The Journal of **PHARMACOLOGY**

AND EXPERIMENTAL THERAPEUTICS

A Publication of The American Society for Pharmacology and Experimental Therapeutics

Founded by John J. Abel 1909

Editor

Eva King Killam

Assistant Editor

Mannfred A. Hollinger

Editors for Specific Fields Analgesia and Drug Abuse

Joseph Cochin Autonomic Pharmacology Robert E. Stitzel

Behavioral Pharmacology John A. Harvey

Cardiovascular Pharmacology Henry R. Besch, Jr. Theodore M. Brody Donald V. Priola

Cell Pharmacology Toshio Narahashi George B. Weiss

Chemotherapy H. George Mandel

Developmental Pharmacology Bernard L. Mirkin

Drug Metabolism and Disposition **Edward Bresnick** Vincent G. Zannoni

Endocrine Pharmacology Paula H. Stern

Gastrointestinal Pharmacology Thomas F. Burks

Immunopharmacology Sydney Spector Neuropharmacology S. J. Enna A. James Hance Charles O. Rutledge

Pulmonary Pharmacology Mannfred A. Hollinger

Editorial Advisory Board

Martin W. Adler Edson X. Albuquerque Edmund G. Anderson Lewis Aronow Leslie E. Bailey Michael D. Bailie Paul Bass John A. Bevan C. Paul Bianchi Leslie C. Blaber David A. Blake Floyd E. Bloom Gary Brooker Carl K. Buckner David B. Bylund Theodore J. Cicero Doris H. Clouet Leonard Cook E. E. Daniel William C. de Groat Walter R. Dixon J. W. Downie Linda Dykstra Hugh L. Evans James A. Ferrendelli Lawrence J. Fischer William W. Fleming Ray W. Fuller Gerard L. Gebber James W. Gibb Shri N. Giri Dora B. Goldstein

Board of **Publications Trustees** Norman Weiner, Chairman James A. Bain Allen H. Conney George I. Drummond

Acting **Executive Officer**

Kay Croker

Frank R. Goodman Charles W. Gorodetzky Garrett J. Gross T. Kendall Harden Harold F. Hardman Louis S. Harris Richard J. Head Philip C. Hoffmann Jordan L. Holtzman Stephen G. Holtzman Jerry B. Hook David M. Jacobowitz Donald R. Jasinski Alain F. Junod S. M. Kirpekar Conan Kornetsky Edwin A. Kroeger Wayne Levin Louis Levy

George E. Lindenmayer Walter Lovenberg Benedict R. Lucchesi K. U. Malik John C. McGiff Donald E. McMillan Jerry Mitchell Perry B. Molinoff W. H. Morse Jose M. Musacchio Mary J. Mycek Robert A. Neal Achilles J. Pappano

Leon I. Goldberg Eva King Killam Norman Kirshner Kenneth C. Leibman

Renal Pharmacology William O. Berndt Toxicology Curtis D. Klaassen William A. Pettinger Larissa A. Pohorecky James W. Putney, Jr. **Arthur Raines** Barbara Rennick G. Alan Robison C. R. Ross Ronald P. Rubin

Robert R. Ruffolo, Jr.

Betty I. Sasyniuk Arnold Schwartz Lewis S. Seiden Eric J. Simon Roger P. Smith John L. Sutko Robert I. Taber A. E. Takemori Robert E. Ten Eick Thomas R. Tephly Richard E. Tessel C. D. Thron U. Trendelenburg Betty M. Twarog Norman J. Uretsky Martin A. Wasserman I. M. Weiner Benjamin Weiss Richard M. Welch David P. Westfall Martin M. Winbury

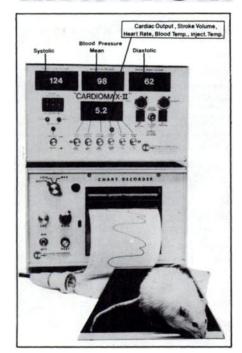
Walter Modell Paul L. Munson Clement A. Stone

Barry B. Wolfe

Ben G. Zimmerman

THE JOURNAL OF PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS (ISSN 0022-3565) is published monthly by The American Society for Pharmacology and Experimental Therapeutics, 428 E. Preston Street, Baltimore, MD 21202. Annual dues includes \$60.00 for journal subscription. Second class postage paid at Baltimore, MD and at additional mailing offices. Postmaster send address changes (Form 3579) to Williams & Wilkins, 428 E. Preston St., Baltimore, MD 21202. Indexed by Current Contents and Index Medicus. Subscription rates \$120.00 (\$140.00 foreign); institutions \$165.00 (\$185 foreign) single copy \$14.00 (\$16.00 foreign). Copyright © 1982 by The American Society for Pharmacology and Experimental Therapeutics

!!!RATS!!!



CARDIAC OUTPUT BY THERMODILUTION

"CARDIOMAX" model II-R is the only computer which can measure cardiac output of rats (and also guinea pigs, rabbits, dogs, chickens, humans and horses). For rats, it uses unique Columbus Instruments thermodilution microprobes 1/3 mm in size!

It also measures systolic, diastolic and mean blood pressures and heart rate up to 1000 beats/minute. Stroke volumes is also automatically computed.

Why Measure Cardiac Output of Rats?

Development of salt sensitive and salt resistive strains of rats provided inexpensive models for studying hypertension. Dynamics of rat circulatory system is similar to dogs or humans. Studies on rats cost only a fraction of studies using dogs.

Automatic Measurements Without Supervision

All parameters (cardiac output, stroke volume, three blood pressures, blood temperature, heart rate, time of day) can automatically be measured periodically and printed when using "CARDIOMAX-II-R" with Columbus Instruments Automatic Injector and Printer.

For more information, write or call:



for prompt subscription service...

attach label here

Please use this coupon and attach a recent label in the space provided when writing to us about:

- change of address
- renewal
- questions regarding your subscription

Please use the space below to indicate your new address.

Name of Journal	
Name	
Address	
City/State/Zip	

THE WILLIAMS & WILKINS COMPANY

428 East Preston Street/Baltimore, Maryland 21202

Nicotinic-Catecholaminergic Interactions in Rat Brain: Evidence for Cholinergic Nicotinic and Muscarinic Interactions with Hypothalamic Epinephrine. Kevin A. Roth, Steven L. McIntire and Jack D. Barchas	416
The Role of Dopamine and Serotonin in the Discriminative Stimulus Effects of Lisuride. Francis J. White and James B. Appel	421
Differential Paraquat Uptake and Redox Kinetics of Rat Granular Pneumocytes and Alveolar Macrophages. Henry Jay Forman, Thomas K. Aldrich, Mark A. Posner and Aron B. Fischer	428
Age Effects on Haloperidol Pharmacokinetics in Male, Fischer-344 Rats. I. M. Kapetanovic, D. J. Sweeney and S. I. Rapoport	434
Changes in the Density of <i>Beta</i> Adrenergic Receptors in Rat Lymphocytes, Heart and Lung after Chronic Treatment with Propranolol. Ralph D. Aarons and Perry B. Molinoff	439
Sensitization Produced by Repeated Administration of Naloxone is Blocked by Food Deprivation. Diane Snell, Dan Feller, David Bylund and R. Adron Harris	444
Interaction between the Renin-Angiotensin and Beta Adrenergic Nervous Systems in Drinking and Pressor Responses after Renal Artery Constriction. J. Atkinson, Pierrette Lüthi, Roselyne Péra-Bally and Lise Peters-Haefeli	453
Presynaptic Inhibition by Dopamine Receptor Agonists of Noradrenergic Neurotransmission in the Rabbit Hypothalamus. A. M. Galzin, M. L. Dubocovich and S. Z. Langer	461
Effects of 2-Nicotinamidoethyl Nitrate on Smooth Muscle Cells of the Guinea-Pig Mesenteric and Portal Veins. Tsuyoshi Karashima, Takeo Itoh and Hirosi Kuriyama	472
Possible Mechanisms of 15-Hydroperoxyarachidonic Acid-Induced Contraction of the Canine Basilar Artery in Vitro. Tohru Koide, Tomohiro Neichi, Michiaki Takato, Hiroshi Matsushita, Katsuaki Sugioka, Minoru Nakano and Shun-ichi Hata	481
Release of Creatine Kinase and Lactate Dehydrogenase from Frog Skeletal Muscles Treated with Imipramine. G. Suarez-Kurtz and A. B. Eastwood	489
Norepinephrine Enhancement of Inhibitory Synaptic Mechanisms in Cerebellum and Cerebral Cortex: Mediation by Beta Adrenergic Receptors. Barry D. Waterhouse, Hylan C. Moises, Hermes H. Yeh and Donald J. Woodward	495
A Technique to Study Hepatic and Intestinal Drug Metabolism Separately in the Dog. David J. Effeney, Susan M. Pond, Man-Wai Lo, Bernie M. Silber and Sidney Riegelman	507
Lack of Gastrointestinal Metabolism of Propranolol in Dogs after Portacaval Transposition. Man-Wai Lo, David J. Effeney, Susan M. Pond, Bernie M. Silber and Sidney Riegelman	512

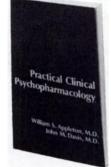
AUTHOR INDEX

Aarons, R. D., 439	Fischman, M. W., 373	Kuriyama, H., 472	Richelson, E., 334
Aaronson, L. M., 319	Forman, H. J., 428	Lamanna, V., 353	Riegelman, S., 507, 512
Aldrich, T. K., 428	Fu, TC., 362	Langer, S. Z., 461	Rose, N. J., 399
Antzelevitch, C., 353	Gaddis, R. R., 282	Lüthi, P., 453	Rosenberg, J., 368
Appel, J. B., 421	Galzin, A. M., 461	Lo, MW., 507, 512	Roth, K. A., 416
Atkinson, J., 453	Gleason, J. G., 295	Malo, P. E., 410	Ruffolo, R. R., Jr., 309
Atkinson, N., 275	Gormezano, I., 289	Martin, B. R., 362	Sanders-Bush, E., 303
Barchas, J. D., 416	Griffin, R. L., 410	Masserano, J. M., 404	Silber, B., 507, 512
Beck, T. R., 269	Grund, V. R., 342	Matsushita, H., 481	Snell, D., 444
Benowitz, N. L., 368	Harris, R. A., 444	McIntire, S. L., 416	Spector, R., 394
Blackshear, M. A., 303	Harvey, J. A., 289	Moe, G. K., 353	Stenstrom, S., 334
Bostick, S. P., 295	Hassid, A., 269	Moises, H. C., 495	Strandhoy, J. W., 347
Buckalew, V. M., Jr., 347	Hata, S., 481	Molinoff, P. B., 439	Suarez-Kurtz, G., 489
Bylund, D., 444	Hatzinikolaou, P., 315	Morris, M., 347	Sugioka, K., 481
Cacini, W., 342	Hinman, D. J., 319	Muccitelli, R. M., 295	Sved, A. F., 329
Charocopos, F., 315	Hjelle, J. J., 275	Murphy, T. B., 399	Sweeney, D. J., 434
Cohen, J., 326	Hostelley, L. S., 295	Nakano, M., 481	Takato, M., 481
Cool, V. A., 289	Itoh, T., 472	Neff, N. H., 326	Tewes, P. A., 373
Dewey, W. L., 362	Jacob, P., III, 368	Neichi, T., 481	Van Itallie, C. M., 329
DiPetti, D., 315	Johanson, C. E., 384	Ohlsson, A. E., 362	Waddell, J. E., 309
Dixon, W. R., 282	Johnson, D. K., 399	Okamoto, M., 319	Wasserman, M. A., 410
Dubocovich, M. L., 461	Jones, D., 362	Péra-Bally, R., 453	Waterhouse, B. D., 495
Dunn, M. J., 269	Jones, R. T., 368	Petersen, D. R., 275	Weichman, B. M., 295
Eastwood, A. B., 489	Kapetanovic, I. M., 434	Peters-Haifeli, L., 453	Weiner, N., 404
Effeney, D. J., 507, 512	Karashima, T., 472	Pippard, M. J., 399	White, F. J., 421
Feller, D., 444	Keller, M. B., 342	Pond, S. M., 507, 512	Woodward, D. J., 495
Fernstrom, J. D., 329	Koide, T., 481	Posner, M. A., 428	Yaden, E. L., 309
Fischer, A. B., 428	Krell, R. D., 295	Rapoport, S. I., 434	Yeh, H. H., 495

TO AUGMENT **YOUR EXPERIENCE—** CLINICAL RESOURCES from WILLIAMS & WILKINS

Let these two exciting titles join forces with your professional abilities.

Try them out free for 20 days!



Manual Of Clinical Pharmacology

Edited by David Robertson, MD, and Craig R. Smith, MD

It is well known that a core armamentarium of several dozen key drugs will suffice for the vast majority of clinical situations. This handy new manual gives you the most thorough understanding possible of the drugs commonly used in clinical practice, and supplies an annotated bibliography on these drugs as a point of access to the more detailed pharmacological literature. The discussion sections are not intended to be complete reviews. They are provided to quickly identify drugs which are practical, difficult, or new. You have to have some knowledge of all of the thousands of drugs on the market . . . but you should have a very thorough understanding of the few dozen drugs that are most frequently used. This little book highlights those areas that are truly most important to you.

Contents: Antibiotics. Antihypertensives. Antiarrhythmics and cardiovascular drugs. Diuretics. Drugs affecting neurotransmission. Anticoagulants. Analgesics. Drugs affecting the central nervous system. Oncologic agents. Drugs affecting the endocrine system. Miscellaneous. Index.

1981/about 368 pages/\$17.00 (softcover)/7300-1

Practical Clinical Psychopharmacology Second Edition

William S. Appleton, MD and John M. Davis, MD

"The authors, who posess impeccable credentials, have put together a handbook that is reliable, responsible, judicious, careful, and practical."

- from a review of the First Edition in **Modern Medicine**

The authors call their book "a practical guide based on solid science." You will find it to be an indispensable manual of the latest clinical applications of psychopharmacology.

This new Second Edition distills the essential information from more than 15,000 published articles. It succinctly covers the diverse aspects of psychopharmacology and deals with the major categories of useful pharmacotherapeutic agents. Practical Clinical Psychopharmacology will provide you with all the latest information so you can prescribe psychotropic drugs rationally and counter side-effects efficiently.

Contents: Before drug therapy begins. Choosing an antipsychotic. Principles of prescribing antipsychotics. Pharmacological treatment for mood (affective) disorders. Anti-anxiety agents: adjuncts to psychotherapy. Medical emergency: overdose.

1980/173 pages/illustrated/\$15.95/0238-4

ORDER TODAY

YES, please send me these selections on 20-day FREE approval:

- □ Robertson Manual of Clinical Pharmacology (7300-1) \$17.00 (U.S. price)
- □ Appleton Practical Clinical Psychopharmacology (0238-4) \$15.95 (U.S. price)

I've checked the payment option below:

□ Payment enclosed. I save all postage and handling with full refund still guaranteed.

□ Bill me.

Bill my VISA □ MasterCard □ Residents of CA, VA, MD, please add sales tax. Prices subject to change without notice. Prices slightly higher outside the U.S. Please pay in U.S. dollars.

TO ORDER TOLL FREE, CALL US TODAY at 1-800-638-0672 from 9 AM to 4 PM. From Maryland phones, call 528-4221 collect.

N	lam

Address

exp. date

City/State/Zip

NEW offer from the oldest and largest truly international bookclub.

"A Better Way to Buy Books."
The Academic Book Club has expanded the idea of a traditional book club into a completely new and unique concept.

SAVE 20-40%

ON ANY BOOK IN PRINT!

Save up to 80% on selected titles.

- NO GIMMICKS
- NO HIDDEN CHARGES
- AND NO HARD SELL

Just Low, Low Prices Every Day of the Year;

Unlimited Choice of Books; And Fast, Efficient, Personal Service on Every Order.

ACADEMIC BOOK CLUB

U.S.A.: Cape Vincent, New York 13618-0399
Canada: 105 Wellington St., Kingston, Ontario K7L 5C7
Europe: Postbus 1891, 1005 AP Amsterdam,
The Netherlands

Asia: 78, First Cross Street, Colombo II, Sri Lanka Africa: P.O. Box 159, Ilaro, Ogun State, Nigeria

Dear ABC

Please tell me, without any obligation on my part, how I can order for myself and for my friends anywhere in the world any book in print, from any publisher, from any country, in almost any language.

Tell me in addition how I can save 20–40% on these books joining the ACADEMIC BOOK CLUB and paying a membership fee as low as 1.8¢ daily (\$6.50 annually).

I understand that one of the features of the club is that I am not now, nor will I ever be, under any obligation whatsoever to buy any particular book or quantity of books from Academic Book Club.

PLEASE	PRINT:
---------------	--------

L L L	3 E	rı	71	IN I																						
Circle	ар	pr	oţ	ori	at	е	al	bb	re	ev	ia	tic	on	(S	s):	C	r.	P	rof	f.	Re	٧.	М	r.	М	rs.
Miss N	۸s.																									
Name																										
Addre	ss																									
																			P.	C	oc	јe				
Note																			Da	ate	€ .					

Help us to serve you better.....

If your mailing label does not contain your zip code, note it on the label and return it to us for correction.

Remember, your Zip Code provides faster, more direct delivery of your journals. Use it on all correspondence, too.



Naunyn-Schmiedeberg's Archives Of Pharmacology

December II

K.-H. Graefe: The Disposition of ³H-(-) Noradrenaline in the Perfused Cat and Rabbit Heart **71**

F. Brandão, E. Rodrigues-Pereira, J. G. Monteiro, R. Davidson: A Kinetic Study of the Release of Noradrenaline by Tyramine 83

L. G. Garland, N. V. Marrion, G. R. Martin: The Extraneuronal O-Methylation of 3H -(\pm)Isoprenaline by Guinea-Pig Tracheal Rings in vitro 88

R. Chermat, L. Doaré, F. Lachapelle, P. Simon: Effects of Drugs Affecting the Noradrenergic System on Convulsions in the Quaking Mouse 94

D. Dawbarn, C. J. Pycock: Motor Effects Following Application of Putative Excitatory Amino Acid Antagonists to the Region of the Mesencephalic Dopamine Cell Bodies in the Rat 100

E. Habermann: Tetanus Toxin and Botulinum A Neurotoxin Inhibit and at Higher Concentrations Enhance Noradrenaline Outflow from Particulate Brain Cortex in Batch 105

Volume 318 Number 2 1981

P. Honerjäger, M. Schäfer-Korting, M. Reiter: Involvement of Cyclic AMP in the Direct Inotropic Action of Amrinone. Biochemical and Functional Evidence 112

S. Halbach, G. Schönsteiner, F. Ebner, M. Reiter: The Effects of p-Chloromercuriphenylsulfonic Acid (PCMBS) on Force of Concentration of Mammalian Myocardium and on ATP Hydrolysis by Sarcolemmal ATPase 121

E. F. Smith III, A. M. Lefer, J. B. Smith, K. C. Nicolaou: Thromboxane Synthetase Inhibitors Differentially Antagonize Thromboxane Receptors in Vascular Smooth Muscle 130

G. Planelles, J. Teulon, T. Anagnostopoulos: The Effects of Barium on the Electrical Properties of the Basolateral Membrane in Proximal Tubule 135

Indexed in Current Contents



Tap into the broadest international coverage of the most rapidly growing branch of biological science

The Journal of Neuroscience the Official Journal of the Society for Neuroscience

You need **The Journal of Neuroscience** NOW, because there's no better way to keep up with crucial advances that affect YOUR work.

You need its interdisciplinary coverage, its scouting of findings in all areas of neuroscience. You'll appreciate the way it mirrors the objectives of the North American Society for Neuroscience, as well as the Societies in Europe and Japan. And the way it keeps you absolutely up-to-date, no matter where significant breakthroughs

Here's a sampling of recent* articles:

- Morphology and Synaptic Connections of Ultrafine Primary Axons in Lamina I of the Spinal Dorsal Horn: Candidates for the Terminal Axonal Arbors of Primary Neurons with Unmyelinated (C) Axons
- In Vitro Resetting of the Circadian Clock in the Aplysia Eye
- Rohon-Beard Neurons Arise from a Substitute Ancestral Cell after Removal of the Cell from Which They Normally Arise in the 16-Cell Frog Embryo
- Postnatal Development of Dopaminergic Neurons in the Rabbit Retina
- Brain Peptidase with a Unique Neuronal Localization: The Histochemical Distribution of Dipeptidyl aminopeptidase II
- Developmental Stage-specific Changes in Lectin Binding to Mouse Cerebellar Cells In Vitro
- The Laminar Origin and Distribution of the Crossed Tectoreticular Pathways

*from the August and October 1981 issues.

Section Editors

Molecular Neuroscience
Solomon H. Snyder
Cellular Neuroscience
Michael V. Bennett
Developmental Neuroscience
Gerald D. Fischbach
Neural Systems
Edward V. Evarts
R. W. Guillery
Behavioral Neuroscience
Eric R. Kandel

The Journal is edited by W. Maxwell Cowan of the Salk Institute for Biological Studies. The Board of Publication Trustees includes Julius Axelrod, Herbert H. Jasper, Seymour S. Kety, Vernon B. Mountcastle, Walle J. H. Nauta, and Pedro N. Rudomin.

Encourage your library to subscribe, and start using this first-rate journal. The institutional fee for a year's subscription is \$230.00. Once your department or institution subscribes, YOU can subscribe for the discount individual rate of \$60.00.

SEND IN THIS COUPON TODAY.

Please sign me up for a year's subscription	to The Journal of Neuro	science,
starting in January, 1982.		
☐ Institutional: \$230.00		
☐ Discount Individual: \$60.00 (With Inst	itutional subscription).	
(Add \$20.00 outside the US)		
PAYMENT Check enclosed B	ll me 🗌 MasterCard	□ VISA
Card Number		Expiration
Name		
Address		
City	State	Zip
ORDER FREE BY PHONE: To ord	ler with or without cred	lit card, call
1-800-638-0672 between 9 am and 4		•
•		,
((w) Willis	ams & Wilkin	S
W ind		~

Dept. 374, P.O. Box 1496, Balto., MD 21203

JONAD 90530