Pharmacy Society of Wisconsin

MEDICAL MISINFORMATION

APPENDICES

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STATINS APPENDIX

Despite robust evidence demonstrating statins significantly reduce cardiovascular morbidity and mortality with few serious adverse effects, misinformation presents a significant barrier to appropriate atherosclerotic cardiovascular disease (ASCVD) prevention. The American Heart Association and the 2026 multi-organizational dyslipidemia guideline emphasize that the cardiovascular benefits of statins far outweigh their risks. This emphasizes the need for clinician-led, evidence-based education to counteract statin misinformation.[1-4]

MYTH #1 "STATINS COMMONLY CAUSE MUSCLE PROBLEMS"[2,3,5-7]

Reality: In randomized controlled trials (RCTs), the rates of muscle symptoms were nearly identical between statin- and placebo-treated participants with less than 1%, and 0.1% of patients discontinuing treatment due to muscle symptoms compared to placebo. In contrast, in real-world settings about 10 to 25% of patients report muscle symptoms. The SAMSON trial demonstrated the vast majority of symptoms (about 90%) are driven by the nocebo effect, patient expectation of harm or side effects driving symptom reporting, rather than the drug itself. Serious statin-related myopathy (CK more than 10 times greater than the upper limit of normal) occurs in less than 0.1% of patients taking a statin. Rhabdomyolysis occurs in 0.001% of patients taking a statin. If muscle aches do occur, they are typically mild and affect large muscles, not joints. Myalgia can be managed by lowering the statin dose or stopping the statin and changing to an alternative statin or non-statin medication.

MYTH #2 "STATINS CAUSE DIABETES"[2,3]

Reality: Statins modestly increase the risk of new-onset type 2 diabetes in patients with risk factors for diabetes including BMI ≥30 kg/m^2, fasting glucose ≥100 mg/dL, metabolic syndrome, and/or hemoglobin A1c of 6.0 to 6.4%. Research indicates that statins do not induce diabetes in patients who are not at risk of diabetes prior to statin initiation. The 2026 multi-organizational dyslipidemia guideline emphasizes that the cardiovascular benefits of statins in patients who develop diabetes far outweigh the risk.

MYTH #3 "STATINS CAUSE LIVER DAMAGE"[1-3]

Reality: Statins can produce small, usually transient transaminase elevations, but serious hepatotoxicity is very rare with an incidence of about 0.001%. Statins are not contraindicated in chronic, stable liver disease, including metabolic dysfunction-associated steatotic liver disease (MASLD). Current data suggest potential benefit in these patient populations. Routine liver function monitoring is not recommended unless symptoms occur.

MYTH #4 "STATINS CAUSE MEMORY LOSS AND COGNITIVE DECLINE"[8,9]

Reality: In 2012, the Food and Drug Administration (FDA) changed statin drug labels to include information that some people had experienced memory loss and confusion while taking statins. This change was based on poor quality studies and evidence that led to concern that lower cholesterol levels would impact brain function. There is no robust evidence supporting a causal relationship between statins and cognitive impairment. The brain makes its own cholesterol and does not depend on the cholesterol in the blood. Long-term, statins may be beneficial on the brain as they help prevent strokes and protect the health of the arteries in the brain.

STATINS APPENDIX

MYTH #5 "STATINS ARE DANGEROUS IN THE ELDERLY"[2,3]

Reality: An AHA Scientific Statement reviewed statin safety across demographic subgroups including the elderly and concluded that the benefit-risk profile remains favorable. The 2026 multi-organization dyslipidemia guideline supports continued use in older adults when clinically indicated.

MYTH #6 "IF I HAVE SIDE EFFECTS, I CAN NEVER TAKE A STATIN"[3,6,10]

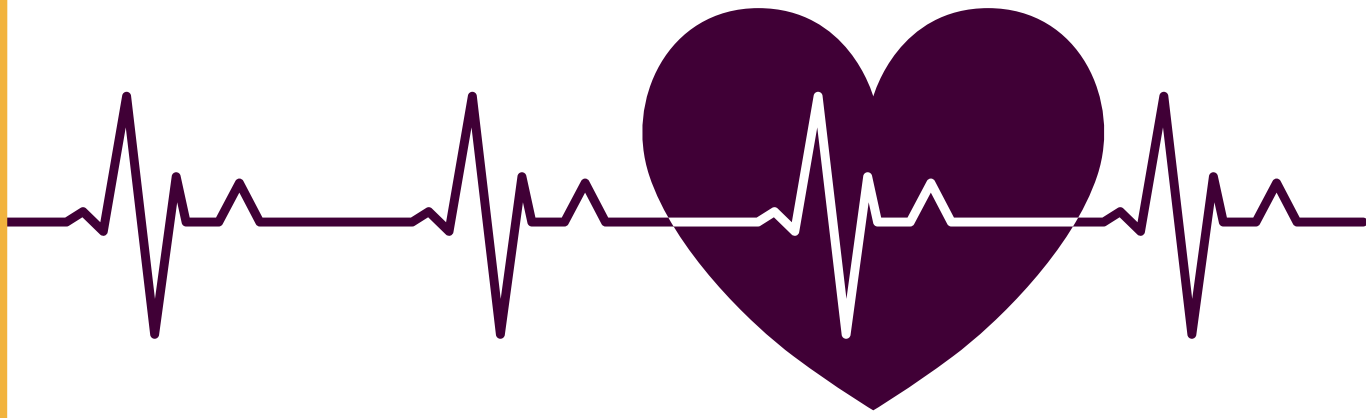
Reality: The 2026 multi-organization dyslipidemia guideline prefers the term "statin-associated side effects" over "statin intolerance" because the large majority of patients are able to tolerate statin rechallenge with an alternative statin, reduced dose, or combination with non-statin therapies. In the SAMSON trial, 50% of participants who had previously discontinued statins were taking one again 6 months after the trial.

MYTH #7 "STATINS DON'T ACTUALLY PREVENT VASCULAR DISEASE"[11]

Reality: Statins can help prevent arterial plaque from worsening and prevent plaque rupture that can lead to a heart attack or stroke. Statins also play a role in reducing inflammation, which is a key cause of cardiovascular disease.

THE BOTTOM LINE[2,11-15]

The benefits of statins are well-established, and statins remain one of the most effective therapies to prevent ASCVD events. In patients without cardiovascular disease, statins have three times the impact of aspirin in preventing cardiovascular disease. The clinical consequence of statin misinformation is significant with statin non-adherence and misconceptions adversely impacting atherosclerotic cardiovascular disease outcomes.



STATINS APPENDIX

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METFORMIN APPENDIX

Metformin is the most widely prescribed first-line medication for type 2 diabetes, with decades of evidence supporting its safety and effectiveness. It works by reducing the amount of sugar the liver produces, helping the body use insulin more effectively, and supporting natural gut hormones that regulate blood sugar.[1] Metformin does not force the pancreas to make extra insulin and as a result it carries very little risk of causing low blood sugar on its own.[2] Long-term use of metformin can lower vitamin B12 levels, which may cause symptoms like numbness or tingling that may be confused with diabetic nerve damage, making periodic monitoring important. Despite its strong track record, metformin remains surrounded by several myths that may discourage patients from taking it.

MYTH #1 "METFORMIN DAMAGES THE KIDNEYS."[1,3-8]

Reality: Metformin does not cause kidney damage. It is excreted unchanged by the kidneys, so dose adjustment is required when kidney function declines, but it is not the cause of renal impairment. Metformin can be safely used in patients with stable kidney function down to an eGFR of 30 mL/min/1.73 m^2. Lactic acidosis is a possible but extremely rare (fewer than 1 case per 10,000 patient-years) adverse event. Lactic acidosis is typically associated with other serious conditions such as acute kidney injury, sepsis, or shock and not metformin alone.

MYTH #2 "METFORMIN IS TOXIC TO THE LIVER."[9-11]

Reality: Metformin is not metabolized by the liver and does not cause liver injury. It is avoided in severe liver disease only due to concerns for impaired lactate clearance, not direct toxicity. Moderate, occasional alcohol use is generally safe in patients with normal liver and kidney function. However, excessive or binge drinking should be avoided.

MYTH #3 "METFORMIN CAUSES LOW BLOOD SUGAR."[2]

Reality: Metformin does not stimulate insulin secretion and carries minimal risk for hypoglycemia when used alone. Low blood sugar may occur when metformin is combined with insulin or sulfonylureas, but that is due to the effects of these other medication classes that increase the risk for hypoglycemia.

MYTH #4 "METFORMIN CAUSES INTOLERABLE GASTROINTESTINAL SIDE EFFECTS."[12-13]

Reality: Gastrointestinal side effects such as nausea, diarrhea, bloating are common but usually temporary and manageable. These gastrointestinal side effects can be minimized by:

- Starting at a low dose
- Titrating slowly
- Taking metformin with food
- Switching to extended-release (ER) formulations

METFORMIN APPENDIX

MYTH #5 "METFORMIN PREVENTS CANCER AND SLOWS AGING."[14-18]

Reality: While some observational studies suggest metformin may be associated with reduced cancer risk and potential anti-aging effects, no high-quality randomized trial has confirmed these benefits. Metformin should not be used for cancer prevention or anti-aging purposes outside of clinical trials.

THE BOTTOM LINE

Metformin is one of the safest, most effective, and well-studied diabetes medications available. It lowers blood sugar without causing low blood sugar on its own, does not damage the kidneys or liver, and is generally well-tolerated. Side effects are usually manageable, and with appropriate monitoring it remains a safe and effective treatment for type 2 diabetes mellitus.

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GLUCAGON LIKE PEPTIDE-1 RECEPTOR AGONISTS APPENDIX

Glucagon-like peptide 1 receptor agonists (GLP-1 RA) have been extensively studied over the past decade, with a growing body of evidence supporting their efficacy and safety. Despite this, misinformation has contributed to confusion among both patients and providers. While gastrointestinal effects such as nausea, vomiting, and diarrhea are the most commonly reported side effects, these are typically transient and can be minimized with gradual dose titration. Despite clear benefits, medical misinformation about GLP-1 RA present barriers to safe and effective use of these evidence-based therapies.

MYTH #1 "COMPOUNDED VERSIONS FROM ONLINE PHARMACIES ARE EQUALLY EFFECTIVE AND LOWER IN COST."[1-4]

Reality: This is a serious safety concern. Compounded GLP-1 RA medications are not FDA-approved and have not been tested for safety or effectiveness the way brand-name versions have. A study using the FDA's safety reporting system found that compounded GLP-1 RA products were linked to higher rates of side effects, hospitalizations, preparation errors, and contamination compared to FDA-approved versions. The American Diabetes Association, the American Association of Clinical Endocrinology, and the FDA all recommend against using compounded GLP-1 RA products because:

- They may use different chemical forms which have not been proven safe in humans.
- They may contain added ingredients that have never been tested in combination with GLP-1 RA medications.
- They often come in multi-dose vials instead of pre-filled pens, leading to dosing errors.
- Testing of compounded products has found impurities, incorrect concentrations, and contamination that are not present in FDA-approved versions.
- Counterfeit products have also entered the supply chain, posing additional risks.

MYTH #2 "GLP-1 RA MEDICATIONS WILL GIVE ME CANCER, MAKE ME DEPRESSED, AND MAKE MY HAIR FALL OUT."[5-10]

Reality: These are some of the most common fears of using GLP-1 RA medications. Here is what the research shows:

- Cancer: Early animal studies raised concerns about thyroid tumors in rodents, but this has not been seen in humans. A review of 48 studies with over 94,000 patients found no increased risk of thyroid, pancreatic, or breast cancer. As a precaution, these medications are not recommended for people with a personal or family history of a rare thyroid cancer called medullary thyroid carcinoma (MTC) or a condition called multiple endocrine neoplasia type 2 (MEN2).
- Depression and suicidal thoughts: A review of 80 studies with over 107,000 patients found no increased risk of depression, suicidal thoughts, or other serious mental health side effects compared to placebo. A separate review of 144 studies confirmed no increased risk of suicide or self-harm. Many patients actually report feeling better emotionally while on these medications.
- Hair loss: Some hair thinning can occur. In clinical trials, it was reported in about 3–5% of patients on GLP-1 RA medications compared to 1% on placebo. This is most likely a type of temporary hair shedding called telogen effluvium, which happens with any significant or rapid weight loss, not just with these medications. Hair typically regrows once weight stabilizes. Hair loss is usually not a reason to stop the medication.

GLUCAGON LIKE PEPTIDE-1 RECEPTOR AGONISTS APPENDIX

MYTH #3 "DISCONTINUATION RESULTS IN COMPLETE WEIGHT GAIN"[11-14]

Reality: Weight regain may occur following discontinuation of GLP-1 RA therapy, consistent with the chronic and relapsing nature of obesity and similar to the recurrence of other cardiometabolic conditions when pharmacotherapy is withdrawn. Clinical trials demonstrate an average regain of approximately 7-12% of body weight within one year of discontinuation, which reflects loss of treatment effect rather than treatment failure. Providers can emphasize that GLP-1 RA therapy should be framed as part of a long-term management strategy and used as an opportunity to establish sustainable lifestyle modifications while appetite and cravings are reduced. Counseling can focus on reinforcing that continuation of nutrition, physical activity, and behavioral strategies is critical for weight maintenance if therapy is stopped. Research shows that the following strategies help maintain weight loss long-term:

- Regular physical activity: aim for at least 60 minutes per day of walking, cycling, or other movement
- Eating regular meals with minimally processed, nutrient-rich foods high in protein and fiber
- Avoiding sugary drinks and highly processed snack foods
- Monitoring weight regularly
- Getting enough sleep and managing stress
- Resistance training to preserve muscle mass

MYTH #4 "GLP-1 RA MEDICATIONS ARE ONLY FOR WEIGHT LOSS."[6,14-16]

Reality: These medications were originally developed to treat type 2 diabetes mellitus, not weight loss. They help control blood sugar by boosting insulin only when blood sugar is high and reducing sugar released by the liver. Weight loss happens because they also reduce appetite and help increase satiety. Today, different GLP-1 RA medications are approved for diabetes, weight management, or both. They have also been shown to reduce heart attack and stroke risk, slow kidney disease, improve liver disease, and help with sleep apnea. These are serious medical treatments, not just "weight loss drugs."

MYTH #5 "GLP-1 RA THERAPIES CAUSE CLINICALLY SIGNIFICANT HYPOGLYCEMIA."[6,16]

Reality: GLP-1 RAs enhance glucose-dependent insulin secretion, resulting in a low intrinsic risk of hypoglycemia when used as monotherapy. The risk for hypoglycemia increases primarily when these agents are used in combination with other glucose lowering therapies such as insulin or sulfonylureas. Appropriate dose adjustments of concomitant therapies can mitigate this risk.

THE BOTTOM LINE

GLP-1 RA medications are among the most well-studied treatments available. Like all medications, they can have side effects. It is important to know that the most alarming claims online are not supported by the evidence.

GLUCAGON LIKE PEPTIDE-1 RECEPTOR AGONISTS

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HERBALS AND SUPPLEMENTS APPENDIX

Herbal and dietary supplements are widely used, with over half of American adults taking them.[1] However, many people believe common myths about supplements that can put their health at risk.

MYTH #1 "NATURAL MEANS SAFE"[2]

Reality: Natural products can cause serious harm. Some supplements have been linked to liver damage, kidney problems, and dangerous interactions with prescription medications. Just because something comes from a plant doesn't mean it's safe for everyone.

MYTH #2 "THE FDA APPROVES SUPPLEMENTS BEFORE THEY'RE SOLD"[3]

Reality: Unlike prescription drugs, dietary supplements do not require The Food and Drug Administration (FDA) approval before being sold. Supplements are regulated similarly to food based on the Dietary Supplement Health and Education Act of 1994. The FDA only steps in after a product is already on the market and safety problems are reported by consumers.

MYTH #3 "WHAT'S ON THE LABEL IS WHAT'S IN THE BOTTLE"[4,5]

Reality: Studies have found that many supplements contain different ingredients or amounts than listed on the label. Some have been contaminated with heavy metals, bacteria, or even prescription drugs that aren't listed.

MYTH #4 "IF IT'S SOLD IN STORES, IT MUST WORK"[3]

Reality: Supplement manufacturers do not have to prove their products work before selling them. Many supplements lack good scientific evidence for their claimed benefits.

MYTH #5 "I DON'T NEED TO TELL MY DOCTOR ABOUT SUPPLEMENTS"

Reality: Supplements can interact with prescription medications, negatively impact various medical conditions, and affect medical treatment. It is important that patients report any supplements that they take to their doctor.

How patients can make safer choices:

Ask these questions before taking any supplement:

- What specific health goal am I trying to achieve?
- Is there quality scientific evidence that this supplement works for my condition?
- Could this supplement interact with my medications or medical conditions?
- Is this supplement from a reputable manufacturer?

Look for quality indicators[3]:

- Third-party testing seals to assure Good Manufacturing Processes and assess for quality, purity, and potency (USP, NSF, ConsumerLab)
- Clear ingredient lists with specific amounts
- Contact information for the manufacturer
- Realistic claims (be wary of "miracle cure" promises)

HERBALS AND SUPPLEMENTS APPENDIX

Talk openly with the healthcare team[6,7]:

- Bring all supplement bottles to appointments
- Discuss health goals and the why behind interest in supplements
- Review potential risks and drug interactions
- Encourage reporting of side effects experienced

THE BOTTOM LINE

Supplements can play a role in health, but they are not risk-free. It is important that patients work with their health care team to make informed decisions based on evidence, not marketing claims. Herbal and supplement safety depends on open communication about everything being taken and clinicians should ask about and encourage reporting of herbal and supplement use.

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VACCINES APPENDIX

Despite strong evidence demonstrating that vaccines are among the most safe and effective public health interventions to date, misinformation continues to pose a significant barrier causing vaccine hesitancy among patients across the United States. There has been extensive research involving millions of children and adults.[1] These studies have confirmed that the benefits of vaccination far outweigh any risks. National health organizations such as the Center for Disease Control and Prevention and the World Health Organization promote staying up to date with the recommended vaccine schedules for all adult and pediatric patients. Misinformation regarding vaccine safety and efficacy drives the need for pharmacist-led, evidence-based patient education to counteract common misconceptions.

MYTH #1 "VACCINES CAUSE AUTISM."[2-4]

Reality: This claim originated from a 1998 study that was later retracted due to fraud. Since then, a meta-analysis of over 1.2 million children and a nationwide Danish study of over 657,000 children both found no link between vaccines and autism. Multiple independent scientific organizations, including the National Academy of Medicine and the Cochrane Collaboration, found that vaccines do not cause autism.

MYTH #2 "VACCINES CONTAIN DANGEROUS TOXINS LIKE ALUMINUM, MERCURY, AND FORMALDEHYDE."[3-6]

Reality: The amounts of these substances in vaccines are significantly less than what people are exposed to through everyday food, water, and air. For example, a child absorbs more aluminum from their diet in the first two years of life than from all recommended vaccines combined. Thimerosal has been removed from nearly all childhood vaccines since 2001, and formaldehyde is naturally produced by the body in amounts far exceeding what is found in any vaccine. Larger studies show no association between these ingredients and harm.

MYTH #3 "GETTING TOO MANY VACCINES AT ONCE OVERWHELMS A CHILD'S IMMUNE SYSTEM."[4,7]

Reality: Children encounter thousands of antigens from their environment every day. This is far more than what is found in vaccines. A study of nearly 500,000 children found no association between the number of vaccine antigens received and the risk of other infections. The National Academy of Medicine has concluded there is no evidence that the immunization schedule is unsafe.

MYTH #4 "NATURAL IMMUNITY IS ALWAYS BETTER THAN VACCINE-INDUCED IMMUNITY."[8]

Reality: While natural infection can produce a strong immune response, it comes at the cost of risking serious complications. These complications include brain swelling, pneumonia, and death. Vaccines provide similar protection without requiring one to suffer through the disease itself in order to gain immunity.

VACCINES APPENDIX

MYTH #5: "VACCINES WEAKEN THE IMMUNE SYSTEM."[1,8]

Reality: Vaccines strengthen the immune system by training it to recognize and fight specific pathogens. Research shows no difference in overall immune function between vaccinated and unvaccinated children. Natural infections can weaken the immune system more than vaccines.

MYTH #6 "THESE DISEASES WERE ALREADY DISAPPEARING BEFORE VACCINES BECAUSE OF BETTER HYGIENE."[8]

Reality: Measles cases dropped by over 95% only after the vaccine was introduced, a decline too rapid to be explained by hygiene alone. When vaccination rates drop, these diseases return, as seen with recent measles outbreaks in under-vaccinated communities.

MYTH #7 "VACCINES CAN BE SAFELY DELAYED OR SPACED OUT WITHOUT ANY CONSEQUENCES."[8]

Reality: The recommended schedule is designed to protect children when they are most vulnerable. Delaying vaccines leaves children unprotected during the highest-risk period of life. Delays in vaccine administration also increase the risk of missing the vaccines entirely.

THE BOTTOM LINE

Vaccines are among the most thoroughly studied medical interventions in history. The evidence overwhelmingly shows they are safe, effective, and essential for protecting patients from serious diseases.

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