



Harry G. Fair

Each year, a special lecture is given in memory of Harry G. Fair, an outstanding OU alumnus. Harry G. Fair was born in Okmulgee, Oklahoma, on June 3, 1916. He received his B.S. in Chemical Engineering in 1939. He joined Phillips Petroleum Company in 1939 and worked his way up to Vice President for Supply and Transportation, with responsibility for world-wide exchange of crude oil and all transportation facilities. In 1966, he joined the M.W. Kellogg Company as Executive Vice President, in charge of all engineering activities and became Executive Vice President of Coastal States Gas Corporation from 1971 until the time of his death on July 27, 1974. Harry G. Fair was active in service to society and to his alma mater. He was a member of a number of professional societies and was a licensed professional engineer.

This lecture is made possible by the Harry G. Fair Memorial Fund contributed by his widow, Jane Swift Fair. Arrangements are made by the School of Chemical Engineering and Materials Science.

"Bioengineering and Vascular Biology"

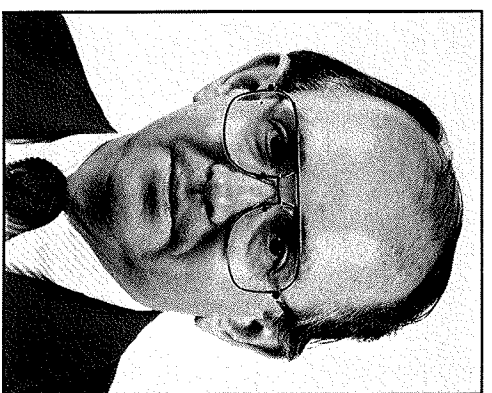
by

Larry V. McIntire

**E. D. Butcher Professor and Chairman,
Institute of Biosciences and Bioengineering,
Rice University**

The vascular endothelium exists in a mechanically active environment that includes both fluid shear stress generated by flowing blood and stretching forces generated by transmural pressures. The magnitude and direction of these forces vary with time and location in the vasculature. Recent work from our laboratories will be discussed showing that endothelial cell protein secretion is altered by hemodynamic forces and that these changes likely occur at the genetic level, including effects on synthesis and secretion or expression of tissue plasminogen activator, plasminogen activation inhibitor type 1, endothelin, thrombomodulin and ICAM-1. Physiological levels of mechanical strain and fluid appear to have quite different effects on protein secretion.

A second topic concerns the molecular mechanisms involved in blood borne neutrophil recognition of specific regions of inflamed endothelium, local arrest, and transmigration to the tissue space. The process is highly regulated, with aspects of both great complexity and beautiful simplicity. A two-step model of neutrophil localization in post-capillary venules at inflammatory sites is presented. The initial step in this model involves an adhesive event that is evidenced by neutrophils rolling along and stopping on the endothelium, and the second step involves transendothelial migration. The initial interaction is only possible over a limited range of local wall shear stresses. Cytokine (IL-1) stimulation of the endothelium is sufficient to bring about both steps. Histamine or thrombin stimulation causes rapid P-selectin expression on the endothelium, which will promote rolling but little transmigration under dynamic conditions. Our current evidence indicates that L-selectin, E-selectin and specific carbohydrate structures are predominantly required after cytokine stimulation for the initial step when adhesion must occur under conditions of venous flow, while L-selectin, P-selectin, and specific carbohydrate structures are required for initial adhesion after histamine or thrombin activation of the endothelium. CD18 integrins may perform an accessory function by slowing the rolling motion and possibly stopping the neutrophil on the luminal side of the endothelium. CD18 integrins (CD11a/CD18 and CD11b/CD18 and ICAM-1) play a predominant role in the second step, transmigration.



Larry V. McIntire

Larry V. McIntire is the E. D. Butcher Professor of Chemical and Biomedical Engineering at Rice University. He is also Chair of the Institute of Biosciences and Bioengineering and Director of the Cox Laboratory for Biomedical Engineering within the Institute. Dr. McIntire received his B.S. and M.S. degrees from Cornell University in 1966 and his Ph.D. from Princeton University in 1970, all in Chemical Engineering. He has been at Rice University since 1970 and has supervised over 30 Ph.D. graduates during that time. Recent activities have included program chair for the Engineering Fundamentals in Life Sciences Area of the American Institute of Chemical Engineers (1992-94), program chair for the Biomedical Engineering Society (1992), member of the Board of Directors of the Biomedical Engineering Society (1992-95), and Sigma Xi National Lecturer (1993-95). Dr. McIntire is a member of the National Research Council Committee on Bioprocess Engineering (1991-92). This committee produced the recently published NRC report "Putting Biotechnology to Work: Bioprocess Engineering". Dr. McIntire's research interests include the effects of flow on mammalian cell metabolism, molecular mechanisms of cell adhesion, tissue engineering, mammalian cell culture, and bioengineering aspects of vascular biology. He is the recipient of a National Institutes of Health Merit Award and was a regular member of the Surgery and Bioengineering Study Section of NIH 1984-88. He is a Funding Fellow of the American Institute of Medical and Biological Engineering. Dr. McIntire was the 1992 Alza Distinguished Lecturer of the Biomedical Engineering Society and the 1992 recipient of the American Institute of Chemical Engineering Food, Pharmaceutical and Bioengineering Division Award.

*You Are Cordially Invited
To Attend*

The 19th Annual

**Harry G. Fair
Memorial Lecture**

in

Chemical Engineering
And Materials Science

April 15, 1993

3:30 P.M.

*The Lecture will be given
on campus,
In Sarkeys Energy Center,
Room M-204*

*Coffee and Refreshments
will be served*

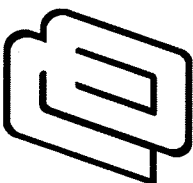
School of Chemical Engineering
& Materials Science
The University of Oklahoma
Sarkeys Energy Center
100 E. Boyd, Room T-335
Norman, Oklahoma 73019-0628

The University of Oklahoma
College of Engineering

The
19th
Annual

**Harry G. Fair
Memorial Lecture**

in



Chemical
Engineering

1993