1 The Fluorescent Microsphere Resource Center (FMRC)

Purpose of the FMRC and this Manual

The Fluorescent Microsphere Resource Center (FMRC) developed from the need to identify and develop nonradioactive methods for measuring regional organ blood flow. This manual is intended to serve as a practical reference for scientists who are beginning to use fluorescent microspheres to measure regional organ perfusion.

The Fluorescent Microsphere Resource Center

The purpose of the FMRC is to provide a forum to exchange information among scientists regarding new methods for measuring regional organ blood flow as well as to continue the development of new methods.

Since its introduction by Rudolf and Heyman (1967), measurement of regional organ blood flow using radio-labeled microspheres has become the gold standard. However, there are increasing concerns regarding health and environmental hazards and expense associated with special handling, disposal and limited shelf-life.

Techniques using fluorescent microspheres to measure regional organ blood flow have only recently been developed and validated against traditional radioactive methods (Glenny, et al. 1993; Prinzen, et al. 1994; Van-Oosterhout, et al. 1995). Fluorescent methodologies are evolving rapidly and are currently being used world-wide. The FMRC serves as a focal point for compilation and dissemination of information regarding fluorescent technology.

The FMRC is a nonprofit organization located at the University of Washington. It is supported as a core facility by multiple investigators in the Division with grants from the NIH. Funds from private industry also support the FMRC with the understanding that these funds will be used to promote the advancement of the scientific process rather than exploitation of commercial interests.

The FMRC Manual

This manual serves as a primer and practical reference for scientists planning to use fluorescent microspheres to measure regional organ perfusion. The manual includes information on all aspects of fluorescent microsphere techniques related to the measurement of regional organ perfusion. Information about the physical properties of fluorescent microspheres, their preparation and injection, and techniques for their recovery are provided. The manual also includes a short tutorial on the principles and measurement of fluorescence. The specifics of using a spectrophotometer are addressed. The manual is

continually revised and updated based on comments, requests, and contributions from users. For this manual to serve its intended purpose, feedback from users is essential. We need to know what works and what does not. Please let us know about sections of the manual that are not clear.

A secondary purpose of this manual is to answer frequently-asked questions (FAQ's). If an answer cannot be found in the manual, personnel at the FMRC or users of the FMRC list server will respond to specific questions.

Obtaining Information from the FMRC

Distribution of information on fluorescent microsphere methods is accomplished through the following modalities:

- **Electronic mail**. Personnel at the FMRC answer this mail and return requested information and manuals. Electronic mail should be sent to:

  glenny@u.washington.edu

- The FMRC has a **home page** on the internet. This web site is updated regularly and provides a convenient interface to browse through FMRC information or download pertinent files. The web site includes recent announcements, the latest manuals and current WINFAC analysis software. Documents are available in Adobe Acrobat™ PDF format for easy viewing and printing. High-quality images of fluorescent microspheres are also available through the web site. The FMRC home page is:

  http://fmrc.pulmcc.washington.edu/

- A **FAX** machine receives requests and transmits information to those scientists who do not have access to the Internet. The fax number is: (206) 685-8673.

- Requests for information or questions can also be answered through **postal mail**. The FMRC may be contacted at the following address:

  Fluorescent Microsphere Resource Center
  University of Washington
  Box 356522
  Seattle, WA 98195-6522
  USA

- Scientists are encouraged to **visit** the FMRC Laboratory. Visitors are welcome to participate in experiments or simply observe. Scientists may conduct their own experiments if previously cleared by the University of Washington Animal Care Committee.

References

Glenny, R. W., S. Bernard and M. Brinkley. Validation of fluorescent-labeled microspheres for measurement of regional organ perfusion. *J Appl Physiol*. 74:2585-97, 1993.

Prinzen, F. W. and R. W. Glenny. Developments in non-radioactive microsphere techniques for blood flow measurement. *Cardiovasc Res*. 28:1467-75, 1994.

Rudolph, A. M. and M. A. Heymann. The circulation of the fetus in utero. Methods for studying distribution of blood flow, cardiac output and organ blood flow. *Circ Res*. 21:163-84, 1967.

van Oosterhout, M. F., H. M. Willigers, R. S. Reneman and F. W. Prinzen. Fluorescent microspheres to measure organ perfusion: validation of a simplified sample processing technique. *Am J Physiol*. 269:H725-33, 1995.