and investigational medications should be combined with lifestyle modifications and generally require a lot of patient counseling on the provider's end.

Currently, there are only two medications FDA approved for weight loss, only one being for long-term use (see Table 2). Several other manufacturers are seeking FDA approval for weight-loss medications that were previously denied approval due to adverse effects, such as potential heart problems, birth defects and cancerous tumor development (see Tables 3-4).

According to new data released by the Centers for Disease Control and Prevention and published in the *Journal of the American Medical Association* in January 2012, obesity among American adults and children has leveled off in recent years, but it's not on the decline. As the most accessible health care providers in the community, pharmacists are in a unique position to monitor a patient's entire medication regimen and counsel patients on the most appropriate, cost-effective and suitable therapy for their individual condition(s). As the state (and the nation) continues to confront the issue of obesity, it's important for pharmacy professionals to keep these things in mind and do what they can with the tools and knowledge they have to assist in combatting this public health concern.

For more information on the pharmacist's role in obesity prevention and treatment, see the article on page 10.



Table 2. FDA-Approved Medications for Weight Loss

Medication	Mechanism of Action	Dosing	Efficacy vs. Placebo	Side Effects	Cautions/Contraindications	Counseling Points
Orlistat (Prescription: Xenical [®] , OTC: Ali [®])	Reversible Lipase Inhibitor	Xenical [®] : 120 mg TID with food Ali [®] : 60 mg TID with food Long-term use	Xenical [®] : 8-9 kg at one year Ali [®] : 7-8 kg at one year Xenical [®] : 5-8 kg at two years Ali [®] : 4.5-7 kg at two years	Headache (30.6 percent), oily spotting (26.6 percent), abdominal pain (25.5 percent), flatus with discharge (23.9 percent), fecal urgency (22.1 percent), fatty/oily stool (20.0 percent), oily evacuation (11.9 percent), increases defecation (10.8 percent), nausea (8.1 percent), fecal incontinence (7.7 percent)	CI: chronic malabsorption syndrome, cholestasis Cautions: fat-soluble vitamin deficiency; associated with severe liver injury	<ul style="list-style-type: none"> Patients should take a multi-vitamin containing fat-soluble vitamin two hours before or after their dose. Patients should avoid a high-fat diet (> 30 percent total daily calories) to decrease GI events. If the meal does not contain fat, the patient does not need to take a dose. Most of the GI effects lasted only 1-4 weeks. This medication should be combined with lifestyle modifications.
Phentermine (Adipex-P [®] C-IV)	Enhanced norepinephrine and dopamine neurotransmission	15-37.5 mg daily 8 mg TID with food Short-term use	3.6 kg at three months	Insomnia, increased blood pressure, palpitations, arrhythmias	Contraindications: cardiovascular disease, moderate to severe hypertension, glaucoma, concomitant MAOI	<ul style="list-style-type: none"> This is only a short-term treatment. This medication should be used in conjunction with a low-calorie diet.

Table 3. Investigational Medications for Weight Loss

Medication	Mechanism of Action	Dosing	Efficacy vs. Placebo	Side Effects	Cautions/Contraindications	Comments
Bupropion SR/ naltrexone SR (Contrave [™])	Bupropion: anorectic effect caused by proopiomelanocortin neuron activation Naltrexone: block beta-endorphin autoinhibitory feedback loop	Bupropion SR 180 mg/ naltrexone 16 mg BID	6-9 percent baseline weight at one year	Nausea (34.1 percent), constipation, dizziness, dry mouth, tremor, upper abdominal pain, tinnitus, HA HDL:* 8-9 percent TG: -13-17 percent <i>*all values are for one-year follow up and statistically significant</i>	Contraindication: seizure disorder, history of bulimia or anorexia nervosa	<ul style="list-style-type: none"> The FDA refused to approve the medication in 2011 stating that it required long-term safety data on cardiovascular risks.
Exenatide (Byetta [®])	GLP-1 analog	10 mcg SQ BID	5.1 kg at 6 months	Nausea, vomiting, diarrhea, dizziness, HA, dyspepsia	Caution: severe GI disease, cases of pancreatitis have been reported, severe renal impairment	
Liraglutide (Victoza [™])	GLP-1 analog	1.2-3 mg SQ daily	4.8-7.2 kg at 20 weeks 7.8 kg at two years	Nausea, vomiting, injection site reactions, insomnia, depressed mood, nervousness SBP:* -4.6 mmHg DBP: -2 mmHg HR: 3 bpm <i>*all values are for two-year follow up and statistically significant</i>	Contraindication: patients with a history or family history of medullary thyroid carcinoma or multiple endocrine neoplasia syndrome type 2 Caution: patients with a history of pancreatitis, severe renal impairment	<ul style="list-style-type: none"> Initial data from the SCALE trial is promising.
Lorcaserin	Selective serotonin 2C receptor agonist	10 mg BID	6-8 percent baseline weight at one year	Upper respiratory infections, HA, dizziness, nasopharyngitis, nausea, fatigue SBP:* -1 mmHg DBP: -1 mmHg HR: -2.0 bpm TG: -4 to -6 percent <i>*all values are for one-year follow up and statistically significant</i>		<ul style="list-style-type: none"> The FDA refused to approve the medication in 2010 due to insufficient efficacy data and cancerous tumor development in long-term rat studies. There were no differences in rate of valvulopathy between treatment and placebo. Arena has filed a resubmission of the New Drug Application and the FDA has set a target date of June 2012.

Table 3 (cont.) Investigational Medications for Weight Loss

Medication	Mechanism of Action	Dosing	Efficacy vs. Placebo	Side Effects	Cautions/Contraindications	Comments
Phentermine/topiramate SR (Qnexa™)	<p>Phentermine: enhanced norepinephrine and dopamine neurotransmission</p> <p>Topiramate: increased satiety due to a decrease in gastrointestinal motility, increased taste aversion, and increased overall energy expenditure</p>	Phentermine 7.5 mg to 15 mg/topiramate 46 mg to 92 mg once daily	<p>8-10 kg at 1 year (7.5 mg/46 mg)</p> <p>10-12 kg at 1 year (15 mg/ 92 mg)</p> <p>9.6 kg at 2 years (7.5 mg/46 mg)</p> <p>10.9 kg at 2 years (15 mg/ 92 mg)</p>	<p>Dose dependent memory and mood effects, paresthesia (17 percent), xerostomia (16.6 percent), constipation (15.1 percent), upper respiratory infection (13.5 percent), nasopharyngitis (10 percent), and headache (9.8 percent), depression (7 percent)</p> <p>SBP:* -5.6 mmHg DBP: -3.8 mmHg HR: 1.7 bpm TC: -6.3 percent LDL: -6.9 percent HDL: 6.8 percent TG: -10.6 percent FBG: -0.07 mmol/L HbA1c: -0.1 percent</p> <p><i>*all values are for one-year follow up, statistically significant, and at the 15 mg/92 mg dose</i></p>	<p>Caution: topiramate has been linked to an increased risk of cleft lip and palate, use caution in women of childbearing age</p> <p>Contraindication: pregnancy</p>	<ul style="list-style-type: none"> The FDA initially rejected the approval, asking for further studies evaluating the risk of CV problems and teratogenicity. The FDA has set April 17, 2012 as the deadline to decide on approval; the decision deadline was delayed at the beginning of April.

Table 4. Other Investigational Medications for Weight Loss

Medication	Comments
Bupropion SR/zonisamide SR (Empatic™)	<ul style="list-style-type: none"> Zonisamide may act synergistically with bupropion to promote weight loss by increasing serotonin and dopamine levels in the brain, but its weight-loss mechanism is largely unknown Results from phase II trials show a 3-7 percent decrease in body weight
Cetilistat	<ul style="list-style-type: none"> Lipase blocker similar to orlistat but may be better tolerated Early trials demonstrate a 4-4.5 kg weight loss at 20 weeks with fewer severe adverse effects
Pramlintide	<ul style="list-style-type: none"> An amylin-mimetic with 6-8 kg weight loss at one year
Pramlintide/metreleptin	<ul style="list-style-type: none"> A combination amylin analog/leptin analog may provide greater weight loss than pramlintide alone; previous leptin studies have shown rapid resistance in obese individuals Early trials have demonstrated a 13 percent baseline weight loss at 20 weeks
Rimonibant (Accomplia®)	<ul style="list-style-type: none"> Cannabinoid-1 receptor blocker also studied as a smoking cessation aid The FDA unanimously voted not to approve based on increased risk of psychiatric events, including suicide (NNH 30), and it was removed from the European market in 2009 for the same reason
Tesofensine	<ul style="list-style-type: none"> NA, DA and 5-HT reuptake inhibitor originally studied for the treatment of Alzheimer's and Parkinson's disease Phase II clinical trials have shown that tesofensine stimulated up to 10 percent weight loss and was well-tolerated (although mood changes and confusion were more common in the treatment groups)

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FDA Panel Recommends Stricter Clinical Trials for Obesity Medications

Back in March, a U.S. Food and Drug Administration (FDA) panel recommended more rigorous clinical trials for obesity medications, particularly to better assess heart risks. The FDA convened a two-day meeting to discuss the development of weight-loss medications and whether or not the agency should require longer studies specifically designed to look at whether the products might increase the risk of heart attacks and strokes.

The drug combination fenfluramine/phentermine, usually called fen-phen, was an anti-obesity treatment that utilized two anorectics. Fenfluramine was marketed by American Home Products (now known as Wyeth) as Pondimin, but was shown to cause potentially fatal pulmonary hypertension and heart valve problems, which eventually led to its withdrawal and legal damages of more than \$13 billion. Since it was taken off the U.S. market in 1997, the development of obesity compounds has been a struggle for manufacturers.

Abbott Laboratories also removed its weight-loss medication Meridia from the U.S. market in 2010 due to concerns about the drug's risk of side effects, such as heart attack and stroke. A new obesity medication hasn't been approved by the FDA in more than a decade, although they're considering approval of Vivus Inc.'s Qnexa®, which was endorsed by an agency advisory panel 20-2 in February.

Currently, Roche Holding AG's Xenical is the only long-term prescription weight-loss medication

on the market, though it hasn't gained wide usage partly because of gastrointestinal side effects. The approval of Qnexa® and two other weight-loss medications has been held up for a variety of safety concerns, including whether the risk of heart problems is increased.

The panel that met in March recommended that manufacturers include heavier, older and sicker patients, or those at higher risk of having heart problems, in clinical studies. Often, people with a history of heart problems are excluded from initial studies. The panel also recommended, on a 17-6 vote, that experimental weight-loss medications be required to show that they don't increase the risk of heart attacks and strokes even if they don't have a signal for potential risk, such as an increase in heart rate in initial, early-stage studies.

In 2008, the FDA toughened guidelines for diabetes medications and now requires pre-approval studies of two years that are designed to look at whether potential diabetes drugs increase heart-attack risks after safety questions were raised about GlaxoSmithKline's diabetes drug Avandia. Access to that drug is severely restricted in the U.S. The FDA is considering whether to adopt similar guidelines for drugs to treat obesity.

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OBESITY: \$190 Billion Burden

Several recent studies have shown that obesity is not only taking a toll on the health and well-being of Americans, it's also increasing our overall health care costs. John Cawley and Chad Meyerhoefer of Lehigh University reported in January in the *Journal of Health Economics* that nationally, obesity is costing Americans \$190 billion in additional medical spending, or approximately 20.6 percent of U.S. health care expenditures. This new analysis corrected people's tendency to low-ball their true weight, and compared obesity with nonobesity (healthy weight and overweight) rather than just comparing to healthy weight. Those who are overweight as opposed to obese don't incur many additional medical costs, so grouping them with the obese underestimates the true conditional costs.

Mayo Clinic also released a paper in March that compared the costs of obesity to those of smoking. Findings show that smoking adds about 20 percent to medical costs each year, and morbid obesity increases costs by 50 percent.

These startling statistics are causing policymakers and the private sector to really look at what can be done to find solutions to this epidemic.

Obesity in the News

Obesity seems to be all over the news lately! Here are just a few articles to get you caught up on the subject:

- **Study: Obesity adds \$190 billion in health care costs**, www.msnbc.msn.com/id/47211549/ns/health-diet_and_nutrition/t/study-obesity-adds-billion-health-costs/#.T58w_dzwR54.email
- **Mayo Clinic study: Obesity outweighs smoking in employer health cost**, www.weau.com/news/headlines/149676685.html
- **No end to obesity epidemic, 20-year forecast shows**, www.msnbc.msn.com/id/47324709
- **U.S. Report Outlines Strategies to Prevent Obesity**, <http://health.usnews.com/health-news/news/articles/2012/05/08/us-report-outlines-strategies-to-prevent-obesity>
- **Why the Campaign to Stop America's Obesity Crisis Keeps Failing**, www.thedailybeast.com/newsweek/2012/05/06/why-the-campaign-to-stop-america-s-obesity-crisis-keeps-failing.html
- **FDA Foods and Veterinary Medicine Program Strategic Plan, 2012-2016**, www.fda.gov/downloads/AboutFDA/CentersOffices/OfficeofFoods/UCM273732.pdf?source=govdelivery

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The Pharmacist's Role in Weight Loss

By JILL COVYEOU

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“A weight loss and maintenance program can be conducted by a practitioner without specialization in weight loss so long as that person has the requisite interest and knowledge. However, various health professionals with different expertise are available and helpful to a practitioner who would like assistance.”¹

Many practitioners may think a special degree is required to assist patients with weight loss, but this quote from the Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults states otherwise. Because of their accessibility to patients, pharmacists are in a perfect position to assist with weight loss. In fact, by using a step-wise approach, you will be able to equip your patients with the information they need for a successful lifestyle transformation.

The first step when counseling any patient on weight loss is to assess their current weight status. Using the body mass index (BMI), we can determine the patient's weight category. BMI can be calculated using an equation [(weight (lbs) x 703)/height (in)²] or using BMI tables (Table 1). Then, using Table 2, you determine the patient's weight category. Only patients who are overweight or greater should participate in a weight-loss program.

The next step is to outline appropriate weight-loss goals for the patient.² Patients should aim to lose 1-2 pounds per week and 10 percent of their body weight over six months. Losing more than this does not allow the body to properly adjust to the new calorie consumption and most patients will eventually regain the lost weight. We also want to give the patient many achievable short-term goals (such as losing 1-2 pounds per week) because it allows the patient to have many small successes that reinforce their new lifestyle. Giving a patient one large overall goal (such as achieving a "normal" weight) will seem almost impossible to achieve, so they may become discouraged and give up.

Many patients will come to the pharmacy looking for that "magic pill" that will allow them to eat whatever they want, never exercise and still shed pounds. Before even discussing weight-loss medications, though, you should be talking about lifestyle modifications. All weight-loss medications should be used in combination with diet and exercise. To achieve a weight-loss goal of 1-2 pounds per week, patients should decrease their daily calorie intake by 500-1,000.² This may sound like a lot, but can generally be achieved with just a few adjustments each day. Patients may get greater initial effect by using a very low-calorie diet (decreasing their daily intake by greater than 1,000 calories). However, as stated above, the body does not have time to adjust to this radical change in energy intake and, as a result, most will regain the weight they initially lost. Along with diet, patients should be counseled to exercise 30 minutes most days of the week.² This does not mean joining a gym or buying a treadmill; exercise can be anything that is considered moderate activity (such as yard work, cleaning or painting). Lifestyle modifications are key to any weight-loss regimen.

Now, you are finally ready to talk about weight-loss medications and supplements. There is only one over-the-counter (OTC) medication that is

Food and Drug Administration (FDA)-approved for weight loss. Orlistat can be recommended for patients who have a BMI > 30 kg/m² or > 27 kg/m² with risk factors (HTN, dyslipidemia, CHD, DMII, sleep apnea).^{3,4} This medication works by blocking approximately 30 percent of dietary fat from absorbing out of the GI tract. As you might guess, the side effects are related to the fat that is then trapped in the GI tract. In fact, the more fat the patient consumes, the worse the side effects will be. Therefore, this medication (through negative reinforcement) teaches the patient to eat a low-fat diet. Prescription strength orlistat (twice the dose of OTC orlistat) has very little increase in efficacy but a much higher rate of adverse events. The tables found on pages 6 and 7 of this publication review the common adverse events and counseling points for orlistat.

Then, there are the myriad of herbal weight-loss supplements. These products are not FDA approved for weight loss and can even be detrimental. Table 3 lists some of the common supplements used for weight loss. Ephedra was the only supplement to demonstrate efficacy until it was removed from the market in 2004 due to an increased risk of cardiovascular and psychiatric adverse events. However, it can still be purchased in its "herbal" form, a.k.a. Ma Huang or bitter orange. Other herbal products, which do not show the efficacy that ephedra showed, are also associated with severe adverse effects, such as hepatotoxicity, dehydration, hypertension and palpitations. Ideally, we would recommend a weight-loss supplement that is both safe and effective. According to the natural medicines database, the supplements that are considered "possibly effective" are caffeine and psyllium. Caffeine is associated with dehydration, palpitations and hypertension, and is considered "possibly unsafe" when used in high doses for weight loss. Psyllium is not associated with serious adverse events, and it's considered "likely safe." So, if we must recommend a supplement for weight loss, we should choose the safer option.

Pharmacists can play an important role in helping patients with weight-loss regimens. We can do more than just point to a product on the shelf. We can also help the patient assess their weight status, recommend appropriate goals, outline lifestyle modifications, help the patient choose a safe and effective product, and give extensive counseling on weight-loss medications.

Table 1. Body Mass Index²

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
HEIGHT (INCH.)	BODY WEIGHT (LBS.)																	
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295

BMI	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
HEIGHT (INCH.)	BODY WEIGHT (LBS.)																	
58	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386
72	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Table 2. Classification of Overweight and Obesity by BMI²

	BMI (kg/m ²)	Obesity Class
Underweight	Less than 18.5	
Normal Weight	18.5-24.9	
Overweight	25-29.9	
Obesity	30-34.9	I
	35-39.9	II
Extreme Obesity	Greater than or equal to 40	III

Table 3. Commonly Used Herbal Supplements⁵⁻¹⁶

Category	Supplement	AKA	Products	Efficacy	Adverse Effects
Increased energy expenditure (thermogenesis)	Ephedra	Bitter orange, citrus aurantium, country mallow, Ma huang	Dexatrim, Diet Fuel, Metabolife, Stacker	0.9 kg per month (up to six months)	Agitation, anxiety, arrhythmias, autonomic events, cardiovascular events, case reports of hepatotoxicity, dry mouth, gastrointestinal events, headaches, hypertension, insomnia, MI, psychiatric events, stroke, seizures
	Hoodia	Hoodia gordonii	Trim Spa, Thermostat	None shown	Little safety data available
	Caffeine	Guarana, yerba mate	Biolean, BLAST Caps, Chizeled, Dexatrim, Everslim, Fat Burner, Green Tea Diet, Hydroxycut	None shown	Dehydration, GI distress, headaches, hypertension, insomnia, nausea, palpitations
Carbohydrate metabolism	Chromium		Atkins Advantage	None shown	Possible free-radical damage, possible sterility, renal damage at large doses
Increased satiety/digestion inhibitor	Fiber	Guar gum, psyllium	Hydroxycut Cleanse, Metamucil,	None shown	Bloating, diarrhea, flatulence, indigestion, nausea
	Chitosan		Diet Fuel, Fat Blocker, Trim Spa Fat Blocker, Ultratrim	Contradictory evidence	
	Guggul	Commiphora mukul, gum guggul	Guggulean, Trim Fast	Contradictory evidence	Belching, bloating, diarrhea, headaches, hiccups, nausea
Increased fat oxidation or decreased fat synthesis	Hydroxycitric acid	Garcinia cambogia	Hydroxycut, Mega T, Metabolife	Contradictory evidence	Anxiety, case reports of hepatotoxicity, GI distress, heart palpitations, irritability
	Camellia sinensis	Epigallocatechin gallate (EGCG), green tea	Dexatrim, Hydroxycut, Mega T	None shown	Case reports of hepatotoxicity (including increased ALT), GI distress, nausea, possible insomnia
	Acai		Mega T, Slim Quick Naturals	No studies	

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Effects of the Roux-en-Y Procedure on Psychotropic Drug Absorption

By BETHANY CROSS

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The prevalence of obesity has increased dramatically over the last 25 years. Obesity, defined as a body mass index (BMI) greater than or equal to 30, affects approximately 50 million Americans. Of those, 12 million are morbidly obese, with a BMI greater than or equal to 40.¹ Serious mental illness makes affected individuals even more susceptible to the effects of obesity. While concerns about the weight gain associated with antipsychotic medications is now well recognized, many other factors contribute to obesity in those with mental illness. One hypothesis includes activation of the brain's dopamine reward center when food, high in fat and carbohydrates, is selected for the diet. Lower levels of physical activity and greater social withdrawal experienced by individuals with serious mental illness further increase obesity rates.

There are many options for individuals to assist in managing body weight. Some are obvious, including maintaining an appropriate diet with regular exercise. With more than 177,600 people opting to undergo the procedure, bariatric surgery is a newer option that can help individuals maintain a healthy weight and avoid unwanted effects of prolonged obesity.² There are two main types of bariatric surgery, categorized by surgical technique, which include restrictive and combination of restrictive plus malabsorption. The restrictive surgery procedure includes procedures like gastric banding, while the combination of restrictive plus malabsorption surgery includes, most commonly, the Roux-en-Y procedure. A 2004 study estimated that 62 percent of patients referred for bariatric surgery received at least one psychiatric diagnosis at the time of evaluation. The most common diagnoses were major depressive disorder, binge eating disorder, and substance abuse or dependence.³

The Roux-en-Y procedure is the most frequently

performed surgery for dramatic weight loss in the United States and will be the focus of this article.^{1,4} In the Roux-en-Y procedure, the stomach is stapled to produce a 30-60 mL pouch and the small intestine is reconnected to bypass the duodenum, the jejunum and all but the last 50-100 cm of the ileum. Because of the smaller stomach volume, less hydrochloric acid is produced, and because of the shortened gastrointestinal tract, there is less surface area available for molecular absorption.¹ Ultimately, individuals with psychiatric illness who undergo the Roux-en-Y procedure are at increased risk of atypical absorption of medications and nutrients because the stomach and gastrointestinal tract have been dramatically altered. Such changes in absorption may lead to dangerous thought and mood disturbances due to subtherapeutic or supra-therapeutic drug concentrations.

There are very few specific recommendations for optimizing medication regimens in individuals that have undergone bariatric surgery, including the Roux-en-Y procedure. General recommendations include avoiding the use of sustained release medications due to the shortened gastrointestinal tract and thus decreased surface area and decreased gastric transit time for drug absorption.^{1,5} Many psychiatric medications are available in liquid formulation; however, mental health professionals have reservations about using this formulation because of the ease of overdose and possible death. Mirtazapine (Remeron®) is the only antidepressant available as an orally disintegrating tablet; however, mirtazapine is associated with both short- and long-term weight gain. In one study, subjects taking mirtazapine reported a ravenous appetite with powerful cravings for carbohydrates, which is exceedingly undesirable in this patient population.⁶ A study published by Season and colleagues examined the dissolution patterns of some of the most common psychiatric medications after the Roux-en-Y procedure. This research demonstrated that dissolution patterns were vastly differ-

ent among psychiatric agents. Results show that citalopram, venlafaxine, diazepam, lorazepam, trazodone, buspirone, haloperidol, oxcarbazepine and methylphenidate dissolved equally in the Roux-en-Y gastrointestinal environment versus an unaltered physiologic gastrointestinal environment (non-Roux-en-Y environment). The newer antipsychotic agents, which included clozapine, olanzapine, quetiapine, risperidone and ziprasidone, were more bioavailable in an unaltered gastrointestinal environment. Of the medications tested, bupropion and lithium were the only medications that displayed more bioavailability in the Roux-en-Y gastrointestinal environment.⁷

With obesity an ever-increasing concern, and more patients opting for surgical solutions, it is important for clinicians to be aware if a patient has a history of bariatric surgery and realize that therapeutic options and monitoring may need to be modified. It may be appropriate to increase the frequency of monitoring in patients with psychiatric illness. Currently, there are few evidence-based recommendations for clinicians to refer to when making difficult therapy choices, especially in this specific patient population. It is vital that medication management be addressed diligently to prevent potentially deadly changes in thoughts and mood in these patients.

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Source: <http://internationalhealthblog.traveling4health.com/wp-content/uploads/2010/09/Obesity-bariatric-surgery-weight-loss-surgery.jpg>

CONTINUING EDUCATION:

Obesity: A Weighty Problem for Type 2 Diabetics

By NICKI BAKER

Pharm.D. candidate

Introduction

Obesity has become an epidemic in the United States, with more than one-third of the adult population and almost 17 percent of youth meeting criteria for obesity.¹ Rates of obesity are even more alarming among type 2 diabetics, with a staggering 80 percent either overweight or obese.²

The relationship between obesity and diabetes is still being worked out by researchers. It is now believed that fat cells, especially those in the belly, secrete hormones involved in insulin resistance.² In fact, the relative risk of diabetes increases by 25 percent for each unit increase in body mass index (BMI) over 22 kg/m². Therefore, it makes sense

then, that weight-loss can significantly reduce a person's risk of developing diabetes. Weight reductions of even 5 percent can prevent or delay the onset of diabetes.³

Obesity and diabetes are costly conditions, in terms of both economics and morbidity. Obese individuals spend about 77 percent more money on health care than do those who are not obese, and medical expenses for diabetics are more than double those of nondiabetics.^{4,5} For patients with both obesity and diabetes, health care costs can be astronomical. The potential health consequences of years of living with diabetes are well-known and include neuropathy, kidney failure, blindness, lower extremity amputation, heart attack, stroke and a host of other diseases.⁵ Because weight-loss is a vital part of diabetes prevention and treatment, it is also a key factor in the prevention of these conditions.

Target Audience

This is a knowledge-type activity developed specifically for pharmacists. This article has been developed to assist pharmacists in their efforts to support overweight and obese type 2 diabetic patients in their weight-loss efforts. Lifestyle modifications are discussed as well as current and investigational pharmacological weight-loss tools.

Disclosure

Baker has indicated that she does not have any conflicts of interest, nor does she have financial relationships with a commercial interest, related to this activity.

Learning Objectives

Upon completion of this activity, participants should be able to:

- recognize the relationship between type 2 diabetes and obesity.
- identify lifestyle changes that should be recommended to patients with diabetes and prediabetes.
- describe medication options that can assist diabetic patients in weight management.
- discuss resources available to patients as they work toward attaining and maintaining a healthy weight.

Evaluation

The process of weight management incorporates both assessment and treatment of a patient.⁶ The gold standard for evaluating a person's body fat content is done by utilizing dual energy x-ray absorptiometry technology, or DEXA. This method accurately quantifies a person's body fat, but is expensive, requires access to a DEXA machine and exposes the patient to small amounts of x-rays.⁷ For an ambulatory care practitioner without access to such technology and with limited time, the body mass index (BMI) calculation has been developed as a quick, easy tool to assess a person's total body fat content (see Table 1). BMI describes a person's weight relative to his or her height and is useful in tracking response to a weight-loss regimen.⁶

Table 1. Body Mass Index (BMI) Reference⁸

Calculations	Weight Category	BMI Range (kg/m ²)
$\text{BMI} = \frac{\text{Weight in kg}}{(\text{Height in m})^2}$	Underweight	< 18.5
	Normal Weight	18.5-24.9
OR $\text{BMI} = \left(\frac{\text{Weight in pounds}}{\text{Height in inches}} \right) \times 703$	Overweight	25.0-29.9
	Grade I Obesity	30.0-34.9
	Grade II Obesity	35.0-39.9
	Grade III Obesity	> 40

Large-scale morbidity and mortality studies have shown that a BMI of 30 kg/m² or greater is associated with an increase in morbidity and has thus been designated the cut-off value for obesity. Beyond 30 kg/m², BMI is further classified as grade I, II or III obesity, with grade I being associated with a moderate risk of mortality, grade II with a high risk and grade III with a very high risk.⁷

While BMI is the preferred way to evaluate a patient's weight status in an ambulatory setting because of its ease of use, it does have shortcomings. No consideration is given to the relative proportion of fat to muscle, so for particularly muscular individuals, the BMI calculation may falsely indicate that he or she is overweight. Gender and ethnicity are also neglected in the BMI calculation and for the same BMI, women generally carry more body fat than do men, as do Asians compared to Caucasians.⁷ In the setting of assessing overweight diabetic patients, however, these issues are unlikely to complicate the picture.

Goal Setting

It is common for patients to have unreasonable or even unsafe goals for weight-loss, hoping to drop a dress size per week or lose 40 pounds in a month. What is a reasonable weight-loss goal? The National Institutes of Health recommend that overweight and obese patients strive to lose 10 percent of their body weight over a period of six months.⁶ The American Diabetes Association (ADA) indicates that a loss of one-half to two pounds per week is a reasonable and safe goal, and explains that small, sustained changes can substantially

improve a diabetic's blood sugar control, energy level and risk for complications.⁹

At some point, most people have resolved to make a lifestyle change, be it eating more fruits and vegetables, spending less time on the couch, saving more money or flossing every day. More often than not, a person's busy lifestyle throws him or her a curveball and, despite the best of intentions, these resolutions fall by the wayside. Making change is hard! One way to support patients in their efforts to make lifestyle changes is by helping them work through the process of goal-setting. Establishing specific, achievable goals can increase the odds that a patient will successfully reach his or her target weight.⁹

To do this, the ADA recommends creating a plan similar to the one provided at the top of the next page. Notice that the plan specifies what actions will be taken, what needs to happen to initiate the plan and when each action will be taken.

Another important piece of the strategy is the inclusion of specific actions to be taken if something gets in the way of the plan and what the reward for adherence to the plan will be. Avoid rewards that involve food or skipping exercise. Support patients along the way and encourage them to expand their plans as they accomplish their goals.

Example Goal-Setting Plan *(adapted from American Diabetes Association)*

Where I am now: *I am 30 pounds over my target weight.*

What I want to do: *I want to lose approximately one pound per week.*

How I will start:

- 1. I will ride my bike to work every day.*
- 2. I will bring a healthy lunch to work every day.*

What I need to get ready:

- 1. I need a new bike helmet.*
- 2. I need to go grocery shopping for healthy lunch foods.*

What might get in the way of my plan:

- 1. If it's raining, I won't be able to bike to work.*
- 1. If I go to lunch with colleagues, I won't eat the lunch I brought.*

What I will do if that happens:

- 1. If it rains, I will drive to work then ride the stationary bike for 30 minutes when I get home.*
- 1. If I go out to eat lunch, I will make a healthy selection at the restaurant.*

When I will start:

I will purchase the helmet and groceries this weekend and start on Monday.

How I will reward myself:

For every month I stick to my plan, I will treat myself to a pedicure or manicure.

activity into daily life that will have a beneficial effect while actually being enjoyable. Gardening, swimming, walking, biking, golfing, yard work and house cleaning all require physical activity and can improve a patient's physical fitness.

Individuals with diabetes should be encouraged to become more physically active, but should consult their physician prior to beginning an exercise regimen because they may be at higher risk for heart disease.¹² This is especially important for patients whose diabetes is uncontrolled. These patients should be advised to start with very low-impact activities to reduce risk of damage to the blood vessels of the eyes and feet. The ADA recommends that patients with pre-diabetes or diabetes aim for at least 30 minutes of moderate activity most days, but five minutes per day may be a good place to start.¹³ Diabetics should wear medical alert identification at all times, but especially during physical activity.

Exercise and Blood Sugar

Patients on medications that have the potential to cause hypoglycemia (low blood sugar), especially insulin, need to be particularly careful when exercising. Physical activity impacts blood sugar to varying degrees, depending on both the patient and the type and intensity of activity. In general, exercise lowers blood sugar because the body is utilizing it for energy, but stress hormones released during strenuous exercise can have the opposite effect and raise blood sugar. Keeping a log of blood sugar trends before, during and after exercise can help patients identify their body's response to physical activity. Patients taking insulin should avoid injecting into an area of the body that will be exercised, as increased blood flow to that area can speed insulin absorption and lower blood sugar. For example, if planning a jog, injecting into the abdomen would be better than injecting into the thigh, which will be used during the upcoming workout.¹⁴ Type 2 diabetic patients should be advised not to exercise if their blood sugar is greater than 400 mg/dL or if ketones are present due to the risk for developing ketoacidosis (although the condition is more common in type 1 diabetics, type 2 diabetics can experience it as well).

Exercise

Getting Started

Not only can exercise help diabetic patients reach and maintain their weight-loss goals, but it can increase the body's sensitivity to insulin, reduce blood pressure, improve cholesterol, boost energy, enhance mood and sleep quality, and even reduce the risk of some cancers.¹⁰ In fact, studies have shown that 30 minutes of exercise five times per week can delay or prevent the onset of diabetes.¹¹ But, for many people, the idea of exercise brings to mind images of exhausting workouts and days of aching muscles. Fortunately, there are countless other ways to incorporate physical

Special Considerations

Patients affected by the complications of diabetes can be deterred from exercise for fear of aggravating or worsening conditions, such as neuropathy that can be painful or frightening. It is especially important for these patients to continue to be active, as these are the patients at highest risk for developing additional complications and experiencing further reductions in functional capacity.¹⁵ Fortunately, exercises can be tailored to all fitness levels and programs can be tailored to patient needs.

Patients with peripheral neuropathy (nerve damage in the extremities) often have reduced tactile sensation in their fingers and toes, which can impair balance. The pain caused by the condition can also render walking difficult. In these situations, patients can consider riding a stationary bike or swimming. These nonweight-bearing activities allow patients to increase their heart rate without painful impact to the lower extremities. Chair exercises can also help patients build upper body strength without straining the lower body. Because of this nerve damage, diabetics may be less sensitive to injuries to their feet and should visually examine them for blisters or wounds after each workout. They should notify a health care provider immediately if foot injuries are discovered.

Nonweight-bearing exercise is also appropriate for patients with proliferative retinopathy, a disease of the eye that can lead to blindness. Exercises that increase blood pressure or involve forward bending or heavy lifting should be avoided, as they have the potential to increase ocular pressure. Ballroom dancing, walking in the pool or use of an elliptical machine at low-to-moderate speed should be considered for these patients.¹⁵

Diet

Even for people who are not obese, making healthy dietary choices can be extremely challenging. New studies, products and fad diets are constantly bombarding the public through the media and pop culture, making the right choices difficult to identify. In the end, there is no miracle diabetic diet, just common sense and reasonable choices that will enable patients to progress toward their weight-loss goals.

Weight-Loss Basics

Simply put, when energy expenditure exceeds energy intake, weight-loss results. A good place for patients to start is by assessing their typical daily caloric intake. Having a patient keep a detailed food journal for a few days will help identify times of day, activities or meals during which a patient consumes more calories than necessary. For example, many people find themselves snacking excessively while watching television. Once these patterns are identified, they can be addressed and replaced with healthier habits. For instance, instead of snacking on potato chips while watching television, which can contain 160 calories, 15 g of carbohydrates, 140 mg of sodium and 10 g of fat (1 g saturated) in just 11 chips, consider frozen grapes, which contain just 52 calories, 14 g of carbs, 2 mg of sodium and no fat in a half cup.^{16,17} Targeting snacks as an area of improvement can be a great starting point for dietary change, as research has shown that snacks account for more than 30 percent of the day's calorie intake for most Americans.¹⁸

Because one pound of body weight is approximately equal to 3,500 calories, cutting about 500 calories per day from the diet can lead to a healthy weight-loss of one pound per week.¹⁹ This can also be accomplished with a combination of diet and physical activity. To create the 500 calorie daily deficit required to lose a pound per week, a patient could choose to start by reducing dietary calories by 250, and increase physical activity to burn the additional 250 calories per day.

Foods Linked to Diabetes

A number of foods have been linked to diabetes as well as weight gain. Avoidance of these foods may help diabetics lose weight and control blood sugar and prevent individuals with prediabetes from progressing to diabetes. Among these foods are sugar-sweetened soft drinks, which, when consumed twice daily, have been associated with a 24 percent increase in risk of developing diabetes. Frequent consumption of trans fats pose a similar risk. One study demonstrated that eating more trans fat can lead to a 30 percent increase in diabetes risk. Red meat, when eaten on a daily

basis rather than weekly, raises risk by 20 percent and process meats, like hotdogs and bacon, can double risk of diabetes when eaten five times per week rather than twice per month. Foods linked to reduction in diabetes risk include fiber, coffee, moderate amounts of alcohol and nuts.²

Glycemic Index

The glycemic index (GI) is a tool that nondiabetics, pre-diabetics and diabetics can utilize to aid in weight-loss efforts. The GI compares a food's ability to elevate blood sugar to that of either white bread or glucose. Selecting foods that have low GI (< 55), or pairing a high GI food (> 70) with a low GI food, prevents the postprandial surges in blood glucose that lead to diabetic complications.²⁰

Even for individuals without diabetes, this rapid change in blood glucose can be detrimental to weight-loss efforts. Insulin released in response to the blood glucose spike can quickly drop blood glucose levels, leading to a false sense of hunger and, ultimately, to overeating.

Fad Diets

The allure of fad diets that promise fast weight-loss without the burden of physical activity can be difficult for patients to resist. To help them identify programs that may be too good to be true, ask three questions:²¹

1. Does the program promise weight-loss of three or more pounds per week?
2. Are certain foods completely off limits?
3. Does the program encourage you to buy products or supplements as part of the diet?

Not only does weight lost extremely quickly tend to be regained quickly, but it can lead to gallstones, electrolyte imbalance and dehydration.²¹ A diet of approximately 1,500 to 1,800 calories, with about 50 percent from carbohydrates, is reasonable for most diabetic patients, but many benefit from working with a dietitian.²² Recommending a dietitian who is also a certified diabetes educator (CDE) can provide patients with another source of education, advice and support.

Pharmacotherapy

Anti-Diabetic Medications Associated With Weight-Loss

A number of medications used for the treatment of diabetes can aid patients in achieving their weight-loss goals. Although these medications are not specifically labeled for weight-loss, educating patients on this highly-desirable side effect can be useful in encouraging compliance with diabetes medications.

Insulin

Treatment of diabetes can result in weight gain or weight loss. One of the major concerns patients have when they started using insulin is the weight gain that they may have heard can result when insulin therapy is initiated. Communicating the reason for this weight gain and understanding the mechanisms by which other anti-diabetes medications affect weight can be helpful in supporting diabetic patients as they work toward their weight goals.

Type 2 diabetics generally begin insulin therapy when oral medications are no longer sufficient to control their elevated blood sugar. The body is not producing a sufficient response to circulating insulin, so excess sugar enters the blood stream but cannot be utilized by cells for energy. Despite high glucose concentrations, the body senses that energy supplies are insufficient and sends a signal to the brain that more energy is needed, resulting in a feeling of hunger. Unused sugar remains in the blood until it is excreted in urine. When insulin therapy is started and sugar can enter cells again, patients have often become so accustomed to overeating to supplement the perceived energy deficit that they continue to overeat in the absence of the hyperglycemia-induced feeling of hunger. The body now has an excess of energy, which it stores in the form of fat.²³ This emphasizes the importance of dietary changes to a patient's diabetes care plan.

The second reason patients often feel that insulin causes weight gain is that high blood concentrations of sugar increase osmotic pressure in the blood and cause water from surrounding tissue to

move into the blood then to be urinated out. This results in overall water loss and a state of dehydration. When insulin corrects the sugar concentration in the blood, the patient's dehydration begins to resolve and water is retained in the body. Patients accustomed to living in a state of dehydration can perceive this return of normal hydration as weight gain due to insulin initiation.²³

Metformin

The value of metformin for blood glucose control in type 2 diabetics has long been recognized and initiation of metformin at diagnosis is recommended for most patients.²⁴ The additional benefits of the medication include weight reduction, improved cholesterol levels, reduced risk of coronary heart disease and protection from some cancers.^{25,26}

The Diabetes Prevention Program (DPP) was a major, multicenter study aimed at assessing the impact of weight-loss through lifestyle changes and/or metformin on the onset of diabetes. The study randomized almost 4,000 patients at high risk of developing diabetes due to elevated fasting blood glucose, impaired glucose tolerance and high BMI to receive intensive lifestyle modification, 850 mg of metformin twice daily or placebo. After 2.8 years, average weight-loss in the lifestyle intervention group was 5.6 kg, 2.1 kg in the metformin group and 0.1 kg in the placebo group.²⁷

Ten years after randomization, a follow-up study on these patients found that the weight-loss experienced by the metformin group was maintained, while the weight-loss experienced by the lifestyle modification group had been partially regained.²⁸ Overall, lifestyle modification patients weighed an average of 2 kg less than they did at randomization; metformin patients weighed 2.5 kg less and placebo patients weighed under 1 kg less than at randomization. With regard to weight, the study concluded that both metformin and lifestyle interventions are effective in producing long-term weight loss.²⁸

A recent study of schizophrenic patients with antipsychotic-induced weight gain randomized patients to receive either 500 mg of metformin twice daily or placebo. During the 12-week study

period, the BMI of patients treated with metformin decreased an average of 1.3 kg/m² while the BMI of patients in the placebo group increased by 0.9 kg/m².²⁹ This was a fairly small study that excluded patients with diabetes, but because the prevalence of prediabetes among patients treated with antipsychotics is so high, these results may be particularly relevant to individuals with prediabetes.

Metformin's most common adverse effects are gastrointestinal, with up to 53.2 percent of patients experiencing diarrhea. Metformin's black box warning cautions that lactic acidosis is a rare but serious complication that occurs when the medication accumulates in the body. Practitioners should consider a patient's renal function when metformin is utilized, as the medication is contraindicated in male patients with serum creatinine 1.5 mg/dL and in females with serum creatinine 1.4 mg/dL.³⁰

GLP-1 Agonists

Oral ingestion of glucose stimulates insulin secretion to a greater degree than does glucose injected directly into the blood stream, suggesting that the gut plays a role in blood glucose homeostasis. The explanation for this phenomenon, known as the incretin effect, appears to be in a number of hormones that are released in response to ingestion of food. In fact, the incretin effect may be responsible for up to 70 percent of insulin released in response to oral glucose intake.³¹

In recent years, manipulation of the incretin system has become an important part of diabetes management. Glucagon-like peptide-1 receptor (GLP-1R) agonists, such as exenatide (Byetta[®]) and liraglutide (Victoza[®]), work directly on the cells of the pancreas, stimulating insulin production and inhibiting glucagon secretion in a glucose-dependent manner.³² In addition to the improvements in blood glucose control, studies of GLP-1R agonists have shown a mean weight-loss of 2.8 kg in diabetic patients, as well as improvements in blood pressure and cholesterol levels.³³ Weight loss caused by these medications is likely attributable to reductions in caloric intake that result from the feeling of satiety promoted by GLP-1R agonists as well as their slowing of gastric emptying.³² This

class of medications is currently being examined as a weight-loss tool for nondiabetic patients.³³

Risk of mild-to-moderate hypoglycemia is relatively low with these medications, occurring in 4-9 percent of patients receiving exenatide monotherapy and 0-12 percent of patients receiving liraglutide monotherapy. Severe hypoglycemia has not been observed in trials of GLP-1 agonist monotherapy. The most common adverse effects experienced from these medications have been transient nausea and diarrhea, which led to the dose titration schedule recommended by manufacturers.³²

Dipeptidyl peptidase-4 (DPP-4) inhibitors, such as sitagliptin (Januvia[®]), saxagliptin (Onglyza[®]) and linagliptin (Tadjenta[®]), also act on the incretin system, but do so indirectly by inhibiting the enzyme that degrades endogenous GLP-1. These medications are considered weight-neutral.³²

Amylin Analogs

Pramlintide (Symlin[®]) has been studied in both type 1 and type 2 diabetics and works by mimicking amylin, a hormone produced in beta cells of the pancreas that, along with insulin, lowers blood sugar. In patients with diabetes, production of or response to both hormones is compromised. Introduction of an exogenous amylin-like substance helps suppress glucagon secretion, which reduces hepatic glucose production. In addition, pramlintide slows gastric emptying, thereby preventing the post-prandial spike in blood glucose and enhancing the feeling of satiety at meals. Pramlintide has been shown to decrease insulin requirements and improve post-prandial blood glucose to help patients maintain a blood glucose in the target range of 70-180 mg/dL. In an open-label trial, type 2 diabetics lost an average of 6.1 pounds over six months. It is indicated for diabetic patients who have not been able to achieve adequate blood glucose control despite optimized insulin therapy.³⁴

Nausea is the most commonly reported adverse effect of pramlintide, but can be minimized by injecting the medication with the first bite of the meal and starting therapy at a low dose (60 g for type 2 diabetics) and increasing slowly. In clinical trials, nausea typically dissipated after one month of use.³⁵ Pramlintide can cause insulin-induced

hypoglycemia, particularly in type 1 diabetics. Prescribers should reduce mealtime insulin by 50 percent on day one of pramlintide initiation to avoid episodes of hypoglycemia.³⁴

Weight-Loss Medications

Weight-loss medications are recommended to augment lifestyle changes in patients with a BMI 30 kg/m² or for patients with a BMI > 27 kg/m² if obesity-related comorbidities, including diabetes, are present.³⁶

Currently Available Options

Lipase Inhibitors

Orlistat 120 mg was introduced as a prescription medication (Xenical[®]) in 1999 and made available in a 60 mg over-the-counter (OTC) product (Alli[®]) in 2007.³⁷ The medication works by reversibly inhibiting gastric and pancreatic lipases responsible for breaking down fat into absorbable forms, resulting in a dose-dependent reduction in fat absorption.³⁸ Unlike other weight-loss medications, orlistat is approved for long-term weight loss, although cost and tolerability often limit its utility for extended durations.³⁹

Orlistat should be taken three times daily, during or up to one hour after consuming fat-containing meals. The most common adverse effects of the medication are gastrointestinal and related to the medication's mechanism of action. Unabsorbed fat often causes oily spotting with flatulence, oily or fatty stools, abdominal pain and other bowel changes.³⁸ In 2010, the product labeling was revised to include safety information regarding 13 cases of severe liver injury identified in patients who took the medication. No casual relationship was identified, but patients are cautioned to immediately report any signs of jaundice, dark urine or itching, as they may be signs of liver damage.³⁷

For patients who can tolerate the side effects of orlistat, the medication may be a useful weight-loss tool when added to optimized diabetes treatment, changes in diet and exercise. A 2002 study of orlistat plus metformin in overweight diabetics showed that patients receiving both medications for 52 weeks reduced their body weight by 4.6 percent, while patients assigned to metformin plus

Table 2. Relative Efficacy of Cetilistat⁴²

Treatment Assigned	Weight-Loss (P vs. placebo)	Patients Achieving ≥ 5 percent Weight Loss	Waist Circumference Reduction	A1C Reduction	Discontinuations Due to AEs
Cetilistat 120 mg TID	4.32 kg (0.0002)	33 percent (0.03)	4.5 cm (0.037)	0.51 percent (0.015)	2.5 percent
Cetilistat 80 mg TID	3.85 kg (0.01)	29 percent (0.01)	4.3 cm (0.033)	0.54 percent (0.018)	5 percent
Cetilistat 40 mg TID	2.94 kg (0.958)	22 percent (NS)	2.9 cm (NS)	0.33 percent (NS)	2.5 percent
Orlistat 120 mg TID	3.78 kg (0.008)	31 percent (0.02)	4.4 cm (0.019)	0.53 percent (0.04)	11.6 percent
Placebo TID	2.86 kg	Not reported	Not reported	0.37 percent	6.4 percent

placebo lost 1.7 percent. Patients in the active treatment group also experienced greater reductions in A1C, systolic blood pressure and cholesterol.⁴⁰ A similar trial of overweight and obese type 2 diabetics being treated with insulin showed patients treated with orlistat had lost approximately 3.9 percent of their body weight at the end of one year of treatment compared to 1.3 percent loss for placebo.⁴¹

A second gastric and pancreatic lipase inhibitor, cetilistat, is being investigated in clinical trials and has shown promising results. In a 12-week study of obese diabetics receiving metformin, patients were assigned to one of three doses of the new medication three times daily, orlistat 120 mg three times daily or placebo. These preliminary findings indicate that cetilistat may be slightly more effective than orlistat and better tolerated. Interestingly, the frequency of discontinuation due to adverse effects was higher in the orlistat and placebo groups than in any of the cetilistat groups. The results are summarized in Table 2.⁴²

Sympathomimetics

Benzphetamine, diethylpropion, phendimetrazine and phentermine may be used as short-term adjuvants to diet and exercise; however, because tolerance develops fairly quickly, they are not indicated for extended treatment or weight-loss maintenance. All four work by stimulating the central nervous system (CNS) to reduce appetite.⁴³

Common adverse effects are also related to CNS stimulation, frequently resulting in dry mouth, constipation and insomnia. Although the Food and Drug Administration (FDA) has labeled these products for short-term use only, many specialists will prescribe them long-term.⁴⁴ All are scheduled substances, indicating the possibility for abuse or dependence.⁴⁵

The most commonly prescribed noradrenergic weight-loss medication in the United States is phentermine. Concerns about use of phentermine in hypertensive patients and restrictions on duration of therapy have recently come under fire, resulting in investigations into long-term use of the medication. One retrospective study found that patients treated with phentermine plus lifestyle modifications for two years experienced more weight loss at each week than patients who did not receive phentermine and that blood pressure declined in both groups.⁴⁶

In the Pipeline

Despite impressive innovation and decades of research, the search for safe and effective weight-loss medications has yielded limited success. As understanding of the metabolic processes involved in both diabetes and obesity advances, new targets and techniques for combating them are being developed. Some of the more promising products are discussed below.

Phentermine/Topiramate SR

The FDA is in the process of reviewing a New Drug Application (NDA) for a product that combines low doses of two medications, phentermine and topiramate, into a single capsule for the purpose of weight-loss. The proposed product, Qnexa[®], is an extended-release capsule that is dosed once daily. In 2010, an FDA advisory committee voted against endorsing the medication, citing concerns over increases in heart rate and the risk of birth defects detected in clinical trials. In response to these concerns, the manufacturer proposed a Risk Evaluation and Mitigation Strategy (REMS) intended to educate prescribers, pharmacies and patients about the risks associated with the medication.⁴⁷

The resubmitted NDA seeks approval of the product for weight-loss and weight-loss maintenance in obese patients (BMI \geq 30 kg/m²) or overweight patients (BMI \geq 27 kg/m²) with comorbidities such as diabetes.⁴⁸ One component of the product, phentermine, is thought to exert its weight-loss effects by causing the release of norepinephrine in the hypothalamus, resulting in elevated leptin levels, which is believed to suppress appetite. It is approved at a recommended dose of 37.5 mg/day as a short-term adjunct to lifestyle modifications as part of a weight-loss program. Interestingly, the other component of the drug, topiramate, was originally developed as a treatment for diabetes. Today, it is used in the treatment of seizure disorders and for migraine prophylaxis in doses up to 400 mg and 200 mg per day, respectively. The mechanism by which topiramate causes weight loss appears to be multifactorial, involving increased satiety and energy expenditure as well as decreased caloric intake due to changes in taste. The developer claims that the weight-loss mechanisms of the medications are “complementary and distinct,” allowing for the use of lower doses of both drugs. The developer has proposed three doses: low, 3.75/23 mg; mid, 7.5/46 mg; and top, 11.25/69 mg.⁴⁸

Results from phase three clinical trials indicate that patients receiving 56 weeks of the low dose lost 6.7 percent of their body weight; patients on mid dose lost 9.6 percent and top dose patients

lost approximately 13 percent. Patients receiving placebo lost approximately 1.8 percent of their body weight. The most common adverse effects of the medication were tingling sensations, dry mouth, constipation, changes in taste, insomnia, dizziness, depression, anxiety, reduced sensation, alopecia, irritability, disturbances in attention, dry eyes, hypokalemia, palpitations and thirst.⁴⁸ The FDA was originally scheduled to issue its decision on the product by April 17, 2012; however, just prior to the deadline, they announced that they will take another three months to evaluate the risk reduction plan for the medication.⁴⁹

Lorcaserin

An NDA was submitted to the FDA in December 2009 seeking approval of lorcaserin (Lorqess[®]) 10 mg tablets, a selective serotonin 2C (5-HT_{2C}) agonist. The medication is believed to reduce food intake by acting centrally to increase meal-related satiety, reduce pre-meal hunger and reducing snacking.⁵⁰

In phase III trials, 47.1 percent of patients randomized to receive lorcaserin 10 mg twice daily plus behavioral modification lost \geq 5 percent of their body weight after a year of treatment, versus 22.6 percent of patients assigned to placebo and behavior modification. Additionally, 22.4 percent of patients in the active treatment group lost \geq 10 percent of their baseline weight compared to 8.7 percent of patients in the placebo group. After year one, patients were either continued on lorcaserin or switched to placebo. Significantly more patients assigned to lorcaserin maintained weight loss during the second year when compared to placebo (67.9 percent vs. 50.3 percent, $P < 0.0001$). The medication was generally well-tolerated with the most common adverse effects including headache, dizziness, nausea, fatigue and dry mouth. Most of the adverse effects resolved with time.⁵⁰

In late 2010, an FDA advisory committee voted against approving the medication, citing concerns over increased breast cancers in rat models and limited efficacy. The committee recommended that the results of a study that was ongoing at the time, BLOOM-DM, which examined use of the medication in diabetic patients, be made available

for additional consideration. The results of this trial revealed no cases of breast cancer but raised concerns over the possibility of cardiac valvulopathy, a complication that led to the withdrawal of the weight-loss medication dexfenfluramine and fenfluramine from the market in the 1990s.⁵¹ A revised NDA was submitted and the FDA is planning to readdress the medication by June 2012.

Bupropion Combinations

Another product recently declined approval by the FDA is the combination product composed of bupropion sustained-release (SR) and naltrexone SR (Contrave®).⁵² The exact mechanism of the product is unclear, but the developer believes the medication promotes weight loss by reducing appetite, stimulating metabolism and interfering with the reward pathway that causes food cravings.⁵³ A phase III trial randomized 1,742 patients to naltrexone SR 32 mg plus bupropion SR 360 mg once daily, naltrexone SR 16 mg plus bupropion SR 360 or placebo for 56 weeks and found mean reductions in body weight of 6.1 percent, 5.0 percent and 1.3 percent respectively. Although an advisory panel voted in favor of approving the medication, the FDA declined the application, indicating that longer-duration studies are needed to examine the potential cardiac risks of the medication.⁵²

Bupropion is also being investigated in combination with the anti-epilepsy medication zonisamide. The mechanism of action of the combination (Empatic®) is not fully understood, but it may be associated with the dopaminergic and serotonergic activity of the medications. A 24-week trial of bupropion 300mg combined with zonisamide 400mg resulted in greater weight loss (9.2 percent) than either of the products alone (bupropion 6.6 percent, zonisamide 3.6 percent) or placebo (0.4 percent). Adverse effects most commonly reported were headache, insomnia and nausea. Clinical trials are ongoing.^{54,55}

Leptin

In the mid-1990s, researchers identified a protein present in mice of normal weight that is absent in overweight mice. When the hormone, leptin, was administered to the overweight mice,

they lost weight. When leptin is administered to humans, however, weight is lost but quickly regained. The problem appears to be caused by leptin resistance.⁵⁶ Leptin re-sensitization has thus been an area of considerable interest in weight-loss research.

Until recently, a twice daily injectable combination of pramlintide and metreleptin (a synthetic analog of leptin) was being developed.⁵⁷ Metreleptin has been effective in reducing weight, insulin resistance and A1C in patients with lipodystrophy, but a recent 16-week study investigating the medication in individuals without lipodystrophy found that it did not reduce body weight in obese patients with diabetes.⁵⁸ Shortly after results of the study were published, the development effort was discontinued. The companies collaborating on the medication continue to express optimism about a future role for leptin in weight management.⁵⁷

Removed From the Market

Weight-loss medications have long been plagued by dangerous side effects and innovations in the industry have repeatedly been halted due to safety concerns. One of the most notorious examples of safety issues associated with weight-loss medications is the combination product known as fen-phen. The product combined fenfluramine and phentermine, the former of which was eventually associated with heart valve disorders. The manufacturers of fenfluramine and the related compound, dexfenfluramine, voluntarily withdrew the products from the market and the FDA banned the sale of the medications. Phentermine was not associated with these cardiac risks.⁵⁹ More recently, sibutramine (Meridia®) was removed from the U.S. market due to elevated risk of cardiac events such as heart attack and stroke.⁶⁰

The endocannabinoid system has been a target of novel anti-obesity medications because of its perceived role in appetite control and glucose metabolism. Rimonabant (Accomplia®), a medication that was approved in areas of Europe, appears to work by antagonism of cannabinoid-1 receptors. Rimonabant was well-tolerated and studies indicated that it was effective in reducing weight and improving secondary endpoints, but later

reports revealed that it was associated with psychiatric side effects, such as anxiety, depression and suicidal ideation. Rimonabant was removed from the European market in 2008 and efforts to introduce it in the United States ceased. Further investigation indicated that this is likely a class effect, halting development of other cannabinoid antagonists.⁶¹

Bariatric Surgery

Surgical interventions intended to cause weight loss, including gastric banding, sleeve gastrectomy, gastric bypass and biliopancreatic diversion, are sometimes referred to as metabolic surgeries because of their often dramatic effect on metabolic syndrome and type 2 diabetes. In most cases, blood glucose control is drastically improved in the weeks immediately following surgery, probably owing to the significant reduction in caloric intake. Patients who do not experience this immediate improvement in diabetes control generally experience more gradual progress that parallels their post-surgical weight-loss. Two meta-analyses of bariatric surgery studies concluded that approximately 78 percent of patients who undergo such surgeries experience remission of their diabetes. Furthermore, 87 percent of patients at least achieve improved glucose control and are able to reduce use of anti-diabetic medications.⁶²

Durability of remission, however, has been questioned in recent years. As many as 40 percent of patients are not able to remain in remission despite initial weight loss and improvements in blood glucose control. Factors that tend to be associated with non-remission or re-emergence of diabetes include advanced age, male gender, duration of diabetes greater than 10 years and insulin use. Thus, although bariatric surgeries can be very helpful for reducing weight, improving blood glucose control and enhancing quality of life for obese diabetic patients, having a long-term diabetes monitoring and management plan in place should be arranged as a component of post-surgery care and should include diet and exercise counseling.⁶²

Role of the Pharmacist

For patients contending with diabetes and obesity, the process of weight loss can be

overwhelming, frustrating and emotional. The encouragement and guidance of an educated pharmacist can make a significant difference to a patient faced with this challenge. One of the areas in which pharmacists can be most supportive is offering continued motivation. Reinforcing that even a 5 percent reduction in weight can have a significant impact on blood pressure, glycemic control and cardiovascular risk can make the intimidating task of losing weight seem manageable.⁶³ Emphasize that maintaining small reductions in weight is among the most important pieces of achieving a healthy weight. The problem with most weight-loss methods is not that they are ineffective in taking weight off, but that they do not provide guidance on how to maintain the weight loss.⁶⁴ Patients may also be encouraged to hear that a weight loss of 7-14 percent is typically sufficient to discontinue at least one anti-diabetic medication. Discontinuation of insulin is even possible with a weight-loss of approximately 11 percent.⁶⁵ These changes, of course, should only be made if deemed appropriate by the patient's health care provider.

Another opportunity for pharmacists to aid patients in reaching their weight-loss goals is by introducing them to tools that allow them to track their progress. The ADA, for example, offers a free online "Diabetes 24/7" program that users can log into and track their blood glucose, A1C, blood pressure, cholesterol, physical activity, weight and medications.⁶⁶

The ADA's Diabetes 24/7 online diabetes management tool is available online at www.Diabetes.org/living-with-diabetes/treatment-and-care/247.html.

Pharmacists are often approached with questions about OTC and herbal weight-loss products. While a review of herbal weight-loss supplements is beyond the scope of this article, it is important to know that as of January 2011, more than 60 weight-loss supplements had been identified by the FDA as contaminated. Most of the tainted products contained sibutramine, but fluoxetine, furosemide, phenytoin, cetilistat and other contaminants have also been identified.⁶⁷ Because of the visibility and accessibility of the pharmacist relative to other health care professionals, it is incumbent upon members of the profession to protect patients from the adverse effects and drug interactions that may result from consumption of such products.

Conclusion

The epidemic of obesity in the United States continues to expand, particularly in the type 2 diabetic population. Because these patients are already at increased risk for a number of health problems, particularly cardiovascular disease, it is especially important that weight-loss be encouraged in obese diabetics. Improvements in diet and increased physical activity are mainstays of weight-loss therapy, but pharmacotherapy and bariatric surgery may be considered if these measures do not produce sufficient weight-loss. Encouragement, support and education provided by a pharmacist can be an essential component in a patient's journey toward a healthy weight.

Continuing Education Self-Assessment Questions

- Which of the following is the best example of a reasonable, well-developed weight-loss goal?
 - I will eat more fruit.
 - I will lose 20 pounds by the end of the month.
 - I will ride my bike 30 minutes per day, five days per week, starting Monday.
 - I will get more exercise.
- The incretin effect explains:
 - how consistently elevated blood sugar causes damage to microvasculature.
 - why orally-ingested glucose stimulates insulin secretion to a greater degree than parenteral glucose.
 - the relationship between elevated blood sugar and elevated blood pressure.
 - why blood sugar is sometimes higher in the morning than it was the previous night.
- Which of the following medications are considered weight-neutral?
 - metformin
 - pramlintide
 - sitagliptin
 - insulin
- Which if the following is false regarding the investigational drug, cetilistat?
 - It appears to be slightly more effective than the similar drug, orlistat.
 - It appears to cause slightly more gastrointestinal adverse effects than does orlistat.
 - It is a gastric and pancreatic lipase inhibitor.
 - It is dosed three times daily.
- Which of the following is true regarding sympathomimetic weight-loss medications?
 - All are controlled substances
 - Common adverse effects include hypersalivation, rhinorrhea and diaphoresis.
 - Recent studies suggest that hypertensive crisis may be more likely from these drugs than originally believed.
 - These drugs work by decreasing intestinal absorption of fat.
- Most research into weight-loss medications acting on the endocannabinoid system was halted due to concerns regarding their:
 - addictive potential.
 - cardiac side effects.
 - effect on seizure threshold.
 - psychiatric side effects.
- Pharmacists can assist diabetic patients in their weight-loss efforts by:
 - providing encouragement and reinforcing that even a 5 percent weight loss can have important health benefits.
 - directing patients toward tools and educational resources.
 - educating patients on how compliance with anti-diabetes medications can improve weight.
 - doing any or all of the above.
- The Diabetes Prevention Program study showed that:
 - weight loss caused by metformin tends to stay off in the long-term.
 - weight gain caused by metformin is transient.
 - lifestyle modifications are only beneficial when combined with metformin.
 - weight gain caused by metformin cannot be taken off by lifestyle modifications.
- Which of the following is a reason why patients may feel that insulin causes weight gain?
 - They return to a state of normal hydration after becoming accustomed to dehydration.
 - Insulin causes slowing of metabolism.
 - Insulin increases appetite.
 - Reductions in energy brought on by insulin lead to reduced physical activity.
- The combination of bupropion SR and naltrexone SR is believed to cause weight loss by all but which of the following mechanisms?
 - Appetite reduction
 - Interfering with the reward pathway
 - Reducing fat absorption
 - Stimulating metabolism

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Important Information Regarding Continuing Education Credit

This activity is ACPE-accredited for pharmacist continuing education credit.

interpersonal skills, organizational skills, pharmacy law and pharmacology/drug therapy. Programs relating to functions outside the scope of practice for pharmacy technicians will not be accepted by PTCB.

This is a knowledge-type activity, which acquires factual knowledge and information is based on evidence as accepted in literature by the health care professions.



Michigan Pharmacists Association is accredited by the Accreditation Council for Pharmacy Education (ACPE) as a provider of continuing pharmacy education. ACPE Program #112-000-12-203-H01-P, 1.0 contact hour. Initial release date: 4/14/2012, Expiration date: 4/14/2015.

Obesity: A Weighty Problem for Type 2 Diabetics

May 2012 Enrollment Form
ACPE No. 112-000-12-203-H01-P

- The passing score on each test is 70 percent. Upon successful completion of the test and PCE evaluation, MPA will mail you a continuing education statement of credit. A failed test may be retaken only once without additional cost within 30 days upon notification of a failing score. There are no refunds for failed tests.
- The quiz may be taken anytime until April 14, 2015. Membership status will be certified using MPA records. Checks must accompany quiz — MPA will not bill you or correct the test unless the proper fee is enclosed.
- Send the answer sheet with your check made payable to: **Michigan Pharmacists Association, 408 Kalamazoo Plaza, Lansing, MI 48933.** Please allow four weeks for processing. The post-test and evaluation can also be completed online at MichiganPharmacists.org/education/online.
- Partial credit will not be awarded

Name _____ MPA ID# _____
 Address _____ City _____ State _____ Zip _____
 Signature _____

Answer Sheet Instructions — Please write the letter of the correct answer to each question in the space provided.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____

I enclose: Member Fee.....\$7 Nonmember Fee....\$15

Please indicate if you are a Pharmacist

PCE EVALUATION — Complete the following questions in regards to learning objectives and overall evaluation.

Please indicate whether this activity covered the following learning objectives.

- Recognize the relationship between type 2 diabetes and obesity. Yes No
- Identify lifestyle changes that should be recommended to patients with diabetes and prediabetes. Yes No
- Describe medication options that can assist diabetic patients in weight management. Yes No
- Discuss resources available to patients as they work toward attaining and maintaining a healthy weight. Yes No

Please rate each of the following statements:

- | | Agree | Disagree | Not Applicable |
|---|--------------------------|--------------------------|--------------------------|
| 1. The activity met my educational needs. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The activity was free from bias. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The content was current. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Information provided will be useful in my practice. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The author was organized in the written materials. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Educational materials were useful. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Teaching and learning methods were effective. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Learning methods were appropriate. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. The author(s) seemed qualified to write on this subject matter | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. The activity increased my understanding of this area. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The topic was relevant to my practice. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please identify topics that are of interest to you and learning gaps that should be addressed.

Topics of Interest/Educational Needs _____

Identify Specific Learning Gaps Related to Educational Needs _____

If this activity contained biased content, please provide details: _____

If you feel that the author(s) were not qualified to write on this subject matter, please explain why: _____

What aspects of this program should have received more attention? _____

What one thing will you do differently after participating in the activity? _____

Additional comments: _____