Stanford

Wray Huestis

Professor of Chemistry, Emerita

Bio

BIO

Professor Wray Huestis' research concerns the molecular mechanisms whereby cells control their shape, motility, deformability and the structural integrity of their membranes. Metabolic control of interprotein and protein-lipid interactions is studied by a variety of biochemical, spectroscopic and radiochemical techniques, including fluorescence and EPR spectrometry, autoradiography and electron microscopy. The role of lipid metabolism and transport in regulating the fluid dynamics of cell suspensions (red blood cells, platelets, lymphocytes) is examined using circulating cells and cells grown in culture. Cell-cell and cell-liposome interactions are studied using model membrane systems with widely differing physical properties. Complexes of liposomes and encapsulated viruses are used as selective vectors to deliver water-soluble compounds across the membranes of intact cells. The particular projects described in the listed publications have as a common goal an understanding of the molecular workings of the cell membrane.

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Chemistry

ADMINISTRATIVE APPOINTMENTS

- Vice-Chair, Department of Chemistry, Stanford University, (2005-2011)
- Associate Professor, Department of Chemistry, Stanford University, (1980-1986)
- Assistant Professor, Department of Chemistry, Stanford University, (1974-1980)
- Sloan Fellow, Stanford University, (1977-1979)

HONORS AND AWARDS

- Distinguished Teaching Award, Stanford University (1988)
- Sloan Foundation Fellow, Alfred P. Sloan Foundation (1977-79)
- National Institutes of Health Research Career Development, NIH (1977 - 1981)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Stanford University Committee on Libraries (2012 - 2013)
- Member, Stanford Chemistry Department Graduate Studies Committee (2011)
- Member, Stanford Chemistry Department Curriculum Committee (2011)
- Member, ad hoc committee on design of Teaching and Learning Center Chemistry and Biology Departments (2011 - 2013)
- Ombuds, Chemistry Department (2003 - 2011)
- Member, Phi Beta Kappa (1997)

- Chair, Stanford Chemistry Department Committee on Teaching Assignments (1990 - 2011)
- Member, National Science Foundation Graduate Fellowship Panel (1989 - 1992)
- Member, Red Cell Club (1980)
- Member, Biophysical Society (1979)
- Member, National Institutes of Health Study Section on Biophysics and Biophysical Chemistry (1977 - 1980)
- Member, American Chemical Society (1967)

PROFESSIONAL EDUCATION

- NIH Postdoctoral Fellow, Stanford University , Chemistry (1974)
- PhD, California Institute of Technology , Biophysics, minor in Chemistry (1972)
- BA, Macalester College , Chemistry (1967)

Publications

PUBLICATIONS

- **Selective amphipathic nature of chlorpromazine binding to plasma membrane bilayers** *BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES*
  Chen, J. Y., Brunauer, L. S., Chu, F. C., Helsel, C. M., Gedde, M. M., Huestis, W. H.
  2003; 1616 (1): 95-105
- **Preparation and analysis of small unilamellar phospholipid vesicles of a uniform size** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
  Pitcher, W. H., Huestis, W. H.
  2002; 296 (5): 1352-1355
- **Interaction of nominally soluble proteins with phospholipid monolayers at the air-water interface** *BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES*
  Pitcher, W. H., Keller, S. L., Huestis, W. H.
  2002; 1564 (1): 107-113
- **Selective virus-mediated intracellular delivery of membrane-impermeant compounds by means of plasma membrane vesicles** *ANTIVIRAL RESEARCH*
  Trigiante, G., Huestis, W. H.
  2000; 45 (3): 211-221
- **Resolution of the paradox of red cell shape changes in low and high pH** *BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES*
  Gedde, M. M., Yang, E. Y., Huestis, W. H.
  1999; 1417 (2): 246-253
- **Interactions of a vesicular stomatitis virus G protein fragment with phosphatidylserine: NMR and fluorescence studies** *BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES*
  Hall, M. P., Burson, K. K., Huestis, W. H.
  1998; 1415 (1): 101-113
- **Red blood cell lipids form immiscible liquids** *PHYSICAL REVIEW LETTERS*
  Keller, S. L., Pitcher, W. H., Huestis, W. H., McConnell, H. M.
  1998; 81 (22): 5019-5022
- **Membrane potential and human erythrocyte shape** *BIOPHYSICAL JOURNAL*
  Gedde, M. M., Huestis, W. H.
  1997; 72 (3): 1220-1233
- **Cytoplasmic pH and human erythrocyte shape** *BIOPHYSICAL JOURNAL*
  Gedde, M. M., Davis, D. K., Huestis, W. H.
  1997; 72 (3): 1234-1246

- **Role of membrane lipid distribution in chlorpromazine-induced shape change of human erythrocytes** *BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES*
  Chen, J. Y., Huestis, W. H.
  1997; 1323 (2): 299-309

- **Hemoglobin oxidation products extract phospholipids from the membrane of human erythrocytes** *BIOCHEMISTRY*
  MOXNESS, M. S., Brunauer, L. S., Huestis, W. H.
  1996; 35 (22): 7181-7187

- **Physical determinants of intermembrane protein transfer** *BIOCHEMISTRY*
  WATERS, S. I., Sen, R., Brunauer, L. S., Huestis, W. H.
  1996; 35 (13): 4002-4008

- **SHAPE RESPONSE OF HUMAN ERYTHROCYTES TO ALTERED CELL PH** *BLOOD*
  Gedde, M. M., Yang, E. Y., Huestis, W. H.
  1995; 86 (4): 1595-1599

- **WHEAT-GERM-AGGLUTININ STABILIZATION OF ERYTHROCYTE SHAPE - ROLE OF BILAYER BALANCE AND THE MEMBRANE SKELETON** *BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES*
  Lin, S. S., Huestis, W. H.
  1995; 1233 (1): 47-56

- **QUANTIFICATION OF 2-DIMENSIONAL NOE SPECTRA VIA A COMBINED LINEAR AND NONLINEAR LEAST-SQUARES FIT** *JOURNAL OF BIOMOLECULAR NMR*
  Brown, J. W., Huestis, W. H.
  1994; 4 (5): 645-652

- **RELATIONSHIP OF PHOSPHOLIPID DISTRIBUTION TO SHAPE CHANGE IN CA2+-CRENATED AND RECOVERED HUMAN ERYTHROCYTES** *BIOCHEMISTRY*
  Lin, S. S., Yang, E. Y., Huestis, W. H.
  1994; 33 (23): 7337-7344

- **OXIDATIVE INTERACTIONS BETWEEN THE ERYTHROCYTE-MEMBRANE AND PHOSPHATIDYLCHOLINE VESICLES** *JOURNAL OF BIOLOGICAL CHEMISTRY*
  Yang, E. Y., Huestis, W. H.
  1994; 269 (20): 14518-14524

- **HYDROGEN-PEROXIDE OXIDATION INDUCES THE TRANSFER OF PHOSPHOLIPIDS FROM THE MEMBRANE INTO THE CYTOSOL OF HUMAN ERYTHROCYTES** *BIOCHEMISTRY*
  Brunauer, L. S., MOXNESS, M. S., Huestis, W. H.
  1994; 33 (15): 4527-4532

- **PHOSPHATIDYLSERINE HEADGROUP DIASTEREOMERS TRANSLOCATE EQUIVALENTLY ACROSS HUMAN ERYTHROCYTE-MEMBRANES** *BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES*
  Hall, M. P., Huestis, W. H.
  1994; 1190 (2): 243-247

- **PROTEIN-KINASE-C AS A MEASURE OF TRANSBILAYER PHOSPHATIDYLSERINE ASYMMETRY** *ANALYTICAL BIOCHEMISTRY*
  Daleke, D. L., Huestis, W. H., Newton, A. C.
  1994; 217 (1): 33-40

- **MECHANISM OF INTERMEMBRANE PHOSPHATIDYLCHOLINE TRANSFER - EFFECTS OF PH AND MEMBRANE CONFIGURATION** *BIOCHEMISTRY*
  Yang, E. Y., Huestis, W. H.
  1993; 32 (45): 12218-12228

- **HUMAN ERYTHROCYTE-MEMBRANE LIPID ASYMMETRY - TRANSBILAYER DISTRIBUTION OF RAPIDLY DIFFUSING PHOSPHATIDYLSERINES** *BIOCHEMISTRY*
  Loh, R. K., Huestis, W. H.
  1993; 32 (43): 11722-11726

- **EFFECTS OF EXOGENOUS PHOSPHOLIPIDS ON PLATELET ACTIVATION** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Brunauer, L. S., Huestis, W. H.
  1993; 1152 (1): 109-118
- **DITHIOTHREITOL STIMULATES THE ACTIVITY OF THE PLASMA-MEMBRANE AMINOPHOSPHOLIPID TRANSLOCATOR** *BIOCHIMICA ET BIOPHYSICA ACTA*
  TRUONG, H. T., Daleke, D. L., Huestis, W. H.
  1993; 1150 (1): 57-62
- **HUMAN ERYTHROCYTE SHAPE REGULATION - INTERACTION OF METABOLIC AND REDOX STATUS** *BIOCHIMICA ET BIOPHYSICA ACTA*
  TRUONG, H. T., Daleke, D. L., Huestis, W. H.
  1993; 1150 (1): 51-56
- **STRUCTURE AND ORIENTATION OF A BILAYER-BOUND MODEL TRIPEPTIDE - A H-1-NMR STUDY** *JOURNAL OF PHYSICAL CHEMISTRY*
  Brown, J. W., Huestis, W. H.
  1993; 97 (12): 2967-2973
- **ERYTHROCYTE MORPHOLOGY REFLECTS THE TRANSBILAYER DISTRIBUTION OF INCORPORATED PHOSPHOLIPIDS** *JOURNAL OF CELL BIOLOGY*
  Daleke, D. L., Huestis, W. H.
  1989; 108 (4): 1375-1385
- **VESICLE-TO-CELL PROTEIN TRANSFER - INSERTION OF BAND-3, THE ERYTHROCYTE ANION TRANSPORTER, INTO LYMPHOID-CELLS** *BIOCHEMISTRY*
  Newton, A. C., Huestis, W. H.
  1988; 27 (13): 4655-4659
- **LYMPHOMA VESICLE INTERACTIONS - VESICLE ADSORPTION, MEMBRANE FRAGMENTATION, AND INTERMEMBRANE PROTEIN TRANSFER** *BIOCHEMISTRY*
  Newton, A. C., Huestis, W. H.
  1988; 27 (13): 4645-4655
- **MEMBRANE BILAYER BALANCE AND PLATELET SHAPE - MORPHOLOGICAL AND BIOCHEMICAL RESPONSES TO AMPHIPATHIC COMPOUNDS** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Ferrell, J. E., Mitchell, K. T., Huestis, W. H.
  1988; 939 (2): 223-237
- **INTERMEMBRANE PROTEIN TRANSFER - BAND-3, THE ERYTHROCYTE ANION TRANSPORTER, TRANSFERS IN NATIVE ORIENTATION FROM HUMAN RED-BLOOD-CELLS INTO THE BILAYER OF PHOSPHOLIPID-VESICLES** *JOURNAL OF BIOLOGICAL CHEMISTRY*
  Huestis, W. H., Newton, A. C.
  1986; 261 (34): 6274-6278
- **SEPARATION OF PHOSPHOINOSITIDES AND OTHER PHOSPHOLIPIDS BY TWO-DIMENSIONAL THIN-LAYER CHROMATOGRAPHY** *ANALYTICAL BIOCHEMISTRY*
  Mitchell, K. T., Ferrell, J. E., Huestis, W. H.
  1986; 158 (2): 447-453
- **EFFLUX OF DIPICOLINIC ACID FROM HUMAN-ERYTHROCYTES, SEALED MEMBRANE-FRAGMENTS, AND BAND-3-LIPOSOME COMPLEXES - A FLUORESCENCE PROBE FOR THE ERYTHROCYTE ANION TRANSPORTER** *ANALYTICAL BIOCHEMISTRY*
  Newton, A. C., Huestis, W. H.
  1986; 156 (1): 56-60
- **SULFHYDRYL REDUCING AGENTS AND SHAPE REGULATION IN HUMAN-ERYTHROCYTES** *BLOOD*
  TRUONG, H. T., Ferrell, J. E., Huestis, W. H.
  1986; 67 (1): 214-221
- **INCORPORATION AND TRANSLOCATION OF AMINOPHOSPHOLIPIDS IN HUMAN-ERYTHROCYTES** *BIOCHEMISTRY*
  Daleke, D. L., Huestis, W. H.
  1985; 24 (20): 5406-5416

- **SELECTIVE ABSORPTION OF ULTRAVIOLET-LASER ENERGY BY HUMAN ATHEROSCLEROTIC PLAQUE TREATED WITH TETRACYCLINE** *AMERICAN JOURNAL OF CARDIOLOGY*
  MURPHYCHUTORIAN, D., Kosek, J., Mok, W., Quay, S., HUESTIS, W., MEHIGAN, J., Profitt, D., Ginsburg, R.
  1985; 55 (11): 1293-1297
- **LIPID TRANSFER BETWEEN PHOSPHATIDYLCHOLINE VESICLES AND HUMAN-ERYTHROCYTES - EXPONENTIAL DECREASE IN RATE WITH INCREASING ACYL CHAIN-LENGTH** *BIOCHEMISTRY*
  Ferrell, J. E., Lee, K. J., Huestis, W. H.
  1985; 24 (12): 2857-2864
- **MEMBRANE BILAYER BALANCE AND ERYTHROCYTE SHAPE - A QUANTITATIVE ASSESSMENT** *BIOCHEMISTRY*
  Ferrell, J. E., Lee, K. J., Huestis, W. H.
  1985; 24 (12): 2849-2857
- **PHOSPHOINOSITIDE METABOLISM AND THE MORPHOLOGY OF HUMAN-ERYTHROCYTES** *JOURNAL OF CELL BIOLOGY*
  Ferrell, J. E., Huestis, W. H.
  1984; 98 (6): 1992-1998
- **SHAPE CHANGES IN GOOSE ERYTHROCYTES** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Nikinmaa, M., Huestis, W. H.
  1984; 773 (2): 317-320
- **ADRENERGIC SWELLING OF NUCLEATED ERYTHROCYTES - CELLULAR MECHANISMS IN A BIRD, DOMESTIC GOOSE, AND 2 TELEOSTS, STRIPED BASS AND RAINBOW-TROUT** *JOURNAL OF EXPERIMENTAL BIOLOGY*
  Nikinmaa, M., Huestis, W. H.
  1984; 113 (NOV): 215-224
- **TRANSFER OF BAND-3, THE ERYTHROCYTE ANION TRANSPORTER, BETWEEN PHOSPHOLIPID-VESICLES AND CELLS - APPENDIX - ANALYSIS OF CHLORIDE INFLUX** *BIOCHEMISTRY*
  Newton, A. C., Cook, S. L., Huestis, W. H., Ferrell, J. E.
  1983; 22 (26): 6110-6117
- **CALMODULIN-DEPENDENT SPECTRIN KINASE-ACTIVITY IN RESEALED HUMAN-ERYTHROCYTE GHOSTS** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Nelson, M. J., Daleke, D. L., Huestis, W. H.
  1982; 686 (2): 182-188
- **CHOLINERGIC STIMULATION OF GLUCOSE-TRANSPORT IN HUMAN-ERYTHROCYTES** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Nelson, M. J., Huestis, W. H.
  1982; 685 (3): 279-282
- **CALCIUM DOES NOT MEDIATE THE SHAPE CHANGE THAT FOLLOWS ATP DEPLETION IN HUMAN-ERYTHROCYTES** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Ferrell, J. E., Huestis, W. H.
  1982; 687 (2): 321-328
- **PREPARATION OF A NOVEL C-13-LABELED HEME PROTEIN** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Nelson, M. J., Huestis, W. H.
  1980; 623 (2): 467-470
- **"α-Adrenergic stimulation of human erythrocyte membrane protein phosphorylation** *BBA Biomembranes*
  J, N. M., Ferrell, J. E., Huestis, W. H.
  1980; 558: 136 - 140
- **CELL TO VESICLE TRANSFER OF INTRINSIC MEMBRANE-PROTEINS - EFFECT OF MEMBRANE FLUIDITY** *BIOCHEMISTRY*
  Cook, S. L., Bouma, S. R., Huestis, W. H.
  1980; 19 (20): 4601-4607
- **EVIDENCE THAT CALCIUM ACTS AS AN INTRACELLULAR MESSENGER FOR ADRENERGIC RESPONSES IN HUMAN-ERYTHROCYTES** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Nelson, M. J., Huestis, W. H.

1980; 600 (2): 398-405

- **MECHANISM OF ERYTHROCYTE LYSIS BY LYSOPHOSPHATIDYLCHOLINE** *BIOCHIMICA ET BIOPHYSICA ACTA*
  Bierbaum, T. J., Bouma, S. R., Huestis, W. H.
  1979; 555 (1): 102-110
- **BROMOTRIFLUOROACETONE ALKYLATES HEMOGLOBIN AT CYSTEINE BETA-93** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
  Huestis, W. H., Raftery, M. A.
  1978; 81 (3): 892-899
- **SELECTIVE EXTRACTION OF MEMBRANE-BOUND PROTEINS BY PHOSPHOLIPID VESICLES** *JOURNAL OF BIOLOGICAL CHEMISTRY*
  Bouma, S. R., Drislane, F. W., Huestis, W. H.
  1977; 252 (19): 6759-6763
- **SODIUM-SPECIFIC MEMBRANE-PERMEABILITY DEFECT INDUCED BY PHOSPHOLIPID VESICLE TREATMENT OF ERYTHROCYTES** *JOURNAL OF BIOLOGICAL CHEMISTRY*
  Huestis, W. H.
  1977; 252 (19): 6764-6768
- **PRELIMINARY CHARACTERIZATION OF ACETYLCHOLINE-RECEPTOR IN HUMAN ERYTHROCYTES** *JOURNAL OF SUPRAMOLECULAR STRUCTURE*
  Huestis, W. H.
  1976; 4 (3): 355-365
- **A single-cell system for study of cholinergic receptor function** *Proceedings of the Dahlem Workshop on Hormone and Antihormone Action at the Target Cell*
  H, H. W.
  edited by Clark, J. H.
  1976
- **CONFORMATION AND COOPERATIVITY IN HEMOGLOBIN** *BIOCHEMISTRY*
  Huestis, W. H., Raftery, M. A.
  1975; 14 (9): 1886-1892
- **FUNCTIONAL ACETYLCHOLINE-RECEPTOR IN HUMAN ERYTHROCYTE** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*
  Huestis, W. H., MCCONNEL, H. M.
  1974; 57 (3): 726-732
- **MOLECULAR-CONFORMATION AND COOPERATIVITY IN HEMOGLOBIN** *ANNALS OF THE NEW YORK ACADEMY OF SCIENCES*
  Raftery, M. A., Huestis, W. H.
  1973; 222 (DEC31): 40-55
- **Characterization of intermediate states in the ligation of hemoglobin** *Biochemistry*
  H, H. W., Raftery, M. A.
  1973; 12: 2531 - 2535
- **Comparison of the functional properties of trifluoroacetonyled hemoglobin and native hemoglobin** *Biochemistry*
  T, L. T., Huestis, W. H., Raftery, M. A.
  1973; 12: 2535 - 2539
- **The binding of n-butyl isocyanide to human hemoglobin** *Biochem. Biophys. Res. Commun.*
  H, H. W., Raftery, M. A.
  1972; 48: 678 - 683
- **Investigation of some transition metal complexes of hydrogen cyanamide** *J. Inorg. Nucl.Chem.*
  C, W. W., Huestis, W. H., Theyson, T. W.
  1972; 39: 2358 - 2362
- **F-19-NMR STUDIES OF OXYGEN BINDING TO HEMOGLOBIN** *BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS*

Huestis, W. H., Raftery, M. A.
1972; 49 (5): 1358-?

- **31P-nmr studies of the release of diphosphoglyceric acid on carbon monoxide binding to hemoglobin** *Biochem. Biophys. Res. Commun.*
  H, H. W., Raftery, M. A.
  1972; 49: 428 - 433
- **OBSERVATION OF COOPERATIVE IONIZATIONS IN HEMOGLOBIN** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Huestis, W. H., Raftery, M. A.
  1972; 69 (7): 1887-?
- **STUDY OF COOPERATIVE INTERACTIONS IN HEMOGLOBIN USING FLUORINE NUCLEAR MAGNETIC-RESONANCE** *BIOCHEMISTRY*
  Huestis, W. H., Raftery, M. A.
  1972; 11 (9): 1648-?
- **USE OF F-19-NUCLEAR MAGNETIC-RESONANCE SPECTROSCOPY FOR DETECTION OF PROTEIN CONFORMATION CHANGES - APPLICATION TO LYSOZYME, RIBONUCLEASE AND HEMOGLOBIN** *COLD SPRING HARBOR SYMPOSIA ON QUANTITATIVE BIOLOGY*
  Raftery, M. A., Huestis, W. H., Millett, F.
  1971; 36: 541-?
- **Use of fluorine-19 nuclear magnetic resonance to study conformation changes in specifically modified ribonuclease S** *Biochemistry*
  H, H. W., Raftery, M. A.
  1971; 10: 1181 - 1186