CIRCULATION
VOLUME XXXVI
July-December 1967

No. 1

EDITORIAL:
The Arterial Medial Cell, Smooth Muscle or Multifunctional Mesenchyme? Robert W. Wissler .................................................. 1

ORIGINAL ARTICLES:

Exercise and Intermittent Claudication: I. Effect of Repetition and Intensity of Exercise. James S. Skinner, and D. Eugene Strandness, Jr. 15


Assessment of Aortic Valvular Stenosis from the Aortic Pressure Pulse. Djavad T. Arani and Richard A. Carleton .................. 30


Distribution of Arterial Lesions Demonstrated by Selective Cinecoronary Arteriography. William L. Proudfit, Earl K. Shirey, and F. Mason Sones, Jr. .................................................. 54

Vectorcardiographic Changes During Intracoronary Injections. Raphael F. Smith, J. Warren Harthorne, and Charles A. Sanders ........ 63

Coronary Disease in Familial Hypercholesterolemia. Julius Jensen, David H. Blankenhorn, and Valdemar Kornerup .................. 77

Large and Small Artery Occlusion in Diabetics and Nondiabetics with Severe Vascular Disease. Margaret C. Conrad .................. 83

The Ultra Low Frequency Force Ballistocardiograph in Acute Cardiomyopathy. Brendan Phibbs, Charles R. Lowe, and Roy W. Holmes ... 92


The Electrophysiological Properties of Diphenylhydantoin Sodium as Compared to Procaine Amide in the Normal and Digitalis-Intoxicated Heart. Richard H. Helfant, Benjamin J. Scherlag, and Anthony N. Damato .................. 108

(Continued)
Protection from Digitalis Toxicity with the Prophylactic Use of Diphenylhydantoin Sodium: An Arrhythmic-Inotropic Dissociation. Richard H. Helfant, Benjamin J. Scherlag, and Anthony N. Damato ... 119

Antihypertensive Properties of Furosemide. Michael Davidov, Nikos Kakaviatos, and Frank A. Finnerty, Jr. 125

SPECIAL ARTICLES:
Decision Rules in Electrocardiography and Vectorcardiography. J. von der Groeben 136


BOOK REVIEWS
NEWS FROM THE AMERICAN HEART ASSOCIATION 161

No. 2

EDITORIAL:
Purging Action of Quinidine: Potentiation of Contraction Coupling to Basic Electric Rhythms. Howard B. Burchell 173

ORIGINAL ARTICLES:

Myocardial Blood Flow in Man as Measured by a Coincidence Counting System and a Single Bolus of $^{82}$RbCl. Suzanne B. Knoebel, Paul L. McHenry, Leon Stein, and Ahmet Sonel 187


Long-Term Results of Endarterectomy of the Internal Carotid Artery for Cerebral Ischemia and Infarction. Albert Heyman, W. Glenn Young, Jr., Ivan W. Brown, Jr., and Keith S. Grimson 212

Influence of Age on the Hemodynamic Response to Exercise. Stevo Julius, Antoon Amery, Leigh S. Whitlock, and James Conway 222

Influence of Hypertension on the Hemodynamic Response to Exercise. Antoon Amery, Stevo Julius, Leigh S. Whitlock, and James Conway 231

Comparison of the Double Two-Step Test and the Maximal Exercise Treadmill Test: Studies in Coronary-Prone Subjects. Samuel Bellet and Laurian Roman 238

The Exercise Test in Diabetic Patients as Studied by Radioelectrocardiography. Samuel Bellet and Laurian Roman 245

Paroxysmal Ventricular Tachycardia with Rate-Dependent Coupling Intervals. Leo Schamroth and Alberto Dolara 255

Incomplete Left Bundle-Branch Block: The View from Transseptal Intraventricular Leads. Richard F. Leighton, Joseph M. Ryan, Richard S. Goodwin, Charles F. Wooley, and Arnold M. Weissler 261

Dynamic Analysis of Heart Sounds in Right and Left Bundle-Branch Blocks. Jan Oravetz, Stanley Wissner, Beatrice Argano, and Aldo A. Luisada 275

(Continued)
CONTENTS OF VOLUME XXXVI


Increased Survival with Prophylactic Quinidine after Experimental Myocardial Infarction. Victor W. Hurst, III, James J. Morris, Jr., Howard J. Zefit, Donald B. Hackel, and Henry D. McIntosh .......... 294

Postpartum Death with Maternal Congenital Heart Disease. Richard L. Naeye, Jack W. C. Hagstrom, and Bruce A. Talmadge .......... 304

Atrial Flutter Associated with Isolated Pulmonic Stenosis. Shlomo Stern and Joseph B. Borman ........................................ 313

Computer Search for Electrocardiographic Lead Directions to Optimize Diagnostic Differentiation: A Novel Concept in Electrocardiographic Lead Design. Charles D. Batchlor, Alan S. Berson, I. Alzona Naval, and Hubert V. Pipberger ........................................ 320

BOOK REVIEWS ........................................ 331

NEWS FROM THE AMERICAN HEART ASSOCIATION .............. 332

EDITORIALS:

The Present Status of Clofibrate (Atromid-S). M. F. Oliver ........ 337

Does the Pattern of Carbohydrate Nutrition Hold a Clue to Atherosclerosis? Forrest E. Kendall ..................... 340

ORIGINAL ARTICLES:

Cardiac Potentials on Body Surface of Infants with Anomalous Left Coronary Artery (Myocardial Infarction). John T. Flaherty, Madison S. Spach, John P. Boineau, Ramon V. Canent, Jr., Roger C. Barr, and David C. Sabiston, Jr. .................................................. 345

Application of Computer Techniques to the Detection and Analysis of Spontaneous P-Wave Variations. Daniel A. Brody, Melvin D. Woolsey, and Robert C. Arzbaecher .......................... 359

Mechanisms of Pulsus Alternans. Keith E. Cohn, Harold Sandler, and E. W. Hancock ............................... 372

Measurement of Pulmonary Edema in Valvular Heart Disease. Michael McCredie .................................................. 381


Cerebrovascular Disease in an Elderly Population. John L. Cutler ........................................ 394

Diffuse Tortuosity and Lengthening of the Arteries. Ali Ertuğrul .................. 400


Calcified Left Atrial Myxoma Simulating Mitral Insufficiency: Hemodynamic and Phonocardiographic Effects of Tumor Movement. John L. Penny, John J. Gregory, Stephen M. Ayres, Stanley Giannelli, Jr., and Plinio Rossi .................................................. 417

(Continued)
CONTENTS OF VOLUME XXXVI


The Measurement of Glomerular Filtration Rate and Effective Renal Plasma Flow in Man by Iothalamate 125I and Iodopyracet 131I. Charles M. Elwood and Eugene M. Sigman 441


Pulmonary Air Embolism During Insertion of a Permanent Transvenous Cardiac Pacemaker. Howard J. Zeft, Alex Harley, Robert E. Whalen, and Henry D. McIntosh 456

Radiological Aspects of Heart Muscle Disease in Nigerian Adults. W. Peter Cockshott, G. J. Thorpe, and A. C. Ikeme 460

NEWS FROM THE AMERICAN HEART ASSOCIATION 468

No. 4

EDITORIALS
Follow-up Care for Patients with Cardiac Pacemakers. Edgar Sowton 473

The Aftercare of Patients with Implanted Cardiac Pacemakers. William M. Chardack 476

Problems and Responsibilities in the Use of Electric Pacemakers. Paul M. Zoll 478

ORIGINAL ARTICLES
Mechanisms of Angina in Aortic Stenosis. Ernest L. Fallen, William C. Elliott, and Richard Gorlin 480

Noradrenaline Release and Metabolism in Orthostatic (Postural) Hypotension. McC. Goodall, W. R. Harlan, Jr., and H. Alton 489


The Deleterious Role of Tachycardia in Mitral Stenosis. Djavad T. Arani and Richard A. Carleton 511


Diagnostic Accuracy of Selective Coronary Cinearteriography. Harvey G. Kemp, Hilary Evans, William C. Elliott, and Richard Gorlin 526


(Continued)
**CONTENTS OF VOLUME XXXVI**

**Thoracic Duct-to-Pulmonary Vein Shunt in the Treatment of Experimental Right Heart Failure.** William R. Cole, Marlys Hearst Witte, Stephen L. Kash, Malcolm Rodger, Virgil R. Bleisch, and Gerhard H. Muelheims .................................................. 539

**Vascular Lesions in Infants with Congenital Rubella.** John R. Estery and Ella H. Oppenheimer .................................................. 544

**Renal Response to Pyrogen in Normotensive and Hypertensive Man.** Ervin A. Gombos, Tae Hung Lee, Joseph Solinas, and Mira Mitrovic .......................... 555

**Prognostic Value of Plasma Renin Activity in Renovascular Hypertension.** Philippe Meyer, Jean Ecoiffier, Jean M. Alexandre, Claudine Devaux, Louis Guize, Joel Menard, Pierre Biron, and Paul Milliez .......................... 570

**Coronary Heart Disease in Women: A Study of Risk Factors in 100 Patients Less Than 60 Years of Age.** Ristéard Mulcahy, Noel Hickey, and Brian Maurer .................................................. 577

**Permanent Ventricular Pacemakers: Comparison of Transthoracic and Transvenous Implantation.** James J. Morris, Jr., Robert E. Whalen, Henry D. McIntosh, Howard K. Thompson, Ivan W. Brown, Jr., and W. Glenn Young, Jr. .................................................. 587

**Temporary Transvenous Catheter-Electrode Pacing of the Heart.** Robert G. Tancredi, Ben D. McCallister, and Harold T. Mankin .......................... 598

**SPECIAL ARTICLE**  
**Hyperglycemia: A Risk Factor in Coronary Heart Disease.** Frederick H. Epstein ........................................................................ 609

**BOOK REVIEW** ........................................................................ 620

**NEWS FROM THE AMERICAN HEART ASSOCIATION** ..................... 621

---

**EDITORIAL:**  
**Experimental Bundle-Branch Block—Fifty Years Ago.** Raymond D. Pruitt .................................................. 625

**ORIGINAL ARTICLES:**  
**Reevaluation of Electrocardiographic and Bedside Criteria for Diagnosis of Ventricular Tachycardia.** R. A. Massumi, A. A. Tawakkol, and A. D. Kistin .................................................. 628

**Termination of Reciprocating Tachycardia by Atrial Stimulation.** R. A. Massumi, A. D. Kistin, and A. A. Tawakkol .................................................. 637

**The Role of Premature Beats in the Initiation and the Termination of Supraventricular Tachycardia in the Wolff-Parkinson-White Syndrome.** D. Durrer, L. Schoo, R. M. Schuilenburg, and H. J. J. Wellens .................................................. 644

**Atrioventricular and Ventriculoatrial Excitation in Wolff-Parkinson-White Syndrome (Type B): Temporary Ablation at Surgery.** Howard B. Burchell, Robert L. Frye, Milton W. Anderson, and Dwight C. McGoon .................................................. 663

**Experimental Production of Aberrant Ventricular Conduction in Man.** Stafford I. Cohen, Sun H. Lau, Jacob I. Haft, and Anthony N. Damato .................................................. 673

**Effects of Diphenylhydantoin on Atrioventricular Conduction in Man.** Richard H. Helfant, Sun H. Lau, Stafford I. Cohen, and Anthony N. Damato .................................................. 686

(Continued)
CONTENTS OF VOLUME XXXVI


Effect of Hyperventilation on Precordial T Waves of Children and Adolescents. J. H. Thomsen and R. H. Wasserburger 700


Effect of Artificial Pacing of the Heart on Cardiac and Renal Function. J. O. Humphries, E. J. Hinman, L. Bernstein, and W. G. Walker 717

Raynaud’s Disease in Children. Warren G. Guntheroth, Beverly C. Morgan, John A. Harbinson, and Gay L. Mullins 724

The Percutaneous Femoral Artery Approach to Selective Coronary Arteriography. Richard D. Spellberg, and Irvin Ungar 730


Cardioglobulin B Content of the Blood Plasma of Newborn Infants. Sergio A. Bencosme, D. J. Delahaye, J. E. Fay, and N. Ozen 766

The Inheritance of Coronary Artery Anatomic Patterns in Rats. Colin M. Bloor, Arthur S. Leon, and Bertram Pitt 771

Aortic Origin of the Right Pulmonary Artery: Surgical Repair Without a Graft. Stanley E. Kirkpatrick, Donald A. Girod, and Harold King 777

Truncal Inversion with Biventricular Pulmonary Trunk and Aorta from Right Ventricle (Variant of Taussig-Bing Complex). Aaron B. Shaffer, José F. Lopez, Irwin K. Kline, and Maurice Lev 783


NEWS FROM THE AMERICAN HEART ASSOCIATION 800

EDITORIALS:

The Criterion for Diastolic Pressure—Revolution and Counterrevolution. A. C. Burton 805

Listening to the Electrocardiogram. Franklin D. Johnston 810

ORIGINAL ARTICLES:


Serial Electrocardiographic Changes in Treated Hypertensive Patients with Reference to Voltage Criteria, Mean QRS Vectors, and the QRS-T Angle. Philip L. Dern, Ray Pryor, Strother H. Walker, and Donald T. Sears 823

(Continued)

Acute Mitral Regurgitation in Man: Hemodynamic Evidence and Observations Indicating an Early Role for the Pericardium. Stuart H. Bartle and Hector J. Hermann ........................................ 839

Angiographic Anatomy of the Left Ventricle and Mitral Valve in Idiopathic Hypertrophic Subaortic Stenosis. Allan L. Simon, John Ross, Jr., and James H. Gault ........................................ 852

CineangiocardioGraphic Studies of the Left Ventricle in Patients with Angina Pectoris. Lars Bjork, Ingemar Cullhed, and Adar Hallén .......... 868

A Later Stage of Anomalous Coronary Circulation with Origin of the Left Coronary Artery from the Pulmonary Artery: Coronary Artery Steal. Arthur E. Baue, Stanley Baum, William S. Blakemore, and Harry F. Zinsser .......................................................... 878

Chromosomal Abnormalities and Congenital Heart Disease. Ingrid Emerit, J. de Grouchy, P. Vernant, and P. Corone ........ 886


Renal Venous Renin Determinations in the Diagnosis of Surgically Correctable Hypertension. Annette Fitz ......................... 942


The Electrocardiophone: A New Instrument for Rapid Bedside Diagnosis of Cardiac Arrhythmias. Henry L. Green .......... 975


BOOKS RECEIVED ........................................ 989

BOOK REVIEWS ......................................................................................................................... 991

(Continued)
CONTENTS OF VOLUME XXXVI

NEWS FROM THE AMERICAN HEART ASSOCIATION ............... 993
VOLUME AUTHOR INDEX ........................................ 997
VOLUME SUBJECT INDEX ......................................... 999
SUPPLEMENTS 1967 AUTHOR INDEX ............................. S-VII
SUPPLEMENTS 1967 SUBJECT INDEX ............................. S-IX
SUPPLEMENTS
toCIRCULATION
VOLUME XXXV AND XXXVI
January-December, 1967

No. 1 (April)
CARDIOVASCULAR SURGERY 1967

Foreword
C. Frederick Kittle .................................. I-1

Early Clinical Experience with Homotransplantation of the Aortic Valve

Early Results of Use of Homografts for Replacement of the Aortic Valve in Man
Tammo D. Hoeksema, Jack L. Titus, Emilio R. Giuliani, and John W. Kirklin .................................. I-9

Combined Prosthetic Replacement of the Mitral and Aortic Valves: Preoperative and Postoperative Hemodynamic Studies at Rest and the Left Ventricular Response to Muscular Exercise
Dean T. Mason, John Ross, Jr., James H. Gault, Eugene Braunwald, and Andrew G. Morrow .................................. I-15

Hemodynamic Results with Full-Flow Orifice Prosthetic Valves
Malcolm M. McHenry, Edward A. Smeloff, Trevor B. Davey, Boris Kaufman, and William Y. Fong .................................. I-24

Exercise Tolerance and Hemodynamic Studies After Replacement of Canine Mitral Valve with and Without Preservation of Chordae Tendineae
G. C. Rastelli, Anastasios G. Tsakiris, Robert L. Frye, and John W. Kirklin .................................. I-34

A Nonthrombogenic, Nonanticoagulant-Dependent Mitral Valve Prosthesis
Trevelyan E. Palmer, Elizabeth V. Lautsch, Miguel E. Sanmarco, and Julio C. Davila .................................. I-42

Late Postoperative Pathological Findings After Cardiac Valve Replacement
William C. Roberts and Andrew G. Morrow .................................. I-48

Conservative Management of Tricuspid Regurgitation in Patients Undergoing Mitral Valve Replacement
Nina S. Braunwald, John Ross, Jr., and Andrew G. Morrow .................................. I-63

(Continued)
S-III
Factors Affecting Thromboembolism Associated with Prosthetic Heart Valves
George E. Duvoisin, Robert O. Brandenburg, and Dwight C. McGoon I-70

Influence of Rhythm and Anticoagulation upon the Incidence of Embolization Associated with Starr-Edwards Prostheses
Thomas J. Yeh, Isam N. Anabtawi, Victor E. Cornett, and Robert G. Ellison .................................................. I-77

Cardioversion after Mitral Valve Operations
Donald R. Kahn, Marvin M. Kirsh, Pauline W. Ferguson, and Herbert Sloan ....................................................... I-82

A Survey of the Current Status of Pulmonary Embolectomy for Massive Pulmonary Embolism
Frederick S. Cross and Albert Mowlem ............................................... I-86

Resuscitation and Function of the Cadaver Heart
Robert D. Wuerflein and Norman E. Shumway ............................................................... I-92

Work Capacity and Efficiency of the Autotransplanted Heart
Willard M. Daggett, Vallee L. Willman, Theodore Cooper, and C. Rollins Hanlon ........................................ I-96

Correction of Total Anomalous Pulmonary Venous Drainage in Infancy Utilizing Deep Hypothermia with Total Circulatory Arrest

Evolution of Corrective Surgery for Ebstein's Anomaly
C. Walton Lillehei, B. R. Kalke, and Robert G. Carlson ............................................................... I-111

Surgical Correction of Tetralogy of Fallot with Previous Systemic to Pulmonary Artery Shunts
Bert W. Meyer, George G. Lindesmith, Robert E. Stanton, and John C. Jones ........................................ I-119

Surgical Treatment of Muscular Subaortic Stenosis: Results from Septectomy in Twenty-six Patients
Denton A. Cooley, Robert D. Bloodwell, Grady L. Hallman, Antonio F. LaSorte, Robert D. Leachman, and Don W. Chapman ......................................... I-124

Surgical Treatment of Cardiac Defects Associated with Corrected Transposition of the Great Vessels
Grady L. Hallman, Sarjit S. Gill, Rovert D. Bloodwell, Dan G. McNa- mara, Joseph R. Latson, Robert D. Leachman, and Denton A. Cooley I-133

Results of Operation for Atrial Septal Defect in Patients Forty-five Years of Age and Older
George R. Daicoff, Robert O. Brandenburg, and John W. Kirklin .......... I-143

Adjustable Prosthesis for Pulmonary Artery Banding: Comparison with Umbilical Tape and Teflon Bands
Ramon A. Shane, Garman O. Kimmell, William E. Jacques, and Gilbert S. Campbell ........................................ I-148

"Demand" and Internal Mammary Artery Implantation
William G. Malette, Barry Schneider, and Ivan B. Tait ........................................ I-152

Surgical Significance of Angiographic Patterns in Coronary Arterial Disease

Circulation, Volume XXXVI, December 1967
Application of Gas Endarterectomy to Atherosclerotic Peripheral Vessels and Coronary Arteries: Clinical and Experimental Results
P. N. Sawyer, M. J. Kaplitt, S. Sobel, and D. DiMaio ......................... I-163

The Edema of Arterial Reconstruction
E. A. Husni .................................................. I-169

Operative Therapy for Femoral-Popliteal Arterial Occlusive Disease: A Comparison of Therapeutic Methods
Nicholas T. Kouchoukos, Jerome F. Levy, John F. Balfour, and Harvey R. Butcher, Jr. ......................... I-174

Follow-up Studies of Acute Dissecting Aortic Aneurysms Managed with Antihypertensive Agents
P. D. Harris, J. R. Malm, J. T. Bigger, Jr., and F. O. Bowman, Jr. .......... I-183

Relative Evaluation of Left Heart Bypass, whether Pulsatile or Pulseless, with Counterpulsation as Techniques for Myocardial Augmentation
Alan L. Goldenberg, Louis Brown, and Clarence Dennis .................. I-188

Influence of Oxygen Flow Rate on Arterial Oxygenation and Acid-Base Balance During Cardiopulmonary Bypass with Use of a Disc Oxygenator
Phillips Hallowell, Gerald Austen, and Myron B. Laver .................... I-199

Effect of Total Cardiopulmonary Bypass on Human Lung Elastic Properties
Emil Blair, Ulf Hedstrand, Carl-Johann Westerholm, and Viking O. Björk ........................................ I-206

Effect of Airway Hypocapnia on Mechanics of Breathing During Cardiopulmonary Bypass
R. W. Patterson, S. F. Sullivan, J. R. Malm, F. O. Bowman, Jr., and E. M. Papper ................................ I-212

Pulmonary Compliance Following Open-Heart Surgery and Its Relationship to Ventilation and Gas Exchange

Sublethal Damage to the Red Blood Cell from Pumping
Eugene F. Bernstein, Robert A. Indeglia, Michael A. Shea, and Richard L. Varco ........................................ I-226

Effects of Induced Ventricular Fibrillation on Ventricular Performance and Cardiac Metabolism
Robert L. Reis, Lawrence H. Cohn, and Andrew G. Morrow .......... I-239

No. 2 (October)

ABSTRACTS AHA 40th SCIENTIFIC SESSIONS and 21st ANNUAL MEETING, COUNCIL ON ARTERIOSCLEROSIS
Council on Arteriosclerosis—American Society for the Study of Arteriosclerosis ................................ II-1
Scientific Sessions of the American Heart Association ..................... II-47
Author Index ................................................................... II-281