Manual 8

Lipid and Lipoprotein Determinations

The National Heart, Lung, and Blood Institute of the National Institutes of Health
ARIC Protocol
Manual 8
Lipid and Lipoprotein Determinations

Visit 2
Version 2.0
March, 1991

For Copies, Please Contact:
ARIC Coordinating Center
Department of Biostatistics
CB #8030, Suite 203, NCNB Plaza
The University of North Carolina
Chapel Hill, NC 27514
FOREWORD

This manual entitled, Lipids and Lipoprotein Determinations, is one of a series of protocols and manuals of operation for the Atherosclerosis Risk in Communities (ARIC) Study. The complexity of the ARIC Study requires that a sizeable number of procedures be described, thus this rather extensive set of materials has been organized into the set of manuals listed below. Manual 1 provides the background, organization, and general objectives of the ARIC Study. Manuals 2 and 3 describe the operation of the Cohort and Surveillance Components of the study. Detailed Manuals of Operation for specific procedures, including reading centers and central laboratories, make up Manuals 4 through 11. Manual 12 on Quality Assurance and Quality Control contains a general description of the study’s approach to quality assurance as well as specific protocols for each of the study procedures.

The version status of each manual is printed on the title sheet. The first edition of each manual is Version 1.0. Subsequent modifications of Version 1 (pages updated, pages added, or pages deleted) are indicated as Versions 1.1, 1.2, and so on, and are described in detail in the Revision Log located immediately after the title page. When revisions are substantial enough to require a new printing of the manual, the version number will be updated (e.g., Version 2.0) on the title page.

ARIC Study Protocols and Manuals of Operation

<table>
<thead>
<tr>
<th>MANUAL</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Description and Study Management</td>
</tr>
<tr>
<td>2</td>
<td>Cohort Component Procedures</td>
</tr>
<tr>
<td>3</td>
<td>Surveillance Component Procedures</td>
</tr>
<tr>
<td>4</td>
<td>Pulmonary Function Assessment</td>
</tr>
<tr>
<td>5</td>
<td>Electrocardiography</td>
</tr>
<tr>
<td>6</td>
<td>Ultrasound Assessment</td>
</tr>
<tr>
<td>A.</td>
<td>Ultrasound Scanning</td>
</tr>
<tr>
<td>B.</td>
<td>Ultrasound B-mode Image Reading Protocol</td>
</tr>
<tr>
<td>7</td>
<td>Blood Collection and Processing</td>
</tr>
<tr>
<td>8</td>
<td>Lipid and Lipoprotein Determinations</td>
</tr>
<tr>
<td>9</td>
<td>Hemostasis Determinations</td>
</tr>
<tr>
<td>10</td>
<td>Clinical Chemistry Determinations</td>
</tr>
<tr>
<td>11</td>
<td>Sitting Blood Pressure and Postural Changes in Blood Pressure and Heart Rate</td>
</tr>
<tr>
<td>12</td>
<td>Quality Assurance and Quality Control</td>
</tr>
</tbody>
</table>
# Manual 8: Lipid and Lipoprotein Determinations

## Table of Contents

1. General ............................................................................................................. 1
   1.1 Introduction ................................................................................................ 1
   1.2 Analytical Measures .................................................................................. 1
   1.3 Justification of Measurements in Cohort Samples ................................ 2
   1.4 Justification of Measurements in Case Control Studies of the Cohort ...... 11
   1.5 References .................................................................................................. 19

2. Technical Part .................................................................................................. 35
   2.1 Specimen Processing in Field Centers, Shipment to Central Laboratory, Temporary and Long Term Storage .......................................................... 35
   2.2 Automated Determination of Cholesterol ................................................. 36
   2.3 Automated Determination of Plasma Triglycerides .................................. 41
   2.4 Automated Determination of Glycerol ...................................................... 43
   2.5 Determination of HDL-cholesterol and HDL (3)-Cholesterol ............... 45
   2.6 Determination of apoA-I in plasma by RIA ........................................... 49
   2.7 Determination of apoB in plasma by RIA ............................................... 55
   2.8 Determination of Lp(a) by Double Antibody ELISA ............................... 59
   2.9 Measurement of LDL-apoB and LDL-cholesterol ................................... 63
   2.10 Expression of apoB epitopes ................................................................. 64
   2.11 ApoE Phenotyping .................................................................................... 67
   2.12 Restriction Fragment Length Polymorphism ......................................... 71
   2.13 Lpa Phenotyping ..................................................................................... 74
   2.14 Postprandial Lipemia .............................................................................. 74
   2.15 References ............................................................................................... 75

3. Data Transmission ............................................................................................ 77

4. Quality Control Procedures ........................................................................... 81
   4.1 Quality Control of Plasma Lipid Determinations ..................................... 81
   4.2 Quality Control of HDL-Cholesterol and HDL3-Cholesterol Measurements .................................................. 85
   4.3 Quality Control of Apolipoprotein ApoA-I and ApoB Measurements ........ 87
   4.4 Quality Control of Lp(a) Measurements ................................................. 91
   4.5 Quality Control of Postprandial Lipemia ................................................. 93
   4.6 References ................................................................................................. 94

Appendix A...Sources of Materials ................................................................. 95

1. Sources of Materials for Automated Determination of Cholesterol ............. 95
2. Sources of Materials for Automated Determination of Plasma Triglycerides .... 95
3. Sources of Materials for Automated Determination of Glycerol .......................... 96
4. Sources of Materials for Determination of HDL Cholesterol .................................. 96
5. Sources of Materials for Determination of Apolipoprotein A-I in Plasma by Radioimmunoassay 96
6. Sources of Materials for Determination of Apolipoprotein B(aPob) in Plasma by Radioimmunoassay ......................... 97
7. Sources of Materials for Determination of Lipoprotein(a) by Double Antibody ELISA ....... 97
8. Sources of Material for Expression of ApoB Epitopes ........................................... 97