CIRCULATION
VOLUME XLIV
July-December, 1971

No. 1 (July)

ORIGINAL ARTICLES:

Fine Structure of the His Bundle. Thomas N. James and Libi Sherf 9

Suicidal and Accidental Digoxin Ingestion: Report of Five Cases with Serum Digoxin Level Correlations. Thomas W. Smith and James T. Willerson ................................................................. 29

Measurement of Heart Chamber Volumes by Analysis of Dilution Curves Simultaneously Recorded by Scintillation Camera. Yasushi Ishii and William J. MacIntyre .............................................. 37

Assessment of Cardiac Contractility: The Relation Between the Rate of Pressure Rise and Ventricular Pressure During Isovolumic Systole. Dean T. Mason, Eugene Braunwald, James W. Covell, Edmund H. Sonnenblick, and John Ross, Jr. .......................... 47


Comparison of Human Ventricular Activation with a Canine Model in Chronic Myocardial Infarction. Thomas M. Daniel, John P. Boineau, and David C. Sabiston, Jr. ........................................... 74

Alterations in the Circulatory Response to Exercise Following a Meal and Their Relationship to Postprandial Angina Pectoris. Robert E. Goldstein, David R. Redwood, Douglas R. Rosing, G. David Beiser, and Stephen E. Epstein .................................................. 90

New Functional Concept of Valvular Mechanics in Normal and Diseased Aortic Valves. Paul D. Stein and William A. Munter .................................................. 101


(Continued)
CONTENTS OF VOLUME XLIV

SPECIAL ARTICLE:
Approaches to Sudden Death from Coronary Heart Disease. Bernard Lown and Marshall Wolf ........................................ 130

RADIOLOGIC NOTES IN CARDIOLOGY:
The Angiocardiographic Diagnosis of Valvular Stenosis. Murray G. Baron .......................................................... 143

BOOKS RECEIVED ........................................ 155

BOOK REVIEWS ........................................ 157

CORRECTION ........................................ 36

NEWS FROM THE AMERICAN HEART ASSOCIATION
Report of Inter-Society Commission for Heart Disease Resources: Community Resources for the Diagnosis and Acute Care of Patients with Rheumatic Fever ........................................ A-197

No. 2 (August)

EDITORIAL:
Autoimmune Heart Disease. Noble O. Fowler ........................................ 159

ORIGINAL ARTICLES:
Acute Hemodynamic Effects of Dopamine in Patients with Shock. Henry S. Loeb, Edward B. J. Winslow, Shahbudin H. Rahimtoola, Kenneth M. Rosen, and Rolf M. Gunnar ........................................ 163

Combined Papillary Muscle and Left Ventricular Wall Dysfunction as a Cause of Mitral Regurgitation: An Experimental Study. Arun K. Mittal, Manly Langston, Jr., Keith E. Cohn, Arthur Selzer, and William J. Kerth ........................................ 174


Diastolic Heart Sounds and Filling Waves in Coronary Artery Disease. Peter F. Cohn, Pantel S. Vokonas, Richard A. Williams, Michael V. Herman, and Richard Gorlin ........................................ 196

Myocardial Function in Coronary Artery Disease Determined by Atrial Pacing. Joseph W. Lihnart ........................................ 203


Transient and Persistent Atrial Standstill with His Bundle Lesions: Electrophysiologic and Pathologic Correlations. Kenneth M. Rosen, Shahbudin H. Rahimtoola, Rolf M. Gunnar, and Maurice Lev ........................................ 220

Myocardial and Body Metabolism in Fatal Cardiogenic Shock after Valvular Replacement. Emerson A. Moffitt, George D. Molnar, and Dwight C. McGoon ........................................ 237

Relationship of Cardiorenal Function to Renin-Aldosterone System in Patients with Valvular Heart Disease. Walter E. Judson and Oscar M. Helmer ........................................ 245

Cold Hypersensitivity in Raynaud's Phenomenon. Glyn Garfield Jamieson, John Ludbrook, and Alan Wilson ........................................ 254

(Continued)
CONTENTS OF VOLUME XLIV

Production of Increased Right-to-Left Shunting by Rapid Heart Rates in Patients with Tetralogy of Fallot. Spencer B. King and Robert H. Franch ............................................. 265


Influence of Aortic Coarctation on Pulsatile Hemodynamics in the Proximal Aorta. Michael F. O'Rourke and Timothy B. Cartmill ........ 281

BRIEF COMMUNICATION: Pacemaker Failure Following External Defibrillation. Jerzy O. Giedwoyn 293

RADIOLOGIC NOTES IN CARDIOLOGY: Pericardial Effusion. Murray G. Baron ........................................ 294

BOOK REVIEWS .................................................. 300

LETTERS TO THE EDITOR: Coronary Revascularization. David H. Spodick ............................................. 302

Use of Propranolol in Preinfarction Angina. Nicholas M. Papazoglov .............................................. 303

Fine Structure of the His Bundle. Maurice Lev .................................................. 304


NEWS FROM THE AMERICAN HEART ASSOCIATION .......... 38

Report of Inter-Society Commission for Heart Disease Resources: Resources for Optimal Long-Term Care of Congenital Heart Disease ..................................... A-205

No. 3. (September)

EDITORIAL: Reentry: Slow Conduction, Summation and Inhibition. Paul F. Cranefield and Brian B. Hoffman ........................................ 309

ORIGINAL ARTICLES:

Dimensional Changes of the Human Left Ventricle Prior to Aortic Valve Opening: A Cineangiographic Study in Patients with and without Left Heart Disease. Joel S. Karliner, Richard J. Bouchard, and James H. Gault ................................................ 312

Mean Velocity of Fiber Shortening: A Simplified Measure of Left Ventricular Myocardial Contractility. Joel S. Karliner, James H. Gault, Dwain Eckberg, Charles B. Mullins, and John Ross, Jr. .............. 323

Clinical and Hemodynamic Studies in Patients with Homograft Mitral Valve Replacement. Anthony F. Graham, John S. Schroeder, Pat O. Daily, and Donald C. Harrison ............................................. 334


Quantitative Hemodynamic Effects of Heart Rate in Aortic Regurgitation. Terrance P. Judge, J. W. Kennedy, Lowell J. Bennett, Robert E. Wills, John A. Murray, and John R. Blackmon ................. 355

(Continued)
**CONTENTS OF VOLUME XLIV**

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural History of Rheumatic Aortic Regurgitation: Criteria Predictive of Death, Congestive Heart Failure, and Angina in Young Patients.</td>
<td>Mario Spagnuolo, Howard Kloth, Angelo Taranta, Eugenie Doyle, and Bernard Pasternak</td>
<td>368</td>
</tr>
<tr>
<td>Longitudinal Hemodynamic and Clinical Study of Mitral Stenosis.</td>
<td>Albert A. Dubin, Harold W. March, Keith Cohn, and Arthur Selzer</td>
<td>381</td>
</tr>
<tr>
<td>Effects of Physical Training on Exertional S-T-Segment Depression in Coronary Heart Disease.</td>
<td>Jean-Marie Detry and Robert A. Bruce</td>
<td>390</td>
</tr>
<tr>
<td>Resting and Postexercise Apexcardiogram Correlated with Maximal Treadmill Stress Test in Normal Subjects.</td>
<td>Wilbert S. Aronow, John Cassidy, and Ronald R. Uyeyama</td>
<td>397</td>
</tr>
<tr>
<td>Role of Parasympathetic Inhibition in the Hyperkinetic Type of Borderline Hypertension.</td>
<td>Stevo Julius, Arturo V. Pascual, and Richard London</td>
<td>413</td>
</tr>
<tr>
<td>Direct Correlation of External Systolic Time Intervals with Internal Indices of Left Ventricular Function in Man.</td>
<td>C. Edwin Martin, James A. Shaver, Mark E. Thompson, P. Sudhakar Reddy, and James J. Leonard</td>
<td>419</td>
</tr>
<tr>
<td>Onset of Angina Pectoris in Relation to Circulatory Adaptation during Arm and Leg Exercise.</td>
<td>John Wahren and Stellan Bygdeman</td>
<td>432</td>
</tr>
<tr>
<td>Intermittent Ventricular Parasystole Due to Entrance Block Failure.</td>
<td>Thomas G. Steffens</td>
<td>442</td>
</tr>
<tr>
<td>Clinical-Physiological Correlations in the Development of Hypertensive Heart Disease.</td>
<td>Edward D. Frohlich, Robert C. Tarazi, and Harriet P. Dustan</td>
<td>446</td>
</tr>
<tr>
<td>Isolated Right Ventricular Hypoplasia.</td>
<td>Luc G. Van der Hauwaert and Magnus Michaelsson</td>
<td>466</td>
</tr>
<tr>
<td><strong>RADIOLOGIC NOTES IN CARDIOLOGY:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interlobar Effusion.</td>
<td>Murray G. Baron</td>
<td>475</td>
</tr>
<tr>
<td><strong>BOOK REVIEW</strong></td>
<td></td>
<td>485</td>
</tr>
<tr>
<td><strong>LETTERS TO THE EDITOR:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vmax as an Index of Contractile State in Man.</td>
<td>Israel Mirsky</td>
<td>486</td>
</tr>
<tr>
<td>Ultrasonic Echoes.</td>
<td>William Dock</td>
<td>487</td>
</tr>
<tr>
<td>Myocardial Function in CAD Determined by Atrial Pacing.</td>
<td>John O. Parker</td>
<td>489</td>
</tr>
<tr>
<td>Pressure-Radius Relationships.</td>
<td>Derek R. Boughner</td>
<td>491</td>
</tr>
<tr>
<td><strong>NEWS FROM THE AMERICAN HEART ASSOCIATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report of Inter-Society Commission for Heart Disease Resources: Optimal Resources for Cardiac Surgery</td>
<td>A-221</td>
<td></td>
</tr>
</tbody>
</table>
EDITORIAL:
Midsystolic Clicks and Coronary Heart Disease. Howard P. Lewis ... 493

ORIGINAL ARTICLES:

Midsystolic Clicks in Arteriosclerotic Heart Disease: A New Facet in the Clinical Syndrome of Papillary Muscle Dysfunction. R. Barrett Steelman, Richard S. White, John C. Hill, John P. Nagle, and Melvin D. Cheitlin ... 503

Early Systolic Clicks Due to Mitral Valve Prolapse. Adolph M. Hutter, Jr., Robert E. Dinsmore, James T. Willerson, and Roman W. DeSanctis ... 516

Postextrasystolic Ventricular Pressure Responses. W. Beck, E. Chesler, and V. Schrire ... 523

"Color Vectorcardiogram" Recorded with a Specially Designed Apparatus for Spatial Representation by Coloring. Shinji Kinishita and Tadashi Kobayashi ... 534

Systolic Time Intervals in Severe Aortic Valve Disease: Changes with Surgery and Hemodynamic Correlations. Alfred F. Parisi, Stephen H. Salzman, and Eliot Schechter ... 539

Relationship Between Changes in Left Ventricular Dimensions and the Ejection Fraction in Man. Richard P. Lewis and Harold Sandler ... 548

Effects of Alcohol on the Electrocardiogram. George Sereny ... 558

The Relationship of Pulmonary Venous Wedge to Pulmonary Arterial Pressures. P. Syamasunda Rao and Norman J. Sissman ... 565

Determination of Left Ventricular Volumes by Ultrasound. Nicholas J. Fortuin, William P. Hood, Jr., M. Eugene Sherman, and Ernest Craige ... 575

S-T-Segment Depression with Near-Maximal Exercise in Detection of Preclinical Coronary Heart Disease. Albert A. Kattus, Charles R. Jorgensen, Ralph E. Worder, and Anthony B. Alvaro ... 585

Mechanism of Increased Sodium Reabsorption during Propranolol Administration. Alan S. Nies, James S. McNeil, and Robert W. Schrier ... 596

Diagnostic Import of QRS Notching in High-Frequency Electrocardiograms of Living Subjects with Heart Disease. Nancy C. Flowers and Leo G. Horan ... 605

Immunoglobulin Binding in Cardiomyopathic Hearts. Sunil K. Das, Jeffery P. Callen, Vernon V. Dodson, and James T. Cassidy ... 612

Mortality Study of the Significance of Extrasystoles in an Insured Population. Manuel Rodstein, Leon Wolloch, and Richard S. Gubner ... 617

Pulmonary Intravascular and Extravascular Fluid Volumes in Exercising Cardiac Patients. Russell Lucpker, Bo Liander, Magnus Korsgren, and Edward Varnauskas ... 626


(Continued)
Hemodynamic Evaluation of Rate Augmentation Produced by Atrial Pacing and Isoproterenol in the Early Postoperative Phase of Cardiac Valve Surgery. Paul W. Armstrong, Herman K. Gold, Mortimer J. Buckley, James T. Willerson, and Charles A. Sanders 649

Chronic Intravascular Hemolysis after Aortic Valve Replacement: Long-Term Study Comparing Different Types of Ball-Valve Prostheses. Elaine Eyster, John Rothchild, and Olga Mychajiw 657

Control of Intractable Ventricular Tachycardia by Coronary Revascularization. Roger R. Ecker, Charles B. Mullins, John C. Grammer, William J. Rea, and James M. Atkins 666


Incomplete Right Bundle-Branch Block: An Electrocadiographic Enigma and Possible Misnomer. E. Neil Moore, John P. Boineau, and Donald F. Patterson, with James Alexander and A. J. Kennel 678

Cardiac Arrest in the Critically Ill: I. A Study of Predisposing Causes in 132 Patients. Samuel J. Camarata, Max Harry Weil, Paul K. Hanashiro, and Herbert Shubin 688


Real-Time Analysis of Cardiac Catheterization Data Using a Computer System. Donald C. Harrison, J. Douglas Ridges, William J. Sanders, Edwin L. Alderman, and John A. Fant0 709

Pathologic Changes in Aortic-Coronary Arterial Saphenous Vein Grafts. Zeev Vlodaver and Jesse E. Edwards 719

Isolated Tricuspid Stenosis. Jacob R. Morgan, Alan D. Forker, J. R. Coates, and W. S. Myers 729


BOOK REVIEWS 751

CORRECTION 538

NEWS FROM THE AMERICAN HEART ASSOCIATION
Report of Inter-Society Commission for Heart Disease Resources: Part II: The Electrical Environment A-237
Part III: Selection and Maintenance Program A-247

No. 5 (November)

EDITORIAL:
"Preinfarctional" Angina: A Need for an Objective Definition and for a Controlled Clinical Trial of its Management. Noble O. Fowler 755

(Continued)
CONTENTS OF VOLUME XLIV

ORIGINAL ARTICLES:
Abnormal Circulatory Responses to High Altitude in Subjects with a Previous History of High-Altitude Pulmonary Edema. Herbert N. Hultgren, Robert F. Grover, and L. Howard Hartley ........................................... 759

Acute Changes in Left Ventricular Volume and Contractility during Ventricular Pacing in Patients with Complete Heart Block. Frederick L. Gobel, Charles R. Jorgensen, Kazato Kitamura, and Yang Wang ................................................................. 771

Carboxyhemoglobin Caused by Smoking Nonnicotine Cigarettes: Effects in Angina Pectoris. Wilbert S. Aronow and Stanley N. Rokaw 782

Sinoatrial-Node Entrance Block. Bruce N. Goldreyer and Anthony N. Damato ................................................................. 789

Conduction through a Narrow Isthmus in Isolated Canine Atrial Tissue: A Model of the W-P-W Syndrome. Domingo de la Fuente, Betty Sasyiuk, and G. K. Moe ................................................................. 803

Digoxin Metabolism in Obesity. Gordon A. Ewy, Bertron M. Groves, Michael F. Ball, Lana Nimino, Barbara Jackson, and Frank L. Marcus 810


Supraventricular Tachycardia Initiated by Sinus Beats. Bruce N. Goldreyer, Melvin B. Weiss, and Anthony N. Damato 820

Occurrence of Ventricular Arrhythmias with Exercise as Compared to Monitoring. Bernard D. Kosowsky, Bernard Lown, Richard Whiting, and Timothy Guiney ................................................................. 826

Sites of Congenital and Surgical Heart Block as Defined by His Bundle Electrocardiography. Kenneth M. Rosen, Ashwin Mehta, Shahbudin H. Rahimtoola, and Robert A. Miller ................................................................. 833

Cholesterol Production in Obesity. Tatu A. Miettinen ................................................................. 842

Myocardial Perfusion Imaging with Radioactive-Labeled Particles Injected Directly into the Coronary Circulation of Patients with Coronary Artery Disease. William L. Ashburn, Eugene Braunwald, Allan L. Simon, Kirk L. Peterson, and James H. Gault ................................................................. 851


Incidence of Myocardial Infarction and Sudden Death from Coronary Heart Disease in Nashville, Tennessee. Ruth M. Hagstrom, Charles F. Federspiel, and Yaw Chin Ho ................................................................. 884

Role of Echocardiography in Diagnostic and Hemodynamic Assessment of Hypertrophic Subaortic Stenosis. Pravin M. Shah, Raymond Gramiak, Allan G. Adelman, and E. Douglas Wigle ................................................................. 891

Quantification of Left Heart Volume and Systolic Output in Transposition of the Great Arteries. Thomas P. Graham, Jr., Jay M. Jarmakani, Ramon V. Canent, Jr., and Paul H. Jewett ................................................................. 899

(Continued)
CONTENTS OF VOLUME XLIV

Double-Lumen Flotation Catheter for Use in Complex Congenital Cardiac Anomalies. David T. Kelly, L. Jerome Krovetz, and Richard D. Rowe .......................................................... 910

Surgical Considerations of Ventricular Septal Defect Associated with Complete Transposition of the Great Arteries and Pulmonary Stenosis. E. S. Imamura, Tetsuo Morikawa, Katsuhiko, Tatsuno, Souji Konno, Tatsuta Arai, and Shigeru Sakakibara ......................................................... 914

BRIEF COMMUNICATION:
Cardiac Surgery in Neonates and Infants. Brian G. Barratt-Boyes ......................................................... 924

RADIOLOGIC NOTES IN CARDIOLOGY:
Left Anterior Oblique View for Evaluation of Left Atrial Size. Murray G. Baron .......................................................... 926

BOOK REVIEW .......................................................................................................................... 932

BOOKS RECEIVED ..................................................................................................................... 933

SYMPOSIUM: Cardiomyopathy
Introduction. Charles K. Friedberg .......................................................... 935
Virus and the Heart. Walter H. Abelmann .......................................................... 950
Ethyl Alcohol and the Heart. Timothy J. Regan .......................................................... 957
Peripartum Cardiomyopathy. John G. Demakis and Shahbudin H. Rahimtoola ......................... 964

LETTERS TO THE EDITOR:
Right Ventricular Anomalous Muscle Bundle. G. S. Gale and J. B. Barlow .......................................................... 969

NEWS FROM THE AMERICAN HEART ASSOCIATION
Report of Inter-Society Commission for Heart Disease Resources:
Guidelines for the Detection, Diagnosis and Management of Hypertensive Patients A-263

No. 6 (December)

EDITORIALS:
Biochemical Profiling and the Natural History of Hypertensive Diseases: Low-Renin Essential Hypertensive Diseases, a Benign Condition. John H. Laragh .......................................................... 971
Measurement of Ventricular Volume in Man. Charles E. Rackley ......................................................... 975
A Stratified System of Coronary Care. Paul N. Yu .......................................................... 979

ORIGINAL ARTICLES:
Effect of Sustained Isometric Handgrip Exercise on Left Ventricular Performance. Richard H. Helfant, Maria A. deVilla, and Steven G. Meister .......................................................... 982


Hemodynamic Effects of Exercise in Isolated Valvular Aortic Stenosis. Robert J. Bache, Yang Wang, and Charles R. Jorgensen .......................................................... 1003

(Continued)
CONTENTS OF VOLUME XLIV

Electrically Induced Atrial Tachycardia with Block: A Therapeutic Application of Permanent Radiofrequency Atrial Pacing. Robert M. Davidson, Andrew G. Wallace, Will C. Sealy, and Michael S. Gordon ................................................................. 1014

Etiology of Right Bundle-Branch Block in Patients Undergoing Total Correction of Tetralogy of Fallot. Henry Gelband, Albert L. Waldo, Gerard A. Kaiser, Frederick O. Bowman, Jr., James R. Malm, and Brian P. Hoffman ......................................................... 1022

Clinical, Surgical, and Pathologic Correlation in Patients with Acute Myocardial Infarction and Pump Failure. Hooshang Bolooki, Louis Lemberg, Ali Ghahramani, Chris Economides, Thomas Caldwell, and James R. Jude ................................................................. 1034

Evaluation of Left Ventricular Contractile State in Childhood: Normal Values and Observations with a Pressure Overload. Thomas P. Graham, Jr., Jay M. Jarmakani, Ramon V. Canent, Jr., and Page A. W. Anderson ................................................................. 1043


Coronary Hemodynamics during Successive Elevation of Heart Rate by Pacing in Subjects with Angina Pectoris. Shinji Yoshida, William Ganz, Roberto Donoso, Harold S. Marcus, and H. J. C. Swan ......................................................... 1062

Evaluation of Pulmonary Arterial End-Diastolic Pressure as an Estimate of Left Ventricular End-Diastolic Pressure in Patients with Normal and Abnormal Left Ventricular Performance. Richard J. Bouchard, James H. Gault, and John Ross, Jr. ................................................................. 1072

Angiographic Features of Rheumatic and Nonrheumatic Mitral Regurgitation. Lewis Wexler, James F. Silverman, Robert F. DeBusk, and Donald C. Harrison ................................................................. 1080

Electrophysiologic Studies on Mobitz Type II Second-Degree Heart Block. Joseph F. Spear and E. Neil Moore ................................................................. 1087

Atrioventricular Conduction Defects in Patients with Sinus Bradycardia: Analysis by His Bundle Recordings. Onkar S. Narula ................................................................. 1096

Mobitz Type II Block without Bundle-Branch Block. Kenneth M. Rosen, Henry S. Loeb, Rolf M. Gunnar, and Shahbudin H. Rahimtoola ................................................................. 1111

SPECIAL ARTICLE:
Use of Exercise Testing for Diagnostic and Functional Evaluation of Patients with Arteriosclerotic Heart Disease. C. Gunnar Blomqvist 1120

RADIOLOGIC NOTES IN CARDIOLOGY:
Right Aortic Arch. Murray G. Baron ................................................................. 1137

BOOK REVIEW ................................................................. 1146

LETTER TO THE EDITOR:
Isosorbide Dinitrate in Angina. Dennis J. Battock and Charles A. Chidsey III ................................................................. 1147

AN APPRECIATION ................................................................. 1150

NEWS FROM THE AMERICAN HEART ASSOCIATION

(Continued)
Report of Inter-Society Commission for Heart Disease Resources: Community Resources for the Management of Patients with Rheumatic Heart Disease

VOLUME AUTHORITY INDEX ................................................................. 1153
VOLUME SUBJECT INDEX ......................................................... 1157
SUPPLEMENTS 1971 AUTHOR INDEX ....................................... S-VII
SUPPLEMENTS 1971 SUBJECT INDEX ....................................... S-IX