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## Hypertriglyceridemia Management and Care: A Nursing Perspective

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### **Abstract:**

Hypertriglyceridemia, characterized by elevated triglyceride levels in the blood, poses significant health risks, including cardiovascular disease and pancreatitis. From a nursing perspective, effective management begins with thorough assessment and education. Nurses play a crucial role in gathering patient history, including diet, lifestyle, and family history, to identify potential causes. Monitoring vital signs and laboratory results, particularly lipid panels, helps tailor intervention strategies. Nurses can educate patients on lifestyle modifications, such as adopting a heart-healthy diet low in saturated fats and sugars, engaging in regular physical activity, and achieving and maintaining a healthy weight. Emphasis should be placed on understanding the role of triglycerides in overall health and how lifestyle changes can positively impact their levels. In addition to lifestyle interventions, nurses must stay vigilant for patients requiring pharmacological treatment. Common medications include fibrates, niacin, and statins, which may be used alone or in combination. Nurses should monitor patients for medication adherence, potential side effects, and their effectiveness in managing triglyceride levels. Furthermore, ongoing education about the importance of regular follow-up appointments for lipid monitoring is essential. Collaborating with a multidisciplinary team ensures comprehensive care, addressing both the physical and psychological aspects of managing hypertriglyceridemia. By fostering a supportive environment and encouraging self-management skills, nurses can significantly contribute to improving patient outcomes.

**Keywords:** Hypertriglyceridemia, Nursing perspective, Patient assessment, Lifestyle modifications, Heart-healthy diet, Physical activity, Pharmacological treatment, Lipid monitoring, Medication adherence, Multidisciplinary care

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### **Introduction:**

Hypertriglyceridemia, characterized by elevated levels of triglycerides in the blood, is a common metabolic disorder linked to an increased risk of cardiovascular disease (CVD), pancreatitis, and other metabolic complications. This condition often arises due to a combination of genetic predisposition, lifestyle factors such as diet and physical inactivity, and comorbid conditions like obesity and diabetes. The growing prevalence of hypertriglyceridemia, particularly in conjunction

with rising rates of obesity and sedentary lifestyles in modern societies, underscores the critical need for effective management and care strategies. As frontline caregivers, nurses play an indispensable role in mitigating the impacts of hypertriglyceridemia through education, assessment, intervention, and interdisciplinary collaboration [1].

The importance of addressing hypertriglyceridemia cannot be overstated. According to recent epidemiological studies, dyslipidemias, which

include elevated triglycerides, are among the most prevalent risk factors for cardiovascular diseases, affecting a significant portion of the adult population worldwide. The American Heart Association recommends that triglyceride levels be maintained below 150 mg/dL to mitigate cardiovascular risk. As nurses are tasked with patient education, lifestyle modification implementation, medication management, and holistic care, understanding the intricacies of hypertriglyceridemia management becomes paramount [2].

Effective management of hypertriglyceridemia requires a multifaceted approach. First and foremost, a comprehensive assessment is essential. This includes obtaining a detailed medical history, conducting physical examinations, and interpreting laboratory values, which aid in understanding the patient's overall health status. Nurses can identify common risk factors such as poor dietary habits, lack of exercise, and the presence of comorbidities during this assessment phase. By adopting a person-centered care framework, nursing professionals can tailor interventions that address individual patient needs and preferences, ultimately fostering better health outcomes [3].

Education is another pivotal aspect of nursing care concerning hypertriglyceridemia. Nurses are uniquely positioned to impart critical information regarding the implications of elevated triglyceride levels. Through targeted patient education initiatives, nurses can highlight lifestyle modifications—such as dietary improvements, increased physical activity, weight management, and smoking cessation—that have been shown to significantly decrease triglyceride levels. Furthermore, understanding the role of pharmacotherapy, including statins, fibrates, and omega-3 fatty acids, allows nurses to inform patients about potential benefits and side effects, facilitating an informed decision-making process [4].

Interdisciplinary collaboration is also essential in the context of hypertriglyceridemia management. Nurses often serve as the communication hub between various healthcare providers, including dietitians, physicians, and pharmacists. Through collaboration, a holistic care plan can be developed that encompasses dietary recommendations, medication adherence, and regular monitoring of triglyceride levels. By fostering an environment of teamwork, nurses can enhance the continuity of care

and ensure that patients receive comprehensive treatment reflective of their unique needs [5].

Research indicates that the integration of evidence-based practices in nursing can significantly improve health outcomes for patients with hypertriglyceridemia. By remaining current with the latest scientific literature and clinical guidelines, nurses can employ strategies backed by empirical research, which ultimately improves patient care quality. For example, studies suggest that structured lifestyle intervention programs led by nurses can effectively lower triglyceride levels and contribute to weight loss in overweight and obese patients [6].

Furthermore, it is vital to explore the psychosocial dimensions of patients dealing with hypertriglyceridemia. The stigma associated with obesity, lifestyle diseases, and chronic conditions can lead to psychological distress, impacting treatment adherence and overall health. Nurses, utilizing their skills in therapeutic communication, can provide the emotional support needed to empower patients to make necessary lifestyle changes. Addressing these psychosocial factors is essential in fostering a supportive environment conducive to health improvement and disease management [7].

### **Pathophysiology and Risk Factors:**

The study of pathophysiology elucidates the complex biological processes that lead to the manifestation of diseases. This field encompasses the changes that occur at the cellular, tissue, and organ levels in response to various insults, which may be infectious, genetic, environmental, or lifestyle-related. Understanding these mechanisms is crucial for comprehending how diseases develop, progress, and respond to treatment. Coupled with the study of pathophysiology is the exploration of risk factors—elements that increase an individual's likelihood of developing a particular health condition. Together, these areas provide invaluable insights for healthcare professionals, researchers, and patients alike [8].

### **Pathophysiology: The Mechanisms of Disease**

At its core, pathophysiology aims to bridge the gap between basic biological sciences and clinical practice. It involves the investigation of how normal physiological processes are altered in disease states, enabling a deeper understanding of symptoms and

their underlying causes. Many diseases can be categorized based on their pathophysiological mechanisms, which can be broadly classified into several categories, including inflammatory, metabolic, neoplastic, and degenerative processes [9].

**1. Inflammatory Mechanisms:**

Inflammation is a fundamental immune response to injury or infection that can become detrimental when dysregulated. In chronic inflammatory conditions such as rheumatoid arthritis or inflammatory bowel disease, persistent inflammation can result in tissue damage, fibrosis, and loss of function. The understanding of inflammatory pathways, including cytokine signaling and immune cell activation, has paved the way for novel therapeutic strategies, such as targeted biologic agents that aim to reduce inflammation and improve patient outcomes [10].

**2. Metabolic Changes:** Many diseases, particularly non-communicable diseases like diabetes and obesity, are characterized by metabolic dysregulation. In diabetes, for example, there is an imbalance in glucose homeostasis due to either insufficient insulin production (Type 1 diabetes) or insulin resistance (Type 2 diabetes). The long-term hyperglycemia associated with these conditions can lead to microvascular and macrovascular complications, such as neuropathy, retinopathy, and cardiovascular disease. Understanding these metabolic pathways highlights the importance of lifestyle interventions and pharmacological treatments in managing the disease [11].

**3. Neoplastic Processes:** The study of cancer exemplifies the interplay between genetics and the environment in disease pathogenesis. The transformation of normal cells into malignant ones involves genetic mutations that disrupt normal cell cycle regulation. Tumors can exhibit different behaviors—benign tumors may grow locally without spreading, whereas malignant tumors can invade surrounding tissues and metastasize to distant sites. Understanding the molecular biology of cancer has led to targeted therapies that aim to inhibit specific oncogenic pathways, minimizing damage to healthy tissues [11].

**4. Degenerative Changes:** Degenerative diseases, such as Alzheimer's and Parkinson's disease, involve the gradual decline of cellular

function and structure. In neurodegenerative conditions, the pathological accumulation of misfolded proteins leads to neuronal death and brain atrophy. Factors contributing to these diseases can be both intrinsic—such as genetic predispositions—and extrinsic, including environmental toxins and lifestyle choices. Current research strives to uncover the precise mechanisms that drive neuronal degeneration, with the ultimate goal of developing effective treatments or preventive strategies [11].

**Risk Factors: Dimensions of Disease Susceptibility**

While understanding the pathophysiology of diseases sheds light on their biological underpinnings, the concept of risk factors provides a broader view of the contributors to disease development. Risk factors can be classified as modifiable or non-modifiable.

**1. Non-modifiable Risk Factors:** These are intrinsic factors that cannot be changed but may predispose individuals to certain conditions. Age and gender are common non-modifiable risk factors; for example, older age is a significant risk factor for diseases such as cardiovascular disease, diabetes, and several cancers. Additionally, genetic predispositions, as seen in familial forms of certain cancers or hereditary conditions like cystic fibrosis, cannot be altered but can guide screening and surveillance strategies [12].

**2. Modifiable Risk Factors:** These include lifestyle and environmental factors that can be changed to lower disease risk. Behaviors such as smoking, excessive alcohol consumption, poor diet, and sedentary lifestyle contribute significantly to the development of chronic conditions. For instance, smoking is a well-established risk factor for lung cancer, while obesity is closely linked to an array of diseases, including Type 2 diabetes, hypertension, and cardiovascular diseases. Public health initiatives focusing on promoting healthy lifestyle choices are crucial in addressing these modifiable risk factors and reducing disease burden on a population level [13].

**3. Socioeconomic Factors:** Socioeconomic status (SES) plays a crucial role in an individual's access to healthcare, education, and other resources that influence health. Individuals from lower SES backgrounds may experience higher rates of stress, limited access to nutritious food, and inadequate

healthcare, further contributing to health disparities. Addressing these social determinants of health is essential for creating equitable health systems and improving overall population health.

4. **Environmental Factors:** Exposure to pollutants, toxins, and infectious agents in the environment can significantly influence disease risk. For example, air pollution is a well-documented risk factor for respiratory conditions and cardiovascular disease. Understanding environmental influences on health underscores the necessity of regulatory policies aimed at reducing exposure to harmful substances [14].

#### **Assessment and Diagnosis in Nursing Practice:**

Hypertriglyceridemia (HTG) is a metabolic disorder characterized by elevated levels of triglycerides in the bloodstream. These elevated levels can significantly contribute to cardiovascular diseases, pancreatitis, and other metabolic disorders. As healthcare providers, nurses play a vital role in the evaluation and management of hypertriglyceridemia, offering holistic care that encompasses assessment, diagnosis, education, and ongoing management. This essay will explore the importance of evaluation and diagnosis in nursing practice concerning hypertriglyceridemia, outlining the key components, nursing assessments, diagnostic tools, and patient education strategies [15].

Triglycerides are a type of fat found in the blood and are a significant source of energy for the body. However, when their levels exceed 150 mg/dL, they are considered elevated, and levels above 500 mg/dL can lead to acute pancreatitis. Hypertriglyceridemia can be primary, stemming from genetic factors such as familial hypertriglyceridemia, or secondary, resulting from lifestyle choices, comorbid conditions like diabetes and obesity, medications, or hormonal changes.

Due to its asymptomatic nature in the early stages, hypertriglyceridemia is often undiagnosed until a routine lipid panel or when complications arise. Therefore, early identification and management are crucial in preventing long-term health consequences [16].

The evaluation process in nursing encompasses obtaining a thorough health history, conducting a physical examination, and collecting relevant

laboratory data. A comprehensive health history is imperative as it helps to identify risk factors that may contribute to elevated triglyceride levels. Factors such as diet (high in refined carbohydrates, sugars, and fat), physical inactivity, alcohol consumption, smoking, and the presence of comorbidities such as diabetes, hypothyroidism, and renal disease play a significant role in understanding each patient's risk profile.

Physical examination findings may include obesity, metabolic syndrome indicators, or signs of pancreatitis, which may suggest an acute exacerbation of hypertriglyceridemia. Specific attention should be paid to the patient's cardiovascular system, noting signs such as hypertension or other indicators of atherosclerosis [17].

A critical component of evaluation in nursing care for hypertriglyceridemia is the interpretation of lipid panel results. The standard lipid profile assesses total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides. Nurses must be able to interpret these results accurately, understanding how to communicate findings effectively to patients and their families [17].

Various diagnostic procedures can help confirm hypertriglyceridemia and rule out other underlying conditions. The fasting lipid panel is the gold standard for diagnosing HTG, usually taken after an overnight fast. Besides the lipid panel, liver function tests, fasting blood glucose, and renal function tests may be employed to evaluate potential secondary causes of elevated triglycerides or assess the overall metabolic status of the patient.

Advanced imaging techniques, such as abdominal ultrasound or CT scans, may be warranted if acute pancreatitis is suspected, allowing healthcare providers to assess for complications like necrotizing pancreatitis or pancreatic necrosis [18].

#### **Nursing Diagnosis**

In nursing practice, establishing nursing diagnoses based on gathered evaluation data is essential. Common nursing diagnoses associated with hypertriglyceridemia include:

- **Ineffective Health Management** related to insufficient knowledge of disease process and required lifestyle modifications.

- **Risk for Ineffective Coping** related to stressors from chronic health conditions and dietary restrictions.
- **Imbalanced Nutrition: More than body requirements** related to a diet high in saturated fats and sugars.
- **Risk for Acute Pain** related to hypertriglyceridemia-induced pancreatitis [19].

Developing nursing diagnoses facilitates targeted nursing interventions that can improve patient outcomes.

### **Patient Education and Management**

Patient education should be a cornerstone of the nursing care plan. Nurses must teach patients about hypertriglyceridemia's implications, emphasizing the importance of lifestyle modification as a foundational approach to management. Dietary education should focus on reducing the intake of trans fats, sugars, and simple carbohydrates while encouraging increased consumption of omega-3 fatty acids, fiber, and fruits and vegetables [19].

In addition to dietary changes, nurses should encourage patients to engage in regular physical activity—aiming for at least 150 minutes of moderate-intensity exercise per week—as part of a comprehensive treatment plan to reduce triglyceride levels. Education on the risks associated with alcohol consumption and smoking cessation is also imperative, as both factors have a significant impact on triglyceride levels.

Nurses should provide resources that facilitate behavior changes, including dietary plans, exercise programs, and support networks. Regular monitoring and follow-up discussions regarding triglyceride levels, adherence to lifestyle changes, and any necessary medication management are crucial in promoting an effective management plan [19].

### **Lifestyle Interventions: Nutrition and Physical Activity:**

Hypertriglyceridemia (HTG), characterized by elevated levels of triglycerides in the bloodstream, is a metabolic abnormality that poses significant risk for cardiovascular diseases, pancreatitis, and other health complications. As its prevalence continues to rise globally, particularly in tandem with increasing rates of obesity, sedentary living, and poor dietary

habits, it becomes imperative to address this condition through effective lifestyle interventions. Nutrition and physical activity emerge as crucial pillars in the management and prevention of hypertriglyceridemia. This essay delves into these lifestyle interventions—particularly focusing on dietary modifications and exercise regimens—and how they jointly contribute to improved lipid profiles and overall health [20].

Before discussing interventions, it is important to understand hypertriglyceridemia's physiological underpinnings. Triglycerides are a type of fat (lipid) found in the bloodstream, and high levels can result from various factors, including genetics, underlying medical conditions (such as diabetes and hypothyroidism), certain medications, and most prominently, lifestyle choices. A blood level of triglycerides greater than 150 mg/dL is classified as elevated, with levels exceeding 500 mg/dL being particularly concerning. The significance of managing hypertriglyceridemia cannot be overstated; high triglyceride levels are often associated with low levels of high-density lipoprotein (HDL) cholesterol and increased levels of low-density lipoprotein (LDL) cholesterol, thus heightening the risk of atherosclerosis and cardiovascular events [21].

### **The Role of Nutrition**

Nutrition plays a pivotal role in the modulation of triglyceride levels. Several dietary strategies can effectively address hypertriglyceridemia, focusing on the quality of macronutrients consumed, portion control, and the interdisciplinary management of dietary habits.

1. **Reducing Sugar Intake:** Studies have demonstrated that excessive intake of simple sugars, particularly fructose found in sugary beverages and processed foods, can significantly elevate triglyceride levels. Reducing added sugars and opting for naturally occurring sugars found in fruits may help improve lipid profiles [22].

2. **Increasing Omega-3 Fatty Acids:** Omega-3 fatty acids have established benefits in lowering triglyceride levels. Foods rich in omega-3s, such as fatty fish (salmon, mackerel, sardines) and plant-derived sources (flaxseeds, chia seeds, and walnuts), should be emphasized in the diet. The American Heart Association recommends at least

two servings of fatty fish per week for cardiovascular health.

3. **Choosing Healthy Fats:** Replacing saturated fats found in red meats and full-fat dairy with healthier unsaturated fats—such as those found in olive oil, avocado, and fatty fish—can positively influence lipid levels. Furthermore, trans fats, often found in fried and processed foods, should be avoided entirely as they raise LDL cholesterol levels and contribute to overall cardiovascular risk [23].

4. **Increasing Fiber Intake:** Soluble fiber, present in foods like oats, legumes, fruits, and vegetables, helps lower LDL cholesterol and can potentially reduce triglyceride levels. Incorporating whole grain products over refined grains adds bulk to meals while also promoting satiety, which can assist with weight management.

5. **Moderate Alcohol Consumption:** While moderate alcohol consumption may benefit some individuals by raising HDL cholesterol levels, excessive intake is to be avoided as it can lead to increased triglyceride levels. Individuals with hypertriglyceridemia are often urged to limit or abstain from alcohol altogether [24].

6. **Promoting Overall Dietary Patterns:** Adopting a Mediterranean diet—a dietary pattern rich in fruits, vegetables, whole grains, legumes, nuts, seeds, and healthy fats—has shown potential in lowering triglyceride levels and improving overall cardiovascular health. This dietary approach embodies the principles of both healthy fat intake and fiber consumption and has been linked with reduced incidence of cardiac events [25].

### The Importance of Physical Activity

In conjunction with nutritional interventions, physical activity plays an essential role in the management of hypertriglyceridemia. Regular exercise contributes to weight loss, improves insulin sensitivity, and enhances overall cardiovascular health, which collectively help in regulating triglyceride levels.

1. **Aerobic Exercise:** Engaging in moderate to vigorous aerobic activities such as brisk walking, running, cycling, or swimming can significantly reduce triglyceride levels. The American College of Sports Medicine recommends at least 150 minutes of moderate-intensity exercise per week or 75

minutes of vigorous activity for substantial health benefits [26].

2. **Resistance Training:** Incorporating resistance training exercises—such as weightlifting or bodyweight exercises—into a fitness routine can assist in building lean muscle mass, enhancing metabolic rate, and promoting fat loss. Aim for at least two sessions per week targeting all major muscle groups.

3. **Lifestyle Physical Activity:** Beyond structured exercise routines, incorporating more physical activity into daily living—such as taking the stairs instead of the elevator, engaging in gardening, or walking during breaks—can also contribute to increased caloric expenditure and improved lipid profiles.

4. **Consistency Over Intensity:** While higher intensity workouts can yield significant health benefits, consistency is crucial. Individuals should engage in physical activities they enjoy, thereby fostering adherence and making exercise a sustainable lifestyle choice [26].

### The Synergistic Effect of Nutrition and Exercise

The integration of nutritional changes with physical activity magnifies the benefits for individuals with hypertriglyceridemia. Together, diet and exercise promote weight loss, improve insulin sensitivity, and foster an overall healthier metabolic state. Studies indicate that even small amounts of weight loss (5%-10% of body weight) can lead to significant improvements in triglyceride levels and overall cardiovascular risk [27].

### Pharmacological Management of Hypertriglyceridemia:

High blood triglycerides, or hypertriglyceridemia, is a common lipid disorder that is characterized by elevated levels of triglycerides—fats found in the blood that are a critical energy source for the body. While normal triglyceride levels typically range from less than 150 milligrams per deciliter (mg/dL), levels above this threshold can lead to various health complications, including cardiovascular disease, pancreatitis, and metabolic syndrome. The management of hypertriglyceridemia is a multifaceted approach that includes lifestyle modifications, dietary alterations, and, when necessary, pharmacological interventions. This essay will explore the pharmacological management

of high blood triglycerides, focusing on the classes of medications used, their mechanisms of action, efficacy, and safety profiles [28].

Triglycerides are a type of fat that are synthesized from dietary carbohydrates and fats. They are an essential source of energy, but excessive levels can accumulate in the bloodstream, leading to a higher risk of arteriosclerosis and heart disease. Elevated triglycerides are often found alongside other lipid abnormalities, such as low levels of high-density lipoprotein (HDL) cholesterol and elevated low-density lipoprotein (LDL) cholesterol, thereby contributing to a more complex cardiovascular risk profile [29].

The causes of hypertriglyceridemia can be primary or secondary. Primary hypertriglyceridemia is often related to genetic factors affecting lipid metabolism, while secondary hypertriglyceridemia can stem from a variety of conditions, including obesity, diabetes mellitus, kidney disease, hypothyroidism, and lifestyle factors such as excessive alcohol consumption and a diet high in simple sugars and fats [30].

### Pharmacological Agents in the Management of Hypertriglyceridemia

When lifestyle changes, including dietary modifications and increased physical activity, are insufficient to lower triglyceride levels, pharmacological treatment becomes necessary. The primary classes of medications used to manage hypertriglyceridemia include fibrates, omega-3 fatty acid supplements, statins, and niacin [31].

1. **Fibrates:** Fibrates, such as fenofibrate and gemfibrozil, are commonly prescribed for high triglycerides. They work primarily by activating peroxisome proliferator-activated receptors (PPARs), which leads to increased lipolysis and the clearance of triglyceride-rich particles from the bloodstream. Clinical trials have shown that fibrates can effectively lower triglyceride levels by 20-50%. However, they are often used with caution in conjunction with statins due to the potential risk of myopathy and rhabdomyolysis [32].

2. **Omega-3 Fatty Acids:** Omega-3 fatty acids, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are derived from fish oil and have been recognized for their lipid-lowering properties. These fatty acids reduce triglyceride

levels by decreasing hepatic VLDL (very low-density lipoprotein) production and increasing triglyceride clearance from the bloodstream. Clinical studies have demonstrated that prescription formulations like icosapent ethyl can produce a significant reduction in triglyceride levels, with studies suggesting reductions of 20-50% or more. Additionally, omega-3 fatty acids have cardioprotective effects, which enhance their benefit for high-risk patients [33].

3. **Statins:** While statins are primarily used to lower LDL cholesterol, they also have a modest effect on lowering triglycerides, typically reducing levels by 10-30%. Statins, such as atorvastatin and rosuvastatin, act by inhibiting the enzyme HMG-CoA reductase, leading to a decrease in cholesterol synthesis and increased uptake of LDL cholesterol from the bloodstream. Statins are often considered for patients with high triglycerides, particularly those with elevated cardiovascular risk factors.

4. **Niacin:** Niacin, or vitamin B3, is another agent that can effectively lower triglyceride levels. It works by inhibiting the hepatic production of VLDL and has been shown to reduce triglycerides by 20-50% in many patients. However, niacin is less commonly prescribed due to its side effects, which may include flushing, pruritus, and gastrointestinal issues [34].

5. **Other Agents:** Additional therapies for hypertriglyceridemia include sodium-glucose cotransporter 2 (SGLT2) inhibitors and PCSK9 inhibitors, which have shown promise in lipid profile improvement. However, their primary indications are often for diabetes management and LDL reduction, respectively. Emerging medications and their roles in triglyceride management are a developing field, emphasizing the need for ongoing research [35].

### Efficacy and Safety of Pharmacological Options

The efficacy of pharmacological interventions for hypertriglyceridemia varies by individual and other comorbid conditions. It is essential for healthcare providers to balance the potential benefits of lowering triglycerides with the risk of adverse effects. While many agents effectively lower triglyceride levels, they are often associated with specific side effects that require monitoring.

Moreover, the combination of therapies can be effective but should be approached with caution. For instance, co-administering fibrates and statins holds a risk of enhanced myopathy; hence, regular monitoring of creatine kinase levels is advised [36].

### Monitoring and Follow-Up Care Strategies:

High triglycerides are a common health concern that can lead to a range of cardiovascular diseases and pancreatic conditions. As a type of fat (lipid) found in the bloodstream, triglycerides are essential for energy; however, elevated levels can signify underlying health issues. Monitoring and follow-up strategies for managing high blood triglycerides are crucial not only for individual health but also for public health outcomes. In this essay, we will explore the causes of high triglycerides, the significance of monitoring them, and effective follow-up strategies.

Triglycerides are formed when the body takes excess calories and converts them into fat for storage. When a person consumes more calories than are burned through physical activity, these calories can be converted into triglycerides. Factors contributing to high triglyceride levels include obesity, sedentary lifestyle, poor diet (especially high in refined carbohydrates and sugars), excessive alcohol consumption, and certain medical conditions such as diabetes and hypothyroidism. High triglyceride levels must be taken seriously since they are a risk factor for coronary artery disease, stroke, and inflammation of the pancreas [37].

### The Importance of Monitoring Triglyceride Levels

Regular monitoring of triglyceride levels is critical for various reasons. First and foremost, it allows for early detection of hypertriglyceridemia (high triglyceride levels). The American Heart Association recommends that adults have their triglyceride levels tested every four to six years. However, individuals with risk factors such as obesity, diabetes, or a family history of heart diseases should have more frequent checks [38].

Monitoring triglycerides also helps healthcare professionals evaluate the effectiveness of lifestyle changes or medical interventions. When patients are enrolled in weight loss programs, receive dietary counseling, or undergo lipid-lowering therapies,

routine blood tests measuring triglycerides can provide valuable feedback about the progress of these measures [38].

### Laboratory Testing for Triglycerides

Triglyceride levels are typically measured through a blood test known as a lipid panel or lipid profile. The test is best performed after fasting for at least 9–12 hours to obtain accurate results. The National Cholesterol Education Program classifies triglyceride levels as follows:

- Normal: Less than 150 mg/dL
- Borderline High: 150–199 mg/dL
- High: 200–499 mg/dL
- Very High: 500 mg/dL or above

Once triglyceride levels are determined, healthcare providers can categorize patients and recommend personalized strategies for managing their levels [39].

### Follow-Up Strategies for Managing High Triglycerides

Addressing high triglyceride levels typically involves a comprehensive approach focusing on lifestyle modifications, pharmacological treatments, and regular monitoring. Below are some effective follow-up strategies.

#### 1. Lifestyle Modifications

The cornerstone of managing high triglycerides is lifestyle changes. Follow-up appointments should involve thorough discussions about an individual's physical activity levels, dietary habits, and weight management. Key lifestyle adjustments include:

- **Adopting a Heart-Healthy Diet:** Encouraging patients to follow a diet low in saturated and trans fats, sugars, and refined carbohydrates while emphasizing whole grains, fruits, vegetables, and omega-3 fatty acids may help lower triglyceride levels. Foods rich in monounsaturated fats, such as olive oil, avocados, and nuts, can also contribute positively.
- **Regular Physical Activity:** Engaging in at least 150 minutes of moderate-intensity exercise per week can significantly lower triglyceride levels. Providers should help set realistic exercise goals and help beneficiaries find activities they enjoy [40].



- **Weight Management:** For overweight or obese individuals, losing 5–10% of body weight can lead to substantial improvements in triglyceride levels. Follow-ups should include body measurements to monitor weight changes and adjust goals as necessary.
- **Limiting Alcohol Intake:** Since alcohol can raise triglyceride levels, healthcare providers should discuss alcohol consumption with patients and advise moderation or complete abstinence if necessary [40].

## 2. Pharmacological Interventions

In cases where lifestyle changes are insufficient, pharmacological interventions may be needed. Medications that are commonly used to lower triglycerides include statins, fibrates, omega-3 fatty acid supplements, and niacin. Follow-up appointments should focus on:

- **Evaluating Medication Efficacy:** Healthcare providers can perform lipid panels at regular intervals (every 3–12 months) after initiating a new medication to assess its effectiveness. This helps determine whether dosage adjustments or a change in medication is appropriate.
- **Monitoring for Side Effects:** Pharmacological treatments often come with potential side effects. Regular follow-ups allow healthcare providers to manage these early and ensure patient safety [41].

## 3. Continuous Education and Support

Patient education plays a vital role in long-term management. Healthcare providers should offer resources that promote understanding of triglycerides and cardiovascular health. This may involve:

- **Building an Action Plan:** Each follow-up appointment can also provide an opportunity to review each patient's personalized action plan, identifying any barriers to achieving health goals.
- **Assessing Psychological Aspects:** Patients may face psychological challenges in maintaining lifestyle changes. Providers can assess and address any emotional or mental health issues that may inhibit progress.

- **Encouraging a Support Network:** Encouraging patients to involve family and friends in their health journey can provide moral support and accountability [42].

## Patient Education and Self-Management Techniques:

Hypertriglyceridemia, characterized by elevated levels of triglycerides in the blood, is a significant health concern that can lead to severe complications, such as cardiovascular disease and pancreatitis. As the prevalence of hypertriglyceridemia rises globally, particularly due to factors such as sedentary lifestyles and dietary habits, there is an increasing need for effective patient education and self-management techniques. Understanding the condition, its underlying mechanisms, treatment options, and the proactive steps individuals can take to manage their triglyceride levels is paramount to improving patient outcomes and quality of life [43].

Triglycerides, a type of fat found in the blood, are derived from the calories consumed in excess of immediate energy needs. While triglycerides are essential for various bodily functions, including providing energy for physical activity, elevated levels can pose significant health risks. A normal triglyceride level is typically below 150 mg/dL, while levels above this can be categorized into different ranges: borderline high (150-199 mg/dL), high (200-499 mg/dL), and very high ( $\geq 500$  mg/dL). Factors contributing to hypertriglyceridemia include obesity, uncontrolled diabetes, excessive alcohol consumption, a diet high in refined carbohydrates and sugars, and genetic predispositions [44].

The consequences of uncontrolled hypertriglyceridemia can be severe. Elevated triglyceride levels are linked to an increased risk of cardiovascular events such as heart attacks and strokes, particularly when coupled with low levels of high-density lipoprotein (HDL) cholesterol. Additionally, very high triglyceride levels can lead to pancreatitis, a painful and potentially life-threatening inflammation of the pancreas. Given these risks, proactive management through patient education becomes essential [44].

## The Role of Patient Education

Patient education plays a crucial role in the management of hypertriglyceridemia. It involves informing patients about the condition, its causes,

potential complications, and the importance of lifestyle modifications and adherence to treatment plans. Effective education fosters a sense of responsibility, motivating patients to participate actively in their health management [45].

1. **Understanding Laboratory Results:** Patients must be educated about what triglyceride levels signify and how they are evaluated. Understanding laboratory results can empower individuals to take ownership of their health and engage in informed discussions with healthcare providers [46].

2. **Awareness of Risk Factors:** Education regarding risk factors associated with hypertriglyceridemia allows patients to identify personal risk profiles. Awareness of modifiable factors such as diet, physical activity, and alcohol consumption enables patients to make informed lifestyle changes.

3. **Medication Adherence:** For some individuals, lifestyle changes alone may not suffice, and medication may be prescribed. Educating patients about the importance of adherence to medications, potential side effects, and the collective benefits of medication alongside lifestyle changes is essential in promoting compliance [46].

### Self-Management Techniques

Effective self-management is integral to controlling triglyceride levels and minimizing the risk of associated health complications. Here are several key self-management techniques that patients can adopt:

1. **Dietary Modifications:** Adopting a heart-healthy diet is fundamental in managing high triglyceride levels. Patients should be advised to limit sugar intake, particularly from sugary beverages and high-fructose corn syrup. Emphasizing a diet rich in whole grains, fruits, vegetables, lean proteins, and healthy fats (such as omega-3 fatty acids found in fish) is recommended. Reducing saturated and trans fats, often found in fried and processed foods, can also significantly impact triglyceride levels [47].

2. **Regular Physical Activity:** Engaging in regular physical activity is an effective method for managing triglyceride levels and improving overall cardiovascular health. Patients should aim for at least 150 minutes per week of moderate-intensity

aerobic activity, such as brisk walking, swimming, or cycling, complemented by muscle-strengthening exercises on two or more days of the week.

3. **Weight Management:** Maintaining a healthy weight is crucial in controlling triglyceride levels. If overweight or obese, even modest weight loss (5-10% of total body weight) can lead to significant improvements in triglyceride levels. Patients should be educated on achievable strategies for gradual weight loss, such as portion control, mindful eating, and regular physical activity [47].

4. **Limiting Alcohol Intake:** Alcohol consumption can significantly elevate triglyceride levels, particularly in susceptible individuals. Educating patients about the recommended limits for alcohol intake—up to one drink per day for women and two for men—can empower them to make informed decisions regarding alcohol consumption.

5. **Regular Monitoring:** Patients should be encouraged to engage in regular check-ups with their healthcare providers to monitor their triglyceride levels and assess the effectiveness of their management strategies. Self-monitoring can promote accountability and motivate patients to maintain adherence to lifestyle changes [48].

### Support and Resources

In addition to personal efforts, support from healthcare providers, family, and community resources can positively influence self-management practices. Healthcare providers should create an open environment where patients feel comfortable discussing their health concerns, challenges, and successes. Support groups, either in-person or online, can provide a sense of community and encouragement. Moreover, utilizing educational materials such as pamphlets, websites, and apps dedicated to heart health can enhance patient knowledge and engagement [49].

### Collaborative Approaches: Interdisciplinary Care in Hypertriglyceridemia Management:

Hypertriglyceridemia, characterized by elevated serum triglyceride levels, is a prevalent metabolic disorder often associated with various health risks, including cardiovascular diseases, pancreatitis, and metabolic syndrome. The management of hypertriglyceridemia requires a comprehensive understanding of its multifactorial etiology, which

includes genetic predispositions, lifestyle factors, and comorbid conditions. As the complexity of this disorder necessitates a multi-faceted strategy for effective management, interdisciplinary care becomes crucial. This essay will explore collaborative approaches to hypertriglyceridemia management, highlighting the roles of various healthcare professionals and the integration of their expertise to deliver optimal patient outcomes [50].

Before delving into the management strategies, it is critical to outline the underlying mechanisms that contribute to hypertriglyceridemia. Triglycerides are fats found in the blood, derived from caloric intake, and stored for energy. Normal triglyceride levels are generally considered to be below 150 mg/dL, while levels above 200 mg/dL warrant attention and intervention. The causes of hypertriglyceridemia may be categorized as primary and secondary. Primary causes are usually genetic disorders such as familial hypertriglyceridemia, while secondary causes often include lifestyle factors like obesity, alcohol consumption, uncontrolled diabetes, and certain medications [51].

The health implications associated with elevated triglyceride levels are significant. Increased triglyceride concentrations are linked to a higher risk of atherosclerosis, fatty liver disease, and acute pancreatitis. Hence, addressing hypertriglyceridemia is essential not only for managing triglyceride levels but also for mitigating associated comorbidities and enhancing overall cardiovascular health [52].

### **The Importance of Interdisciplinary Care**

Interdisciplinary care refers to an integrated approach involving multiple healthcare professionals from diverse disciplines working collaboratively to provide patient-centered care. This model is particularly advantageous in managing conditions like hypertriglyceridemia, where a variety of biological, behavioral, and social factors intersect [53].

1. **Holistic Assessment and Diagnosis:** The management journey of a patient with hypertriglyceridemia begins with comprehensive assessments that leverage the expertise of various healthcare providers. Primary care physicians, endocrinologists, and lipidologists play crucial roles in diagnosing the condition, interpreting laboratory results, and identifying potential secondary causes.

Nutritionists or dietitians are equally important for assessing dietary habits and lifestyle factors that may be exacerbating hypertriglyceridemia [54].

2. **Personalized Treatment Plans:** Given the multifactorial nature of hypertriglyceridemia, personalized treatment plans are key to effective management. In this collective effort, physicians can prescribe pharmacotherapy, such as fibrates or statins, while dietitians can develop individualized dietary guidelines aimed at lowering triglyceride levels. Exercise physiologists can create tailored physical activity plans that align with the patient's abilities, preferences, and medical history. Together, these professionals ensure that the treatment approach is not only evidence-based but also suited to the patient's unique needs [55].

3. **Behavioral Health Support:** The behavioral aspects of managing hypertriglyceridemia cannot be overlooked. Certified health coaches or behavioral therapists can assist patients in implementing meaningful lifestyle changes through motivational interviewing and cognitive-behavioral techniques. This collaboration plays a pivotal role in addressing barriers to adherence, helping patients establish healthier habits. In many cases, the combination of dietary changes, physical activity, and psychological support results in better outcomes than pharmacological interventions alone [56].

4. **Continuous Monitoring and Follow-Up:** The chronic nature of hypertriglyceridemia necessitates ongoing monitoring and follow-up. Interdisciplinary teams can set a schedule for regular evaluations to assess triglyceride levels, track progress, and adjust treatment plans as necessary. This consistent engagement reinforces adherence to lifestyle modifications and empowers patients to take ownership of their health [57].

5. **Patient Education and Empowerment:** An essential component of managing hypertriglyceridemia is patient education. Healthcare providers must work together to ensure that patients understand their condition, the importance of triglyceride management, and the role of each treatment component. This interdisciplinary effort fosters a culture of empowerment, encouraging patients to actively engage in their health journey [58].

### Challenges in Implementing Interdisciplinary Care

While the benefits of interdisciplinary care are evident, several challenges can impede its implementation in hypertriglyceridemia management. One such challenge is the disparity in communication among healthcare providers. Effective coordination requires robust communication channels, which can be hindered by fragmented healthcare systems or insufficient time during consultations. Furthermore, the diversity of training and expertise among team members can lead to conflicting opinions regarding treatment approaches [59].

Additionally, systemic obstacles such as limited access to multidisciplinary resources, especially in rural or underserved areas, can negatively affect collaborative care models. Patients may also exhibit resistance to change, often stemming from various psychological factors, making it imperative for interdisciplinary teams to approach these challenges with empathy, understanding, and persistence [60].

### Conclusion:

In conclusion, effective management of hypertriglyceridemia requires a multifaceted approach that emphasizes the critical role of nursing in patient care. Nurses are pivotal in assessing patients, educating them on lifestyle modifications, and monitoring their progress. By fostering an understanding of the condition and its associated risks, nurses can empower patients to take charge of their health through diet, exercise, and adherence to prescribed pharmacotherapy.

Moreover, collaboration with interdisciplinary teams enhances the quality of care, ensuring that patients receive a comprehensive treatment plan tailored to their individual needs. As hypertriglyceridemia is often associated with other metabolic disorders, ongoing education and follow-up are essential components of nursing care. By integrating these strategies, nurses can significantly contribute to improving patient outcomes and reducing the incidence of complications related to high triglyceride levels, ultimately promoting better cardiovascular health and overall well-being.

### References:

1. Ganda OP, Bhatt DL, Mason RP et al. Unmet Need for Adjunctive Dyslipidemia Therapy in

Hypertriglyceridemia Management. *J Am Coll Cardiol* 2018; 72:330–343.

2. Grundy SM, Stone NJ, Bailey AL et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/AD A/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation* 2019; 139:e1082–e1143.
3. Davidson M, Stevenson M, Hsieh A et al. The burden of familial chylomicronemia syndrome: Results from the global IN-FOCUS study. *Journal of clinical lipidology* 2018; 12:898–907.e892.
4. Warden BA, Minnier J, Duell PB et al. Chylomicronemia syndrome: Familial or not? *Journal of clinical lipidology* 2020; 14:201–206.
5. Rosqvist F, McNeil CA, Pramfalk C et al. Fasting hepatic de novo lipogenesis is not reliably assessed using circulating fatty acid markers. *The American Journal of Clinical Nutrition* 2019; 109:260–268.
6. Do R, Willer CJ, Schmidt EM et al. Common variants associated with plasma triglycerides and risk for coronary artery disease. *Nat Genet* 2013; 45:1345–1352.
7. Jørgensen AB, Frikke-Schmidt R, West AS et al. Genetically elevated non-fasting triglycerides and calculated remnant cholesterol as causal risk factors for myocardial infarction. *Eur Heart J* 2013; 34:1826–1833.
8. Gaudet D, Blom D, Bruckert E et al. Acute Pancreatitis is Highly Prevalent and Complications can be Fatal in Patients with Familial Chylomicronemia: Results From a Survey of Lipidologist. *Journal of Clinical Lipidology* 2016; 10:680–681.
9. Ference BA, Kastelein JJP, Ray KK et al. Association of Triglyceride-Lowering LPL Variants and LDL-C–Lowering LDLR Variants With Risk of Coronary Heart Disease. *JAMA* 2019; 321:364–373.
10. Williams L, Rhodes KS, Karmally W et al. Familial chylomicronemia syndrome: Bringing to life dietary recommendations throughout the

- life span. *Journal of clinical lipidology* 2018; 12:908–919.
11. Laufs U, Parhofer KG, Ginsberg HN, Hegele RA. Clinical review on triglycerides. *European Heart Journal* 2019; 41:99–109.
  12. Jacobsen AS, Nazir; Blumenthal Roger S; Martin Seth Shay. Hypertriglyceridemia Management According to the 2018 AHA/ACC Guideline. Expert Analysis. American College of Cardiology 2019. A summary of the recent 2018 AHA/ACC guidelines on the management of hypertriglyceridemia.
  13. Varbo A, Benn M, Tybjaerg-Hansen A et al. Remnant Cholesterol as a Causal Risk Factor for Ischemic Heart Disease. *Journal of the American College of Cardiology* 2013; 61:427–436.
  14. Wolska A, Dunbar RL, Freeman LA et al. Apolipoprotein C-II: New findings related to genetics, biochemistry, and role in triglyceride metabolism. *Atherosclerosis* 2017; 267:49–60.
  15. Sarwar N, Danesh J, Eiriksdottir G et al. Triglycerides and the risk of coronary heart disease: 10,158 incident cases among 262,525 participants in 29 Western prospective studies. *Circulation* 2007; 115:450–458.
  16. Wolska A, Reimund M, Remaley AT. Apolipoprotein C-II: the re-emergence of a forgotten factor. *Current opinion in lipidology* 2020; 31:147–153.
  17. Shan L, Yu XC, Liu Z et al. The angiopoietin-like proteins ANGPTL3 and ANGPTL4 inhibit lipoprotein lipase activity through distinct mechanisms. *J Biol Chem* 2009; 284:1419–1424.
  18. Gaudet D, Stevenson M, Komari N et al. The burden of familial chylomicronemia syndrome in Canadian patients. *Lipids in health and disease* 2020; 19:120–120.
  19. Olivcrona G. Role of lipoprotein lipase in lipid metabolism. *Curr Opin Lipidol* 2016; 27:233–241.
  20. Landray MJ, Haynes R, Hopewell JC et al. Effects of extended-release niacin with laropiprant in high-risk patients. *The New England journal of medicine* 2014; 371:203–212.
  21. Ference BA, Kastelein JJP, Ray KK, et al. Association of triglyceride-lowering LPL variants and LDL-C-lowering LDLR variants with risk of coronary heart disease. *JAMA*. 2019;321:364–373.
  22. Zilversmit DB. Atherogenesis: a postprandial phenomenon. *Circulation*. 1979;60:473–485.
  23. Arca M, Borghi C, Pontremoli R, et al. Hypertriglyceridemia and omega-3 fatty acids: Their often overlooked role in cardiovascular disease prevention. *Nutr Metab Cardiovasc Dis*. 2018;28:197–205.
  24. Grise SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/AD A/AGS/APhA/ASPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on clinical practice guidelines. *Circulation. J Am Coll Cardiol*. 2019;73:3168–3209.
  25. Jaross W, Assmann G, Bergmann S, et al. Comparison of risk factors for coronary heart disease in Dresden and Munster. Results of the DRECAN (Dresden Cardiovascular Risk and Nutrition) study and the PROCAM (Prospective Cardiovascular Munster) Study. *Eur J Epidemiol*. 1994;10:307–315.
  26. Nordestgaard BG, Langsted A, Mora S, et al. Fasting is not routinely required for determination of a lipid profile: clinical and laboratory implications including flagging at desirable concentration cut-points—a joint consensus statement from the European Atherosclerosis Society and European Federation of Clinical Chemistry and Laboratory Medicine. *Eur Heart J*. 2016;37:1944–1958.
  27. Hegele RA, Ginsberg HN, Chapman MJ, et al. The polygenic nature of hypertriglyceridaemia: implications for definition, diagnosis, and management. *Lancet Diabetes Endocrinol*. 2014;2:655–666.
  28. Mach F, Baigent C, Catapano AL, et al. 2019 ESC/EAS guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk. *Eur Heart J*. 2019.
  29. Leiter LA, Lundman P, da Silva PM, et al. Persistent lipid abnormalities in statin-treated

- patients with diabetes mellitus in Europe and Canada: results of the Dyslipidaemia International Study. *Diabet Med.* 2011;28:1343–1351.
30. Nordestgaard BG, Benn M, Schnohr P, et al. Nonfasting triglycerides and risk of myocardial infarction, ischemic heart disease, and death in men and women. *JAMA.* 2007;298:299–308.
31. Tushuizen ME, Diamant M, Heine RJ. Postprandial dysmetabolism and cardiovascular disease in type 2 diabetes. *Postgrad Med J.* 2005;81:1–6.
32. Ference BA, Ginsberg HN, Graham I, et al. Low-density lipoproteins cause atherosclerotic cardiovascular disease 1. Evidence from genetic, epidemiologic, and clinical studies. A consensus statement from the European Atherosclerosis Society Consensus Panel. *Eur Heart J.* 2017;38:2459–2472.
33. Piercy KL, Troiano RP, Ballard RM, et al. The physical activity guidelines for americans. *JAMA.* 2018;320:2020–2028.
34. Pedersen SB, Langsted A, Nordestgaard BG. Nonfasting Mild-to-Moderate Hypertriglyceridemia and Risk of Acute Pancreatitis. *JAMA Intern Med.* 2016;176:1834–1842.
35. NICE. National Institute for Health and Care Excellence. Cardiovascular disease: risk assessment and reduction, including lipid modification.
36. DEGAM. Hausärztliche Risikoberatung zur kardiovaskulären Prävention. S3-Leitlinie. AWMF-Register-Nr. 053-024 DEGAM-Leitlinie Nr. 19.
37. Universitätsklinikum Leipzig — AöR. Merkblatt zur Ernährung für Patienten mit Hypertriglyzeridämie.
38. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clin Chem.* 1972;18:499–502.
39. Nordestgaard BG, Schnohr P, et al. Lipid measures and primary prevention of cardiovascular disease: a population based cohort study.
40. Parhofer KG. The treatment of disorders of lipid metabolism. *Dtsch Arztebl Int.* 2016;113:261–268.
41. Yokoyama M, Origasa H, Matsuzaki M et al. Effects of eicosapentaenoic acid on major coronary events in hypercholesterolaemic patients (JELIS): a randomised open-label, blinded endpoint analysis. *Lancet* 2007; 369:1090–1098.
42. Manson JE, Cook NR, Lee IM et al. Marine n-3 Fatty Acids and Prevention of Cardiovascular Disease and Cancer. *N Engl J Med* 2019; 380:23–32.
43. Skulas-Ray AC, Wilson PWF, Harris WS et al. Omega-3 Fatty Acids for the Management of Hypertriglyceridemia: A Science Advisory From the American Heart Association. *Circulation* 2019; 140:e673–e691.
44. Mach F, Baigent C, Catapano AL et al. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk: The Task Force for the management of dyslipidaemias of the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS). *European Heart Journal* 2019; 41:111–188.
45. Jacobson TA, Glickstein SB, Rowe JD, Soni PN. Effects of eicosapentaenoic acid and docosahexaenoic acid on low-density lipoprotein cholesterol and other lipids: a review. *J Clin Lipidol* 2012; 6:5–18.
46. Wang C, Harris WS, Chung M et al. n-3 Fatty acids from fish or fish-oil supplements, but not alpha-linolenic acid, benefit cardiovascular disease outcomes in primary- and secondary-prevention studies: a systematic review. *Am J Clin Nutr* 2006; 84:5–17.
47. Park Y, Harris WS. Omega-3 fatty acid supplementation accelerates chylomicron triglyceride clearance. *Journal of lipid research* 2003; 44:455–463.
48. Grimsgaard S, Bonna KH, Hansen JB, Nordoy A. Highly purified eicosapentaenoic acid and docosahexaenoic acid in humans have similar triacylglycerol-lowering effects but divergent

- effects on serum fatty acids. *Am J Clin Nutr* 1997; 66:649–659.
49. Leslie MA, Cohen DJ, Liddle DM et al. A review of the effect of omega-3 polyunsaturated fatty acids on blood triacylglycerol levels in normolipidemic and borderline hyperlipidemic individuals. *Lipids Health Dis* 2015; 14:53.
50. Jump DB, Tripathy S, Depner CM. Fatty acid-regulated transcription factors in the liver. *Annu Rev Nutr* 2013; 33:249–269.
51. Pan M, Maitin V, Parathath S et al. Presecretory oxidation, aggregation, and autophagic destruction of apoprotein-B: a pathway for late-stage quality control. *Proc Natl Acad Sci U S A* 2008; 105:5862–5867.
52. Boden WE, Probstfield JL, Anderson T et al. Niacin in patients with low HDL cholesterol levels receiving intensive statin therapy. *The New England journal of medicine* 2011; 365:2255–2267.
53. Chan DC, Pang J, Barrett PH et al. omega-3 Fatty Acid Ethyl Esters Diminish Postprandial Lipemia in Familial Hypercholesterolemia. *J Clin Endocrinol Metab* 2016; 101:3732–3739.
54. Skulas-Ray AC, Kris-Etherton PM, Harris WS et al. Dose-response effects of omega-3 fatty acids on triglycerides, inflammation, and endothelial function in healthy persons with moderate hypertriglyceridemia. *Am J Clin Nutr* 2011; 93:243–252.
55. Balk EM, Lichtenstein AH. Omega-3 Fatty Acids and Cardiovascular Disease: Summary of the 2016 Agency of Healthcare Research and Quality Evidence Review. *Nutrients* 2017; 9.
56. Yang ZH, Amar M, Sampson M et al. Comparison of Omega-3 Eicosapentaenoic Acid Versus Docosahexaenoic Acid-Rich Fish Oil Supplementation on Plasma Lipids and Lipoproteins in Normolipidemic Adults. *Nutrients* 2020; 12.
57. Watanabe T, Ando K, Daidoji H et al. A randomized controlled trial of eicosapentaenoic acid in patients with coronary heart disease on statins. *J Cardiol* 2017; 70:537–544.
58. Bhatt DL, Steg PG, Miller M et al. Cardiovascular Risk Reduction with Icosapent Ethyl for Hypertriglyceridemia. *N Engl J Med* 2019; 380:11–22.
59. Group ASC, Bowman L, Mafham M et al. Effects of n-3 Fatty Acid Supplements in Diabetes Mellitus. *N Engl J Med* 2018; 379:1540–1550.
60. Miyoshi T, Noda Y, Ohno Y et al. Omega-3 fatty acids improve postprandial lipemia and associated endothelial dysfunction in healthy individuals - a randomized cross-over trial. *Biomed Pharmacother* 2014; 68:1071–1077.