1. Selected Lipid Management Recommendations and Guidelines

1.1. General Lipid Recommendations and Guidelines

1.1.1. 2015 National Lipid Association recommendations for patient-centered management of dyslipidemia: Part-1, full report
1.1.2. 2015 National Lipid Association recommendations for patient-centered management of dyslipidemia: Part-2
1.1.3. 2017 Update on the use of PCSK9 inhibitors in adults: Recommendations from an Expert Panel of the National Lipid Association
1.1.4. 2017 American Association of Clinical Endocrinologists and American College of Endocrinology Guidelines for Management of Dyslipidemia and Prevention of Cardiovascular Disease
1.1.5. 2016 ACC Expert Consensus Decision Pathway on the Role of Non-Statin Therapies for LDL Cholesterol Lowering in the Management of Atherosclerotic Cardiovascular Disease Risk
1.1.6. 2016 ESC/EAS Guidelines for the Management of Dyslipidaemias: The Task Force for the Management of Dyslipidaemias of the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS)
1.1.8. 2004 NCEP ATP III and Update

1.2. Familial Hypercholesterolemia

1.2.1. 2017 Managing the Challenging Homozygous Familial Hypercholesterolemia Patient: Academic Insights and Practical Approaches for Severe Dyslipidemia: A National Lipid Association Masters Summit*
1.2.2. 2016 Defining severe familial hypercholesterolemia and the implications for clinical management: a consensus statement from the International Atherosclerosis Society Severe Familial Hypercholesterolemia Panel
1.2.3. 2015 The Agenda for Familial Hypercholesterolemia: A Scientific Statement from the American Heart Association
1.2.4. 2014 Integrated guidance on the care of familial hypercholesterolemia from the International FH Foundation
1.2.5. 2014 Homozygous familial hypercholesterolemia: new insights and guidance for clinicians to improve detection and clinical management. A position paper from the Consensus Panel on Familial Hypercholesterolaemia of the European Atherosclerosis Society*

1.3. Children and Adolescents

1.3.1. 2016 Screening for Lipid Disorders in Children and Adolescents: US Preventive Services Task Force Recommendation Statement
1.3.2. 2016 Final Recommendation Statement from the U.S. Preventive Services Task Force Lipid Disorders in Children and Adolescents: Screening
1.3.3. 2015 EAS Consensus Statement on Familial Hypercholesterolemia in Children

1.4. Lipid-Altering Drug Safety

1.4.1. 2014 NLA Statin Safety Update
1.4.2. 2007 NLA Safety Task Force: The Non-statins
1.4.3. 2006 NLA Statin Safety Task Force

1.5. Other

1.5.1. 2017 Dietary Fats and Cardiovascular Disease: A Presidential Advisory From the American Heart Association
1.5.2. 2016 Lipids and Bariatric Procedures Part 1 of 2: Scientific Statement from the National Lipid Association, American Society for Metabolic and Bariatric Surgery, and Obesity Medicine Association

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1.5.3. 2016 Lipids and Bariatric Procedures Part 2 of 2: Scientific Statement from the American Society for Metabolic and Bariatric Surgery, National Lipid Association, and Obesity Medicine Association
1.5.4. 2013 Chronic Kidney Disease Clinical Practice Guideline for Lipid Management
1.5.5. 2013 Obesity, Adiposity, and Dyslipidemia: A Consensus Statement from the National Lipid Association
1.5.6. 2011 NLA Expert Panel on Biomarkers: Clinical utility of inflammatory markers and advanced lipoprotein testing
1.5.7. 2011 AHA Scientific Statement on Triglycerides and CVD
1.5.8. 2010 EAS Consensus Statement on Lp(a)

2. Lipids and/or Lipid Treatment Targets
   2.1. Non–High-Density Lipoprotein Cholesterol (non–HDL-C)
   2.2. Low-Density Lipoprotein Cholesterol (LDL-C)
   2.3. Apolipoprotein B (apo B)
   2.4. LDL Particle Number
   2.5. Triglycerides
   2.6. High-Density Lipoprotein Cholesterol (HDL-C)
   2.7. Lipoprotein (a)
   2.8. Chylomicrons
   2.9. Very-Low Density Lipoproteins (VLDL)
   2.10. Intermediate Density Lipoproteins
   2.11. Lipoprotein Remnants (Chylomicron, VLDL, etc.)

3. Non-lipid Biomarkers*
   3.1. High Sensitivity CRP
   3.2. Interleukin-1
   3.3. Pro-BNP
   3.4. Cardiac Troponin I and T
   3.5. Lp-PLA2

4. Lipid Testing Methodologies
   4.1. Fasting vs Non-Fasting Lipid Testing
   4.2. Plasma or Serum Cholesterol and Triglyceride Levels [e.g., Automated Enzymatic Analyses Standardized via the Center for Disease Control’s (CDC) Lipid Standardization program]
   4.3. HDL Cholesterol (e.g., Precipitation and Ultracentrifugation)
   4.4. Low-Density Lipoprotein Cholesterol (LDL-C) Levels
      4.4.1. Calculated (e.g., Friedewald Equation, Martin-Hopkins Equation)
      4.4.2. Direct Measurements (e.g., Ultracentrifugation and Precipitation known as “beta-quantification” or “beta quant”)
   4.5. Non-High-Density Lipoprotein Cholesterol (e.g., Calculated)
   4.6. Apolipoprotein B (apo B) (e.g., Enzyme-linked Immunosorbent Assay)*
   4.7. Lipoproteins*
4.7.1. Gradient gel electrophoresis*
4.7.2. Tube gel electrophoresis*
4.7.3. Ultracentrifugation*
4.7.4. Vertical auto profile*
4.7.5. Nuclear magnetic resonance*

4.8. LDL particle number*
4.8.1. NMR*
4.8.2. Differential ion mobility analysis*

4.9. Lipoprotein(a) or Lp(a) (e.g., Standardized Immunoassays)*

4.10. Remnant Lipoprotein Particles*
4.10.1. Immunoseparation*
4.10.2. Vertical auto profile*
4.10.3. Calculation method (total cholesterol minus HDL-cholesterol minus LDL-Cholesterol)*

4.11. LDL Particle Size*
4.11.1. Segmented gradient gel electrophoresis*
4.11.2. Vertical auto profile ultracentrifugation*
4.11.3. Nuclear magnetic resonance*

5. Lipoproteins and Lipoprotein metabolism*
5.1. Lipoprotein Structure and Function
5.2. Intestinal Lipid Transport and Chylomicron Formation, Secretion and Catabolism*
5.3. Hepatic Lipid Transport and VLDL Formation, Secretion and Catabolism*
5.4. LDL Receptor Expression, Function and Catabolism (PCSK9)*
5.5. HDL Synthesis, Maturation, Catabolism, Role in Peripheral / Reverse Cholesterol Transport and Non-ASCVD Effects*
5.6. Cholesterol and Bile Acid Metabolism*
5.7. Microbiome
5.8. Intrahepatic Gene Regulation via Nuclear Receptor Factors*
5.8.1. LXR
5.8.2. FXR
5.8.3. PPAR
5.8.4. SREBP

6. Vascular Biology*
6.1. Normal Arterial Biology*
6.2. Pathogenesis of Atherosclerosis*
6.3. Thrombosis*
6.4. Inflammation*

7. Atherosclerotic Cardiovascular Disease Risk Assessment
7.1. ASCVD Risk Factors (2014 NLA Recommendations Part 1)
7.1.1. Prior or Current Coronary Artery Disease or ASCVD
7.1.1.1. Myocardial Infarction
7.1.1.2. Coronary Stenosis
7.1.1.3. Stroke
7.1.1.4. Carotid Stenosis

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7.1.1.5. Other Large Artery Atherosclerosis
7.1.1.6. Peripheral Vascular Disease
7.1.1.7. Aortic Aneurysm

7.1.2. Family History of Premature ASCVD
7.1.3. High Blood Pressure
7.1.4. Cigarette Smoking
7.1.5. Diabetes Mellitus
7.1.6. Obesity
7.1.7. Metabolic Syndrome
7.1.8. History of Preeclampsia, Gestational Diabetes, or Pregnancy-induced Hypertension
7.1.9. Renal Disease (e.g., Microalbuminuria, Chronic Kidney Disease)
7.1.10. Inflammatory Diseases
   7.1.10.1. Human Immune Virus
   7.1.10.2. Rheumatoid Arthritis
   7.1.10.3. Systemic Lupus Erythematosus

7.1.11. Solid Organ Transplant

7.2. Subclinical Atherosclerosis Evaluation
   7.2.1. Coronary Artery Calcium Scoring
   7.2.2. Coronary Computed Tomography Angiography (CCTA)
   7.2.3. Carotid Intima-media Thickness and Plaque
   7.2.4. Ankle-brachial Index

7.3. ASCVD Risk and Other Calculators
   7.3.1. American College of Cardiology/American Heart Association Atherosclerotic Cardiovascular Disease Risk Estimator
   7.3.2. Lifetime ASCVD Risk Calculators
      7.3.2.1. ACC/AHA Lifetime Risk Calculator
      7.3.2.2. Framingham Lifetime Risk Calculator
   7.3.3. Predominantly US Risk Assessment Calculators / Estimators
      7.3.3.1. United States National Heart, Lung, and Blood Institute Framingham Risk Score
      7.3.3.2. Multi-Ethnic Study of Atherosclerosis (MESA) 10-Year CHD Risk with Coronary Artery Calcification Risk Score
      7.3.3.3. Reynolds Risk Score
      7.3.3.4. Strong Heart Study Risk Calculator*
   7.3.4. Predominantly International Risk Assessment Calculators / Estimators
      7.3.4.1. QRSK Risk Calculator*
      7.3.4.2. Systemic Coronary Risk Estimation (SCORE)*
      7.3.4.3. Prospective Cardiovascular Munster Study (PROCAM)*
      7.3.4.4. National Health Service (NHS) Health Check*
   7.3.5. American College of Cardiology Statin Intolerance App

8. Atherosclerotic Cardiovascular Disease (ASCVD) Risk Categories
   8.1. Very-High Cardiovascular Disease Risk
   8.2. High Cardiovascular Disease Risk
   8.3. Moderate Cardiovascular Disease Risk
   8.4. Low Cardiovascular Disease Risk
9. **Lipid Treatment Targets, Goals, Thresholds, and Screening**

9.1. **Definitions**
   9.1.1. Lipid Targets
   9.1.2. Lipid Goals
   9.1.3. Lipid Thresholds

9.2. **Lipid Screening**

9.3. **Lipid Treatment Goals and Thresholds**
   9.3.1. Non-HDL-C
   9.3.2. LDL-C
   9.3.3. Triglycerides
   9.3.4. Apolipoprotein B

10. **Genetic Dyslipidemias**

10.1. **Physical Findings**
   10.1.1. Xanthomas
   10.1.2. Xanthelasma (including Non-Hyperlipidemic Causes)
   10.1.3. Corneal Arcus
   10.1.4. Lipemia Retinalis
   10.1.5. Apple Versus Pear Body Fat Distribution
   10.1.6. “Test Tube” Blood Appearance

10.2. **Hypolipidemias**
   10.2.1. Hypoalphalipoproteinemia Syndromes (deficiencies in APOA1, apoA1milano, ABCA1 (Tangiers), ABCG1, LCAT (Fish Eye Disease)
   10.2.2. Abetalipoproteinemia (MTP deficiency)
   10.2.3. Hypobetalipoproteinemias
   10.2.4. PCSK9 Loss of Function
   10.2.5. ANGTL 3 Loss of Function

10.3. **Major Lipid Associated Genes (GWAS Studies)**
   10.3.1. LDL - LDLR, APOB, PCSK9, APOB, HMGCR, NPC1L1, LDLRAP1, SORT1, ABCG5/ABCG8, CYP27A1
   10.3.2. Triglycerides - APOCIII, APOCII, APOA5, LPL, ANGPTL4, ANGPTL3, LMF1, GPIHBP1
   10.3.3. HDL - ABCA1, ABCG1, LCAT, CETP, SR-B1, LIPC, LPL
   10.3.4. Lp(a) - LPA

10.4. **Hypertriglyceridemia**
   10.4.1. Polygenic
   10.4.2. Monogenic Hypertriglyceridemia & Familial Hyperchylomiconemia Syndromes (FCS)
   10.4.2.1. Lipoprotein Lipase Deficiency
   10.4.2.2. APOCII Deficiency
   10.4.2.3. GPIHBP1 Deficiency (glycosylphosphatidylinositol anchored high density lipoprotein binding protein 1)
   10.4.2.4. LMF1 Deficiency (liase maturation factor)
   10.4.2.5. GPD1 Deficiency (glycerol-3-phosphate dehydrogenase 1)
   10.4.3. Familial Dysbetalipoproteinemia (ApoE II/II or other variants)

10.5. **Hypercholesterolemia**
   10.5.1. Homozygous Familial Hypercholesterolemia
   10.5.2. Heterozygous Familial Hypercholesterolemia
   10.5.3. Polygenic Hypercholesterolemia
   10.5.4. Sitosterolemia
   10.5.5. Autosomal Recessive Hypercholesterolemia
   10.5.6. Lysosomal Acid Lipase (LAL) Deficiency
10.6. Combined Hyperlipidemia or Mixed Dyslipidemia
   10.6.1. Familial Combined Hyperlipidemia
   10.6.2. Non-Familial Combined Hyperlipidemia

11. Familial Hypercholesterolemia
   11.1. Prevalence
   11.2. Genetics and Genetic Testing
      11.2.1. LDL Receptor
      11.2.2. Defective apo B
      11.2.3. PCSK9 Gain of Function
   11.3. Diagnostic Criteria
   11.4. Relevance of Lipoprotein (a)
   11.5. Treatment

12. Secondary Causes of Dyslipidemia
   12.1. Lifestyle Related Dyslipidemia Due to Diet, Smoking, Alcohol, or Obesity
   12.2. Concomitant Drug-induced Hyperlipidemia
   12.3. Diabetes Mellitus and Insulin Resistant States
   12.4. Hypothyroidism
   12.5. Chronic Kidney Disease (including Nephrotic Syndrome)
   12.6. Obstructive Liver Disease (including Primary Biliary Cirrhosis)
   12.7. HIV
   12.8. Inflammatory Disorders (RA, SLE, Psoriasis)
   12.9. Graft Versus Host Disease
   12.10. Pregnancy, PCOS, & Menopause
   12.11. “Two hit” Genetic and Secondary Dyslipidemias

13. Nutrition and Medical Nutrition Therapy
   13.1. Nutrition Science Evidence-Based Related to Blood Lipids and/or ASCVD Risk
      13.1.1. Core Metabolic Studies of PUFA-MUFA vs. SFA Feeding
      13.1.2. Prospective Cohort Studies of Foods-Nutrients
      13.1.3. Randomized Clinical Trials of Whole Diets, Foods-Nutrients
   13.2. Foods-Nutrients that Modify ASCVD Risk
      13.2.1. Decrease ASCVD Risk:
         13.2.1.1. Fruits-Vegetables
         13.2.1.2. Beans-Legumes
         13.2.1.3. Nuts-Seeds
         13.2.1.4. Whole Grains
         13.2.1.5. Fish-Seafood
         13.2.1.6. Liquid Vegetable Oils High in PUFA-MUFA
         13.2.1.7. Alcohol (in Moderation)
      13.2.2. Increase ASCVD Risk
         13.2.2.1. Solid Fats High in Saturated and Trans-Fats
         13.2.2.2. Dietary Cholesterol
         13.2.2.3. Processed / Refined Carbohydrates and Added Sugars

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13.2.2.4. Processed Meats
13.2.2.5. Sodium

13.2.3. Recommended Whole Dietary Patterns for ASCVD Risk Reduction
13.2.3.1. AHA/ACC Diet Pattern
13.2.3.2. Healthy U.S. Diet Pattern
13.2.3.3. Mediterranean Diet Pattern
13.2.3.4. DASH Diet Pattern
13.2.3.5. Vegetarian-Vegan Diet Pattern
13.2.3.6. Ornish Diet Pattern

13.2.4. Contemporary Nutrition Topics, Controversies and/or Myths
13.2.4.1. Low Fat vs. Higher Fat Diets
13.2.4.2. Ketogenic and Other Popular Diets for Weight loss
13.2.4.3. Specific foods-nutrients (dairy fat, coconut oil, gluten)
13.2.4.4. Nutrition supplements (Omega-3 fatty acids vs. others)

13.2.5. Medical Nutrition Therapy and Therapeutic Diet Interventions
13.2.5.1. For Lowering LDL Cholesterol
   13.2.5.1.1. Dietary Saturated Fat Restriction to < 7% of Calories
   13.2.5.1.2. Plant Stanols and Sterols
   13.2.5.1.3. Soluble Fiber
   13.2.5.1.4. Soy Protein
13.2.5.2. For Lowering Moderately Non-HDL-C and Triglycerides
   13.2.5.2.1. Dietary Whole Grains and Fiber
   13.2.5.2.2. Dietary Sugar Restriction
   13.2.5.2.3. Alcohol Restriction
13.2.5.3. For Lowering Very High Triglycerides > 500 mg/dL
   13.2.5.3.1. Indication for Hospitalization and Fasting
   13.2.5.3.2. Role of IV Insulin in Patients with Type 2 Diabetes Mellitus
   13.2.5.3.3. Role of Therapeutic Plasma Exchange
   13.2.5.3.4. Role of Enteral or Parenteral Nutritional Support
   13.2.5.3.5. Long-term Nutritional Management (Very Low-Fat Diets, MCTs)

13.3. Food Effects on Lipid Levels
13.3.1. Saturated Fats
13.3.2. Processed Carbohydrates
13.3.3. Trans Fats
13.3.4. Polyunsaturated Fats
13.3.5. Monounsaturated Fats
13.3.6. Complex Carbohydrates
13.3.7. Proteins

13.4. Basic Principles of Healthy Nutrition
13.4.1. Saturated Fats and their Replacement
   13.4.1.1. Replacing Saturated Fats with Processed or Refined Carbohydrates
   13.4.1.2. Replacing Saturated Fats with Mono or Polyunsaturated Fats
13.4.2. Processed or Refined Carbohydrates and Added Sugar
13.4.3. Omega-3 Fatty Acids
13.4.4. Calories
13.4.5. Sodium
13.4.6. Alcohol
13.5. Nutrition therapy of dyslipidemia
   13.5.1. Triglyceride-induced Acute Pancreatitis
      13.5.1.1. Indication for Hospitalization and Fasting
      13.5.1.2. Role of Insulin in Patients with Type 2 Diabetes Mellitus
      13.5.1.3. Role of Therapeutic Plasma Exchange
      13.5.1.4. Role of Enteral or Parenteral Nutritional Support
      13.5.1.5. Dietary Advancement Once Pancreatitis Resolves
      13.5.1.6. Long-term Nutritional Management
   13.5.2. Elevated Triglyceride Levels without Pancreatitis

13.6. Evidence-based Dietary patterns
   13.6.1. Mediterranean Diet
   13.6.2. Therapeutic Lifestyle Diet
   13.6.3. Dietary Approaches to Stop Hypertension
   13.6.4. Ornish Diet
   13.6.5. Vegetarian Diet

13.7. Dietary supplements
   13.7.1. Efficacy
   13.7.2. Safety

13.8. Other Popular Diets
   13.8.1. Atkins Diet
   13.8.2. Paleo Diet

14. Physical Activity and Lipids
   14.1. Dynamic (Aerobic) Exercise and Lipids
   14.2. Resistance (Weight Lifting) Exercise and Lipids
   14.3. Non-exercise Activity Thermogenesis
   14.4. Exercise Prescription
   14.5. Physical Activity Goals
   14.6. Metabolic Equivalent Tasks
   14.7. Tracking
      14.7.1. Exercise Logs
      14.7.2. Pedometer / Accelerometer
      14.7.3. Dynamic Training Metrics (e.g., miles run, laps swam)
      14.7.4. Resistance Training Metrics (e.g., muscle circumference measurements, reps, sets)
      14.7.5. Percent Body Fat Measurements*
         14.7.5.1. Dual-energy X-ray Absorptiometry (DXA)
         14.7.5.2. Bioelectrical Impedance*
         14.7.5.3. Calipers*
         14.7.5.4. Other [Calculated (e.g., U.S. army percent body fat equation), near-infrared interactance, whole-body air displacement plethysmography (BOD POD, underwater weighing)] *

15. Obesity, Adiposopathy, Metabolic Syndrome, and Diabetes Mellitus
   15.1. Obesity as a Disease
   15.2. Adipose Tissue as an Active Endocrine and Immune Organ
   15.3. Concomitant Drugs that Affect Weight and Lipid Levels
   15.4. Metabolic Syndrome
15.5. Diabetes Mellitus Pharmacotherapy and ASCVD Outcomes

15.6. Weight Loss Effects on Lipid Parameters
   15.6.1. Nutrition
   15.6.2. Physical Activity
   15.6.3. Weight Management Pharmacotherapy
   15.6.4. Bariatric Surgery

16. Lipid Pharmacotherapy Safety and Efficacy
   16.1. Statins
      16.1.1. Mechanism of Action
      16.1.2. Lipid Efficacy
         16.1.2.1. Intensity of Statin (High, Moderate, and Low)
         16.1.2.2. Absolute Versus Percent LDL Cholesterol Reduction
      16.1.3. ASCVD Outcomes Efficacy
      16.1.4. Safety and Tolerability
      16.1.5. Drug Interactions
         16.1.5.1. Pharmacokinetics and Pharmacodynamics
         16.1.5.2. Drug Metabolism (CYP Enzyme Systems)
         16.1.5.3. Transporters
         16.1.5.4. Statin Drug Interactions
      16.1.6. Statin Intolerance
         16.1.6.1. Muscle
            16.1.6.1.1. Myalgias
            16.1.6.1.2. Myopathy
            16.1.6.1.3. Rhabdomyolysis
         16.1.6.2. Brain
         16.1.6.3. Liver
         16.1.6.4. Glucose and Diabetes Mellitus
         16.1.6.5. Management of Statin Intolerance

   16.2. Fibrates
      16.2.1. Mechanism of Action
      16.2.2. Lipid Efficacy
      16.2.3. ASCVD Outcomes Efficacy
      16.2.4. Safety and Tolerability
      16.2.5. Drug Interactions

   16.3. Omega-3 Fatty Acids
      16.3.1. Mechanism of Action
      16.3.2. Lipid Efficacy
      16.3.3. ASCVD Outcomes Efficacy
      16.3.4. Safety and Tolerability
      16.3.5. Drug Interactions

   16.4. Cholesterol Absorption Inhibitors
      16.4.1. Mechanism of Action
      16.4.2. Lipid Efficacy
      16.4.3. ASCVD Outcomes Efficacy
      16.4.4. Safety and Tolerability
      16.4.5. Drug Interactions
16.5. PCSK9 Inhibitors
   16.5.1. Mechanism of Action
   16.5.2. Lipid Efficacy
   16.5.3. ASCVD Outcomes Efficacy
   16.5.4. Safety and Tolerability
   16.5.5. Drug Interactions

16.6. Bile Acid Sequestrants (Resins)
   16.6.1. Mechanism of Action
   16.6.2. Lipid Efficacy
   16.6.3. ASCVD Outcomes Efficacy
   16.6.4. Safety and Tolerability
   16.6.5. Drug Interactions
   16.6.6. Effect on Glucose Levels

16.7. Niacin
   16.7.1. Mechanism of Action
   16.7.2. Lipid Efficacy
   16.7.3. ASCVD Outcomes Efficacy
   16.7.4. Safety and Tolerability
   16.7.5. Drug Interactions
   16.7.6. Effects on Glucose Levels

16.8. Drugs for Homozygous Familial Hypercholesterolemia
   16.8.1. PCSK9 Inhibitor (Safety and Efficacy)
   16.8.2. Lomitapide (Safety and Efficacy)
   16.8.3. Mipomersen (Safety and Efficacy)

16.9. Investigational Lipid-altering Pharmacotherapy
   16.9.1. Delivery Modalities (small molecules, prodrugs, anti-sense, monoclonal antibodies, gene therapy)
   16.9.2. Proprotein Convertase Subtilisin Kexin 9 (PCSK9) Acting Agents (Inclisiran, Vaccines)
   16.9.3. Adenosine Triphosphate Citrate Lyase Inhibitor (Bempedoic Acid)
   16.9.4. Dialkyl Ether Dicarboxylic Acid (Gemcabene)
   16.9.5. Cholesteryl Ester Transfer Protein (CETP) Inhibitors (Dalcetrapib, TA-8995)
   16.9.6. Antisense Oligonucleotides (ASO’s) (apoC3, lipoprotein (a), Angiopoietin-like protein 3)
   16.9.7. Peroxisome Proliferator Activated Receptor (PPAR) Agents (Pemafibrate, MBX-8025)
   16.9.8. Adeno-associated Viral (AAV) Vector Gene Therapy (LDL Receptor, Lipoprotein Lipase)
   16.9.9. High-Density Lipoprotein-mediated Therapy (Reconstituted HDL’s, Endothelial Lipase Inhibitors)

17. Lipoprotein apheresis*
   17.1. Dextran Sulfate Apo B Lipoprotein Adsorption System (Liposorber)*
   17.2. Heparin Extracorporeal LDL Apheresis (HELP)*
   17.3. Conventional Plasmapheresis (Plasma Exchange)*
   17.4. Efficacy and Safety of Lipoprotein Apheresis*
      17.4.1. Lipid Effects
      17.4.2. Safety
      17.4.3. Evidence of ASCVD Outcomes Benefits
      17.4.4. Indicated Use
      17.4.5. Lp(a) Lowering
18. Management of by Age, Race, and Gender

18.1. Dyslipidemia in Children, Adolescents, and Young Adults < 21 Years of Age
   18.1.1. Lipid Screening
   18.1.2. ASCVD Risk Assessment
   18.1.3. Nutrition and Physical Activity
   18.1.4. Statin Therapy
   18.1.5. Non-statin Therapy

18.2. Individuals >75 years
   18.2.1. Risk Assessment
   18.2.2. Drug Metabolism, Drug Interaction, and Medication Dosing
   18.2.3. Polypharmacy
   18.2.4. Concurrent Illnesses, Life Expectancy, and Overall Medical Status (Frailty)
   18.2.5. Patient Preference

18.3. Asians
   18.3.1. South Asians Versus Other Asians
   18.3.2. Metabolic Syndrome & Insulin Resistance
   18.3.3. Differences in Culture and Nutrition
   18.3.4. Different Diagnostic Criteria for Waist Circumference and Predisposition for Dysfunctional Adipose Tissue (Adiposopathy)
   18.3.5. Differences in Lipid Profiles [Lp(a), Non-HDL Cholesterol, HDL Cholesterol, Triglycerides]
   18.3.6. ASCVD Risk Assessment
   18.3.7. Statin and Other Lipid-altering Drug Dosing

18.4. African Americans
   18.4.1. Overall Cardiovascular Disease Risk and Mortality
   18.4.2. Differences in Culture and Nutrition
   18.4.3. Differences in ASCVD Risk Factors [Blood Pressure, Lp(a), Triglycerides, HDL Cholesterol]
   18.4.4. Difference in Statin Safety Measurements (Creatine Kinase)
   18.4.5. ASCVD Risk Assessment

18.5. Hispanics / Latinos
   18.5.1. Overall Cardiovascular Disease Risk and Mortality (Hispanic Paradox)
   18.5.2. Differences in Culture and Nutrition
   18.5.3. Differences in ASCVD Risk Factors (Triglycerides and HDL Cholesterol)
   18.5.4. ASCVD Risk Assessment

18.6. Women
   18.6.1. Risk Assessment
   18.6.2. Primary and Secondary Prevention
   18.6.3. Statin Benefits and Risk
   18.6.4. Other Lipid-altering Drug Benefits and Risk
   18.6.5. Lipid Drug Administration During Reproductive Years
   18.6.6. Pregnancy
   18.6.7. Polycystic Ovary Syndrome
   18.6.8. Menopause

19. Management of Dyslipidemia in Other Patient Populations

19.1. Human Immunodeficiency Virus (HIV)
   19.1.1. ASCVD risk – NLA vs. ASCVD vs. DAD Scoring
   19.1.2. HIV Lipodystrophy
   19.1.3. Protease Inhibitors and Potential for Drug Interactions
   19.1.4. Efficacy and Safety of Lipid-altering Drugs
   19.1.5. Clinical Trials
19.2. Patients with Inflammatory Diseases
   19.2.1. ASCVD Risk
   19.2.2. Lipid Effects of Anti-inflammatory Drugs
   19.2.3. Efficacy and Safety of Lipid-altering Drugs

19.3. Patients with Other Chronic Diseases
   19.3.1. Type 1 Diabetes Mellitus
   19.3.2. Type 2 Diabetes Mellitus
   19.3.3. Metabolic Syndrome
   19.3.4. Insulin Resistance
   19.3.5. Partial Lipodystrophy
   19.3.6. Chronic Kidney Disease
   19.3.7. Solid Organ Transplant

20. Lipid Treatment Adherence, Measurement, and Quality Improvement
   20.1. Lipid Treatment Performance Measures
       20.1.1. Lipid Goals (Absolute Targets % LDL-C Reduction)
       20.1.2. Other Lipid Outcome Measures
   20.2. Improving Lipid Treatment Adherence Gaps
   20.3. Improving Lipid Treatment Adherence and Gaps
       20.3.1. Use of Team-based Care
       20.3.2. Use of Behavior Change Techniques
       20.3.3. Use of Health IT (System, Provider and Patient-level Tools)

21. Consultative Issues in Clinical Lipidology
   21.1. Clinical Management of Homozygous FH*
       21.1.1. Diagnosis
           21.1.1.1. Family History
           21.1.1.2. Lipid Levels
           21.1.1.3. Physical Findings
       21.1.2. Diagnostic Criteria
       21.1.3. Genetic Screening
       21.1.4. Cascade Screening
       21.1.5. Lifestyle Intervention
       21.1.6. When to Start Lipid-altering Drug Therapy
       21.1.7. Choice of Lipid-altering Drug Therapy
       21.1.8. Treatment in Women
           21.1.8.2. Pregnancy
           21.1.8.3. Breast Feeding
       21.1.9. LDL Apheresis
   21.2. Clinical Management of Heterozygous FH
       21.2.1. Diagnosis
           21.2.1.1. Family History
           21.2.1.2. Lipid Levels
           21.2.1.3. Physical Findings
       21.2.2. Diagnostic Criteria
       21.2.3. Genetic Screening
       21.2.4. Cascade Screening
       21.2.5. Lifestyle Intervention
       21.2.6. When to Start Lipid-altering Drug Therapy

* Advanced
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21.2.7. Choice of Lipid-altering Drug Therapy
   21.2.7.1. Child-bearing Potential
   21.2.7.2. Pregnancy
   21.2.7.3. Breast Feeding

21.2.8. LDL Apheresis

21.3. Clinical Management of Severe Hypertriglyceridemia
   21.3.1. Diagnosis
      21.3.1.1. Family History
      21.3.1.2. Lipid Levels
      21.3.1.3. Physical Findings
   21.3.2. Diagnostic Criteria
   21.3.3. Genetic Testing
   21.3.4. Lifestyle Intervention
   21.3.5. When to Start Lipid-altering Drug Therapy
   21.3.6. Choice of Lipid-altering Drug Therapy
      21.3.6.1. Child-bearing Potential
      21.3.6.2. Pregnancy
      21.3.6.3. Breast Feeding
   21.3.7. Hospitalization Decision

21.4. Clinical Management of Low HDL Cholesterol Levels
   21.4.1. Diagnosis
      21.4.1.1. Genetic Causes
      21.4.1.2. Secondary Causes
   21.4.2. Lifestyle Intervention
   21.4.3. Drug Therapy

21.5. Clinical Management of Elevated lipoprotein (a)
   21.5.1. Family History
   21.5.2. Presence or Relative Absence of Other ASCVD Risk Factors
   21.5.3. Progressive ASCVD Despite Absence of Substantial Other ASCVD Risk Factors
   21.5.4. Racial Considerations
   21.5.5. Drug Therapy

22. Evidence Based Medicine, Journal Article Interpretation, and Statistics for the Clinical Lipidologist*
   22.1. Clinical Trial Process*
      22.1.1. Study Idea or Hypothesis
      22.1.2. Protocol Development
      22.1.3. Data Management & Statistical Plan
      22.1.4. Ongoing Data Collection and Processing with Cleaning & Discrepancy Management – quality control
      22.1.5. Data Lock
      22.1.6. Transfer for Statistical Analyses
      22.1.7. Quality Assurance
      22.1.8. Statistical Analyses
      22.1.9. Clinical Study Report
      22.1.10. Abstract
      22.1.11. Manuscript

Revised January 2018  * Advanced
22.2. Study Designs*
22.2.1. Placebo Controlled
22.2.2. Randomized Controlled Trials (RCTs)
22.2.3. Cohort Trials
22.2.4. Observational Studies
22.2.5. Meta-analyses
22.2.6. Hierarchy of Study Design

22.3. Clinical trial interpretation*
22.3.1. Primary Outcomes
22.3.2. Secondary Outcomes
22.3.3. Intention to Treat Analysis
22.3.4. Per-protocol or Completer Analysis
22.3.5. Landmark Analysis
22.3.6. Post-hoc and Subgroup Analyses
22.3.6.1. Correction for Multiplicity
22.3.6.2. Bonferroni
22.3.6.3. Stepwise Hierarchical Testing

22.4. Statistical and Clinical Significance*

22.5. Sample Size and Power Calculations*

22.6. Demographics*

22.7. Missing Data*
22.7.1. Drug Approval Considerations
22.7.2. Last Observation Carried Forward

22.8. Outlying Data*

22.9. Data Distribution (Parametric/Normal Versus Nonparametric/Non-normal) *
22.9.1. Parametric/Normal/Gaussian
22.9.1.1. Total and LDL Cholesterol
22.9.1.2. Glucose
22.9.2. Non-parametric/Non-normal/Non-Gaussian *
22.9.2.1. Triglycerides
22.9.2.2. Lp (a)
22.9.2.3. CRP

22.10. Data Location (Mean, Median)*

22.11. Basic Statistical Tests and Plots*
22.11.1. P-value and Setting Alpha for Statistical Significance
22.11.2. Confidence Intervals
22.11.3. Forest Plots
22.11.4. Kaplan Meier Curve
22.11.5. Waterfall Plots

22.12. Event Rates, Relative Risk Reduction (RRR), Absolute Risk Reduction (ARR), Hazard Ratios, Odds Ratios*

22.13. Number Needed to Treat (NNT) and Cost-efficacy

22.14. Number Needed to Harm (NNH)*

22.15. Study Biases and Limitations (e.g., Publication Bias)*
22.16. Interpreting Reviews and Guidelines*
   22.16.1. Grading of Evidence – AHA/ACC Level of Evidence and Strength of Recommendation
   22.16.2. GRADE Guidelines
22.17. Clinical Decision Making
   22.17.1. Patient’s Values, Preferences, Beliefs
   22.17.2. Shared Decision Making
   22.17.3. Clinical Judgment
22.18. Sentinel and Landmark Clinical Trials
   22.18.1. Historic
   22.18.2. Recent
   22.18.3. Ongoing