

***THE FELLOWSHIP PROGRAM IN
MATERNAL-FETAL MEDICINE***

**Thomas Jefferson University
Jefferson Medical College**

**Thomas Jefferson University Hospital
Jefferson Health System**

**Christiana Care Health System
Delaware**

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Director, Maternal-Fetal Medicine Fellowship Program**

MATERNAL-FETAL MEDICINE FELLOWSHIP PROGRAM
DEPARTMENT OF OBSTETRICS & GYNECOLOGY

The Division of Maternal-Fetal Medicine at TJUH offers a three-year fellowship, in accordance with the guidelines established by the American Board of Obstetrics and Gynecology. The fellowship is a comprehensive structured program designed to provide didactic training, research experience, and extensive clinical activity within a busy division acknowledged regionally, nationally, and internationally in these areas. The program is approved to train two fellows per year.

FELLOWSHIP PROGRAM GOALS

The Maternal-Fetal Medicine fellowship at Thomas Jefferson University Hospital is designed to provide:

1. Extensive supervised experience in all areas of clinical perinatal medicine, in both inpatient and outpatient settings.
2. Protected time for basic science or clinically-oriented perinatal research, either within the Division or working with designated affiliated mentors within the University. These corollary research areas include (but are not limited to) Perinatal Infectious Diseases, Critical Care and Obstetric Anesthesia, Genetics and Prenatal Diagnosis, Epidemiology and Clinical Research, Ultrasound and Fetal Echocardiography, and Reproductive Immunology.
3. Training in the performance of all perinatal diagnostic procedures, including obstetric ultrasound and doppler, amniocentesis, chorionic villus sampling, fetal blood sampling, and fetal organ biopsy.
4. Structured rotations in In-Patient High-Risk Services, Out-Patient Maternal and Fetal Services consisting of Consults together with Ultrasound and Prenatal Diagnosis, Genetics, Ultrasound, Infectious Diseases, and Neonatology, along with formal classroom teaching in Biostatistics and another Maternal-Fetal Medicine related course (all required). Formal electives are available at Jefferson in Critical Care, and Obstetric Anesthesia, and at the Children Hospital of Philadelphia in Fetal Surgery. Other electives at Jefferson and at other institutions as well as classroom courses are guided by the fellow's research interest.
5. Correlation of perinatal training with in-depth education in neonatal medicine, including the newest advances in ventilatory support, neonatal surgery and resuscitation and management of the very-low-birth weight infant.

BRIEF SUMMARY OF THE PROGRAM

The goal of the Maternal-Fetal Medicine fellowship program at Thomas Jefferson University is to prepare individuals for a productive career in academic perinatal medicine. The structure of the three-year course of training serves as a model for the balance between clinical acumen and research experience needed to successfully approach such a career. Clinical exposure in all areas of maternal and fetal medical management is provided both at Thomas Jefferson University Hospital and at its affiliated site for perinatal medicine at Christiana Care Health System. Both centers have long-standing reputations for excellence in clinical and research areas, with a large volume of publications and presentations at national meetings. The incorporation of both sites into a single fellowship program centered at Thomas Jefferson University has greatly expanded both guided research and supervised clinical training opportunities for fellows-in-training. All fellows are primarily based at Jefferson, which provides their academic appointments, with structured training rotations in inpatient and outpatient medicine at both hospital sites.

STRUCTURE OF THE FELLOWSHIP

The diagrams on the following pages offer representational models of the three years of training within the Maternal-Fetal Medicine Division at Jefferson.

The three years of training consist of 50% clinical blocks, alternating supervision of the Inpatient High-Risk Services with other required clinical rotations and 50% protected time for research. The curriculum is designed to help the fellow progress from basic obstetrical and ultrasound skills to advanced maternal-fetal medicine diagnostics, therapeutics and counseling. Each fellow spends six months in the first and second year in MFM clinical services. The first year, three months are spent on the High-Risk Service, which coordinates in-house activities at Jefferson. The High-Risk "team" consists of the fellow and a consistent supervising Maternal-Fetal Medicine attending, working along with the committed resident teams at each hospital. The other three months of clinical experience are spent at Christiana Care Health System, where the fellow acquires and masters hands-on ultrasonographic experience, and has the opportunity to also get involved in interesting in-patient or outpatient MFM patient management, with education and research opportunities as well. The second year, three of the six clinical months are spent in the Jefferson Center for Maternal-Fetal Health. The fellow, under direct, constant supervision of one of the MFM attendings, is involved in Outpatient MFM, i.e. maternal and fetal consultations, as well as ultrasonographic high-risk consultations and prenatal diagnosis. As shown, there is also protected research time in both of the first two years. The time in the first year is designed to be placed early enough in the year to allow the fellow to identify a research track and to begin developing a project along with his or her research mentor.

The third year of the fellowship is designed to concentrate, conduct, and complete the fellow's research training. Only a month is spent on the inpatient service, one in clinical genetics and three on the Outpatient MFM, with the remaining time spent on research. This formula provides 18 months of research over a three-year period, including time for classroom work or a one-month elective specific to the selected research track.

The three years of the fellowship are divided in the different rotations as follows in the next three pages. (See 2004-2005 sample schedule).

HIGH-RISK PREGNANCY MANAGEMENT CLINICAL EXPERIENCE

FACILITIES

Thomas Jefferson University Hospital and Christiana Care Health System together constitute one of the major tertiary referral centers for the metropolitan Philadelphia region and the largest in Delaware. As the result of a consolidated network of outreach programs in the community, the combined MFM Divisions act as consultants for a base of over 30,000 deliveries per year. While many of these women are seen primarily for antenatal evaluation and/or co-management, a substantial proportion, up to 25 per month, are transferred to the in-city hospitals for primary perinatal management of significant complications diagnosed either in the mother or fetus.

Over 2,300 women deliver primarily at Jefferson per year; approximately 55% are indigent women managed by the faculty-supervised resident service. A High-Risk Clinic (Resident Service) staffed by an MFM Fellow and MFM Attending is run at Jefferson two half-days per week; the fellow is also involved in the antepartum counseling and management of patients into the private MFM practice. Another half-day session in High-Risk Clinic is dedicated to women with current drug addiction. Christiana Care Health System has traditionally had the largest general obstetric service in the region, along with an active high-risk obstetric service, with over 7,000 deliveries, the combined programs provide the fellow with a substantial inpatient base for both clinical experience and research opportunities.

Both Jefferson and Christiana Care Health Systems have committed antepartum in-house units and large antepartum testing services. Both hospitals have obstetric intensive care units, with capability for both invasive hemodynamic monitoring and ventilatory support. Full-time obstetric anesthesia support is on-site, and the fellow learns the importance of co-managing critically ill patients with the expertise of these colleagues.

IN-PATIENT HIGH-RISK CLINICAL EXPERIENCE AT JEFFERSON

Three months of first year, two of second year, and one of third year are spent on the Inpatient High-Risk Service, with responsibility for antepartum management and delivery of high-risk patients as well as in-house consults. The on-service fellow is not pulled from these responsibilities to cross-cover any other functions except for two half-sessions of High-Risk Clinic Outpatient coverage. The fellow works directly with an MFM Attending, devoted to service responsibilities supervision. Teaching rounds are done together each morning. This allows for continuity of management plans for the team and patients alike. The service team also consists of two residents (PGY-4 and PGY-2) at Jefferson who are responsible for much of the micromanagement of service issues. The fellow 'runs' the service, but direct supervision is present for rounds, all procedures, consults, deliveries, etc.

OUT-PATIENT HIGH-RISK CLINICAL EXPERIENCE AT JEFFERSON

Three months of second and of the third year are dedicated to Out-Patient High-Risk clinical experience. This consists of directly supervised outpatient consultations and new high-risk patients' visits approximately 2-3 sessions per week, and 4-5 high-risk ultrasound sessions per week (see also Ultrasonographic Experience below). The rest of this rotation consists of protected time to read about the most interesting maternal and fetal cases seen that week, and review pertinent selected topics in detail. Consultations and new visits come from a vast referral area, and cover the vast list of maternal-fetal pathology. A perinatal nurse practitioner and an MFM attending provide direct nursing and didactic/supervisory (respectively) help. Fellows present the new obstetrics, maternal and fetal cases in the Thursday morning conference. The specific management is reviewed with all division members, with emphasis on evidenced-based practice.

HIGH-RISK CLINICAL EXPERIENCE AT CHRISTIANA CARE HEALTH SYSTEM

The primary reason and responsibility for the MFM fellow at CCHS is to acquire ultrasonographic experience (see also Ultrasonographic Experience below). This is acquired in direct contact with supervising MFM CCHS attendings, who offer not only sonographic didactics but also education regarding interesting maternal and fetal consults referred to the MFM CCHS unit. Opportunity for early morning in-patient rounds, invasive prenatal diagnosis procedures, resident teaching, and collaborative research are ample at this very busy center (see below).

ULTRASONOGRAPHY EXPERIENCE

FACILITIES

JEFFERSON

The Division of Ultrasound and Reproductive Imaging in the Department of Obstetrics and Gynecology at Thomas Jefferson University and Hospital is one of the country's leading centers.

Since 1977, most of the out-patient obstetrical ultrasound examinations have been referred directly to the Department of Obstetrics and Gynecology, where all these obstetrical ultrasounds are supervised and read by Maternal-Fetal Medicine faculty under the direction of Dr. Stuart Weiner. More than 600 obstetrical ultrasound examinations/month (4,800/year) are performed, with a large percentage being high-risk. This unit performs all high-risk out-patient obstetrical ultrasound scans, biophysical fetal monitoring (including Doppler), and invasive obstetrical procedures such as amniocentesis, chorionic villus sampling, fetal cord blood sampling, and in-utero treatment. Two new 3D/4D GE machines complement an array of state-of-the-art equipment. 3D/4D ultrasounds are usually performed under the supervision of George Bega, M.D., international expert, well-published and frequent speaker on this topic. High-risk and screening fetal echocardiography, with added expertise from

renowned Dennis Wood, RDMS, and perinatal cardiology attendings from AI Dupont Children's Hospital, are performed in three weekly sessions. Genetic services, including full-time genetic counseling, first trimester, second trimester, and integrated screening, are available at this comprehensive site. Same day first trimester testing is offered. The fellow participates in all of these activities, with progressive involvement from hands-on experience in the first year to a consultative role by the second year, adding invasive procedures by the third year.

The Division of Ultrasound in the Department of Radiology has also been for decades one of the world's leading centers, under the director of Dr. Barry Goldberg. There are eight full-time physicians, eight ultrasound Fellows, 16 technologists, and support personnel including a media specialist, photographer, engineer, and an anatomist. At present there are more than 35 ultrasound instruments in the Division, including sector scanners (both mechanical and phased), linear arrays, static imagers, automated imagers, Doppler units, and the latest 3-D machines (now real-time). This division performs in-patient obstetrical ultrasounds, including high-risk. The fellows have an opportunity to review interesting ultrasounds in this division. The fellows also often perform high-risk ultrasound, including Doppler studies and procedures, on in-patients, including amniocentesis, PUBS, transfusions etc done at or after viability. The educational facilities adjacent to the clinical and research areas include three classrooms, an audio-visual center and a library. Lectures are videotaped and categorized by subject in an adjacent area. Currently, there are more than 2,000 hours of videotapes available. These are from international experts at Jefferson and several other leading centers around the world. The Fellow can make use of the audiovisual material for self-paced learning. The library has an extensive collection of books, journals and reprints available for review.

CHRISTIANA CARE HEALTH SYSTEMS

Christiana Hospital is a 780-bed, modern facility in Newark, Delaware with one of the largest family maternity services in the nation. More than 7,000 babies are born at Christiana Hospital each year. Christiana Hospital has Delaware's only delivering Level Three neonatal intensive care unit and provides the entire range of newborn care for premature babies. It has complete specialized pregnancy services for high risk pregnancies, including diagnosis and treatment. The Christiana Care Health System serves more than a million people throughout Delaware and in neighboring areas of Pennsylvania, Maryland and New Jersey.

EDUCATIONAL PROGRAM

The Fellow's formal Ultrasound education is comprehensive.

FORMAL LECTURE EDUCATION

A five-week formal didactic course, including lectures on physics and instrumentation, cross-sectional anatomy, OB/GYN ultrasound, abdominal ultrasound, and echocardiography, is given in collaboration with the Department of Radiology. Other lectures throughout the year are given on echocardiography, 3D ultrasound, Doppler and other high-end sonographic skills by the MFM faculty, and sonographers. An ultrasound conference, presented jointly

with radiology, is given once a month. Fellows from MFM and Radiology alternate giving the formal lecture.

CHRISTIANA CARE HEALTH SYSTEMS

The fellows get hands-on, full-time, low-and high-risk MFM-attending supervised ultrasonographic experience during three months of the first year and one month of the second year. The Fellow begins with hands-on scanning to learn basic ultrasound techniques. By the end of the first year three-month rotation, the Fellow is well prepared to perform all aspects of obstetrical and antenatal ultrasound. The fellow functions as a sonographer. Given the large high-risk referrals to this unit, the experience includes the complete array of fetal malformations. Usually two MFM attendings cover this unit the entire day as their sole responsibility.

JEFFERSON

During three months of both the second and third year, the fellow functions within the Jefferson Center for Maternal-Fetal Health Ultrasound Unit to acquire consultative skills for diagnosis and counseling of fetal anomalies. The fellows review with the sonographer and then the attending perinatologist the pertinent ultrasonographic findings, and performs the counseling as necessary. Integration of genetic, non-invasive and invasive prenatal diagnosis and state-of-the-art ultrasound is available, with direct attending supervision. The senior fellow is offered training in amniocentesis, CVS, fetal reductions, organ biopsy, umbilical cord occlusion, fetal blood sampling and transfusions.

EDUCATIONAL WEEKLY MEETING AT JEFFERSON

Every Thursday, after 7am grand rounds, there is a four-hour MFM/Ultrasound/Genetics meeting with all members of the MFM Division involved. The fellows are protected from other duties during this time. Several one to one-and-a-half hour meetings are held in this period. MFM clinical meeting is a review of interesting new private and clinic high-risk out-patients for that week. Interesting in-patients, deliveries, procedures, etc are also reviewed, often being presented by the fellows. Fetal therapy meeting is held twice per month, and when complicated fetal cases are reviewed. This meeting is run by a dedicated fetal therapy nurse practitioner, Alexa Herman, and supervised by Dr. Stuart Weiner. Several attendings from consulting services such as neonatology, pediatric urology, genetics, pediatric cardiology, pediatric surgery, etc. attend and actively contribute to the meeting. Regular research meetings give the fellow the opportunity to present new research before submitting to the IRB or for funding. A monthly genetic conference reviews pertinent perinatal topics, with lectures both from attendings (in particular Dr. Adele Schneider) and MFM fellows. Maternal and fetal morbidity and mortality meetings are also held monthly in this time slot.

Starting in the Spring 2004, most Wednesdays at noon are dedicated to guideline, consensus, and MFM management discussions. These are then posted for future, on-going education, on the Jefferson intranet.

The fellow attends and actively participates in all these meetings throughout the fellowship program.

GENETICS EXPERIENCE

FACILITIES:

The Genetics unit at Jefferson is a multidisciplinary referral center for the Delaware Valley and is one of the most active prenatal diagnostic center in the area. Over 1,000 genetic amniocenteses and Chorionic Villus Samplings are performed within the unit each year. From eight to 15 couples per week at risk for a child with a structural abnormality are referred to our unit for prenatal diagnostic ultrasound evaluation. Fetal skin biopsies, fetoscopy and ultrasonically guided cord blood sampling procedures are performed when indicated.

There is an active biochemical division. This unit is the original and principal center in the area for the detection of Tay-Sachs Disease and was the first unit to report the prenatal diagnosis of Tay-Sachs by chorionic villus sampling.

EDUCATIONAL PROGRAM

The Fellow is actively involved in the prenatal diagnostic service including genetic counseling and performance of prenatal diagnostic procedures. A rotation with the Division's medical geneticist, Dr. Adele Schneider, is available, and Dr. Schneider offers didactic lectures to the Fellows on a monthly basis.

Didactic education in medical genetics is achieved through lectures and conferences. There is a monthly genetics and bi-weekly fetal therapy conference. The topics for the conference are rotated between genetics, reproductive loss, prenatal diagnosis and treatment, and biochemistry. The Fellow attends and participates in these conferences, not only while on the genetics rotation but throughout the three years of the fellowship. As an elective, there is in the spring a lecture course in graduate-level genetics.

NEONATOLOGY EXPERIENCE

FACILITIES

Thomas Jefferson University Hospital has a Level III Intensive Care Nursery as well as a Transitional Nursery and a special unit for the treatment of bronchopulmonary dysplasia. The Intensive Care Nursery has 24 acute beds, including 14 respirator beds. The ICN runs an occupancy rate of 90% or greater with frequent peaks to 100%. Most of the babies cared for are in-borns resulting from maternal transports.

The ICN serves as a major referral unit for the geographic area. It is one of the only few local units actively performing ECMO (three machines) and liquid ventilation. All pediatric medical and surgical subspecialties are present and active. Many neonatal surgical procedures such as bronchoscopy, tracheotomies, gastrostomies, repair of congenital

diaphragmatic hernias, and patent ductus ligations are performed in the special Operating Room within the nursery.

EDUCATIONAL PROGRAM

The Maternal-Fetal Medicine Fellow spends two weeks in the Intensive Care Nursery. Through didactic lectures by the neonatal staff, hands-on neonatal care, and direct observations through rounds the Fellow becomes familiar with intensive neonatal care, complications and limitations of the care of the newborn, newborn resuscitation, and transitional physiology.

There is a combined neonatal/perinatal conference held weekly on Wednesdays. There is a monthly perinatal morbidity and mortality conference held jointly between the Divisions of Neonatology and Maternal-Fetal Medicine. There is a biweekly Fetal Therapy conference also attended by both Divisions. The fellows are encouraged to attend the Neonatal Fellowship lecture series.

RESEARCH

The 18 months of research are a tremendously important time of the fellowship. In order to help the fellow focus, educational and research tracks have been developed.

Educational and research tracks are designed to emphasize five specific areas. Fellows are expected to select one desired track at the beginning of the program and to conduct appropriate literature searches and project development within the time provided in the first part of their first year. The tracks and identified mentors are listed in the following pages. Each research area has at least one mentor from the MFM faculty who will be responsible for the evaluation and planning of the research and guided education activities of the fellow under their supervision.

A formal detailed research proposal is expected from each fellow by the end of year one. Progress should be made so that the project would be appropriate for submission for presentation in abstract form to a national meeting by the end of year two. By the third year, a completed paper should be ready to submit for publication in a peer-review journal.

See details of each track in the next pages.

RESEARCH TRACKS AND MENTORS

<i>DIDACTIC TRACK</i>	<i>PRIMARY MFM MENTOR</i>	<i>ADDITIONAL MENTORS</i>
Genetics and Prenatal Diagnosis	Adele Schneider, M.D.	Stuart Weiner, M.D.
Ultrasound, Fetal Echocardiography, 3D	Stuart Weiner, M.D.	George Bega, M.D. Dennis Wood, RDMS Paul Anisman, M.D. Barry Goldberg, M.D. Alfred Kurtz, M.D. Laurence Needleman, M.D.
Critical Care Obstetrics	Lauren Plante, M.D.	Jane Huffnagle, M.D.
Clinical Research and Epidemiology	Jason Baxter, M.D., M.S.**	

Courses and Description of Research/Didactic Tracks

(1) *Genetics and Prenatal Diagnosis*
Suggested Didactic Courses

University Course #	Title	Year of Fellowship	Semester
GE611	Introduction to Molecular Genetics	1	Spring
GE637	Advanced Human Genetics	1	Spring*
DB615	Developmental Biology & Teratology I -embryology	2	Fall**
DB625	Developmental Biology & Teratology II -mechanism of development	2	Spring (Jan-Mar)
DB635	Developmental Biology & Teratology III - mechanism of teratogens	2	Spring (Mar-June)
BI512, 522, 532	Experimental Principles in Molecular Biology I, II, III	3	512-Fall 522-Spring (Jan-Mar) 532-Spring (Mar-June)
GE710, 720, 730	Seminars in Genetics	3	710-Fall 720-Spring (Jan-Mar) 730-Spring (Mar-June)

*Requested

**Suggested

(2) ***Reproductive Immunology***
Suggested Courses:

University Course #	Title	Year of Fellowship	Semester
IM505	Fundamentals of Immunology	2	Fall
IM632	Molecular Immunology and Immunogenetics	2 or 3	Spring
IM623	Immunopathology	2 or 3	Spring
DB615	Developmental Biology & Teratology -embryology	3	Fall

Suggested Didactic/Research Rotations:

Immunology Laboratory/Research-18 months

Clinical Reproductive Immunology & Reprod. Loss-1 day/week during R/D rotations

(3) *Infectious Disease*
Suggested Courses:

University Course #	Title	Year of Fellowship	Semester
MI600	Microbiology	1	Spring
GE611	Introduction to Molecular Genetics	1	Spring
MI531	Principles of Virology	2	Fall
MI590 A,B	Introduction to Clinical Virology	2	A- Fall B- Spring
IM530	Infections and Immunology	2 or 3	Spring
MI614	The Biology and Pathogenesis of AIDS	2 or 3	Spring
B1512,522, 532	Experimental Principles in Molecular Biology I, II, III	3	512 - Fall 522-Spring (Jan-Mar) 532-Spring (Mar-June)
DB615	Developmental Biology and Teratology -Embryology	3	Fall

Suggested Didactic/Research Rotations:

Microbiology or Virology Laboratory	3 months
Clinical Pediatric and Adult Infectious Disease Service	3 months*
Research in Infectious Disease	13 months

**Note:* The month of infectious disease rotation required of all MFM fellows is included in this time.

(4) ***Ultrasound and Fetal Echocardiography***
Suggested Courses:

University Course #	Title	Year of Fellowship	Semester
*	Vascular Imaging and Doppler U/S	1	July 28-31
*	Obstetrics and Gynecology	1	November 9-13
*	Transvaginal Ultrasound	1	November 5-6
*	3D/4D Ultrasound in OB/GYN	1	March 5-6
*	Principles of OB/GYN Ultrasound	1	September 28- October 2
*	Fetal Echocardiography	1 / 2	October 21-22
DB615	Developmental Biology and Teratology -embryology	2	Fall

**Note:* Non-credit courses of Jefferson Ultrasound Research and Education Institute

Required Didactic/Research Rotations:

Fetal Echocardiography	3 months
Research	15 months

(5) ***Critical Care Obstetrics***
Suggested Courses

University Course #	Title	Year of Fellowship	Semester
Physio 100	Medical Physiology	2	Jan-May 10
*	High Risk and Critical Care Obstetrics Course and Examination	1	

Suggested Didactic/Research Rotations

OB Anesthesia: 2 months
 Critical Care Unit: 4 months
 Research: 14 months

It is anticipated that completion may be applied toward certification

(6) Clinical Research and Epidemiology
Suggested Courses

Participation in this tract requires completion of a training program in human investigation. This program requires 40 credits to be eligible for a Master of Science degree. Physicians may receive up to 12 credits for studies in medical school. A detailed description of the program follows which can be completed by the MFM fellow during the same period of three years that the MFM fellowship is completed. The schedules and activities of the fellow are tailored to permit completion of the program and fulfillment of the clinical objectives of the MFM fellowship. This track offers a unique opportunity for academic growth and professional development.

**NIH-Sponsored Training Program In Human Clinical Investigation
at Thomas Jefferson University**

Thomas Jefferson University has established an NIH-sponsored training program in human biomedical investigation, that integrates formal training in disciplines central to clinical investigation, practical experience in clinical trials execution and opportunities to design individualized clinical studies with direct mentoring. Participants who successfully complete the two-year program will be eligible for a Masters Degree. The overall goal of the program is to integrate training in human research methodologies with extensive exposure to, and participation in ongoing clinical research programs at the University as well as clinical research of the students' design and execution. The program is designed to produce investigators who can establish competitive clinical research programs in their primary disciplines.

Qualifications of Accepted Trainees. The program is focused on training investigators in clinical research to enable them to assume leadership positions in academic centers, in governmental regulatory agencies or the pharmaceutical/biotechnology industry. For physician applicants, priority is given to those who are board-eligible in their primary specialty and/or are in subspecialty training programs. Ph.D., R.N., Pharm.D. and other applicants are evaluated on the basis of their past activities, research interest area(s), and career goals as they relate to clinical investigation. Faculty members are eligible as well.

Distribution of Trainees' Effort. Most of the trainees' time in this program during the first year is devoted to classroom-based studies. Also, trainees usually select a research mentor during the first three months of training. The trainee is expected during the first year to implement at least one clinical investigation in the Thomas Jefferson University Clinical Research Unit, gaining expertise in clinical study design, execution and data analysis. Year two is devoted predominantly to elective study and pursuit of individual clinical research relevant to the student's primary area of interest. The program has been designed to complement, not replace, ongoing training/work schedules of all participants.

Trainee Guidance and Evaluation. Overall guidance and evaluation of performance is the responsibility of the Program's Directors with input from the Program's Advisory Committee. Fellows receive training in the form of a recommended curriculum and required journal clubs, research seminars, experiences reviewing clinical protocols within the institution, and a rotation in the Editorial offices of the *Annals of Internal Medicine*. These didactic and clinical experiences continue through the two years of the training program. Trainees will identify mentors for their primary research training in consultation with the Program's Directors. Specific preceptors are responsible for evaluating research progress while the Program Directors regularly meet with students to assess progress.

Expectations of Participants Who Complete the Program. The overall goals of the program are to impart to trainees the requisite expertise in the concepts, approaches, and techniques of clinical investigation to facilitate their development as independent investigators. Specifically, trainees completing the program will have:

- Completed 40 credit hours of study (including research, elective and, if applicable, credit for prior courses);
- Participated in at least one study in Jefferson's Clinical Research Unit of sufficient scientific rigor to result in presentation at a national meeting and/or publication in peer-reviewed journal;
- Designed, implemented and analyzed an original clinical research project in their specific area of interest of sufficient scientific rigor to present at national meetings and/or publish in a peer-reviewed journal.

Upon completion of their training, it is expected that participants will be uniquely qualified for positions in academic medical centers emphasizing clinical research as well as positions in the pharmaceutical/biotechnology industry, and governmental agencies.

Application Procedure. Interested individuals should forward an application for admission to the College of Graduate Studies; a letter outlining their intent to obtain training in clinical investigation and a statement of career goals; at least three letters of recommendation including, where appropriate, letters from prior mentors, program directors, and supervisors; copy of medical school transcripts and diplomas; certificates of completion of clinical or professional training; and professional certification exam scores; and copy of C.V. to Director, Training Program In Human Investigation, Thomas Jefferson University, 132 South 10th Street, 1170 Main, Philadelphia, PA 19107

Human Investigation Track-Required Courses

Core Courses

BI 550	Topics in Medical Biochemistry	3 credits*
GC 660	Statistical Methods of Data Analysis	2 credits
PR 522	General Pharmacology	3 credits*
PR 525	Clinical Pharmacology	3 credits
PR 720	Seminar	1 credit
PR 870/80/90	Masters Thesis Research	6 credits
PR 810/20/30	Clerkship	6 credits*
	Total:	24 credits

Track Courses

MI 580	Principles of Epidemiology	2 credits
GC 510	Database Design and Management	2 credits
GC 630	Fundamentals of Clinical Trials	3 credits
GC 640	Research Ethics and Responsible Conduct	1 credit
GC 650	Pharmacoeconomics	3 credits
GC 655	Clinical Epidemiology	3 credits
GC 690	Regulatory Issues in Scientific Research	2 credits
	Total:	16 credits

Electives

GC 525	Information Management	3 credits
GC 530	Fundamentals of Biosafety	2 credits
GC 600	Management Skills	3 credits
GC 610	Strategic Management	3 credits
GC 620	Financial Management	3 credits
GC 625	Drug Development Issues	3 credits
GC 680	Lab Techniques in Molecular Biology	2 credits
GC 526	Presentation Skills	2 credits
GC 615	Grants Management	2 credits
GC 670	Experimental Design in Research	2 credits
GC 720	Scientific Writing	2 credits

Grand Total: 40 credits

*Physicians may receive up to 12 credits for studies in medical school

Master of Science Program in Public Health

The Master of Science Program in Public Health provides graduate training, research, and service opportunities in the primary disciplines of public health: biostatistics, epidemiology, health services administration, health education/behavioral science, and environmental science. The principal aim is to prepare graduates to assume or continue professional and leadership roles as public health practitioners in research, policy development, or teaching in the challenging healthcare environment.

This program is designed around a core curriculum providing fundamental knowledge in modern public health disciplines, field or laboratory based research, an experiential component, and several elective tracks for specialized instruction. The initial specialty tracks are:

- health policy and management, and
- epidemiology/molecular microbiology

The graduates will be able to pursue careers in the administration of public health departments and centers, leadership of health insurance organizations, health consulting activities, international programs and the pharmaceutical industry.

The program is designed for part-time students with the option of full-time study. Students must earn 40 credit hours (course work, a practicum, and a master's level research thesis). Part-time students can complete the program in two to four years. Full-time students will require at least twelve to eighteen months to complete the program because of course scheduling and completion of the practicum and research thesis.

The **contact person** for the MPH program is Ms. Jennifer Ravelli, MPH. She can be reached at 215-503-0174 or by E-mail at Jennifer.Ravelli@jefferson.edu

MSPH Required Core Courses

Required Core Courses		
Course No	Course Name	Credit Hours
PH 501	Introduction to Public Health	3
PR 530	Fundamentals of Biosafety	2
GC 660	Statistical Methods of Data Analysis	2
GC 670	Experimental Design in Research	2
MI 580	Fundamentals of Epidemiology	2
GC 655	Clinical Epidemiology	2
PR 630	General Toxicology	3
GC 650	Pharmacoeconomics	3
PH 502	Behavioral & Social Theories in Public Health	2
PH 810, 820, 830	Clerkship	3
PH 870, 880, 890	Master's Thesis Research	6
Required Core Course Credit Hours		30

Recommended Electives and Track Courses		
Course No	Course Name	Credit Hours
PH 503	Planning & Evaluating Health Programs	2
GC 680	Laboratory Techniques in Molecular Biology	2
GC 535	Introduction to Genomics & Bioinformatics	2
GC 525	Information Systems	3
GC 630	Fundamentals of Clinical Trials	3
GC 635	Fundamentals of Clinical Trial Management	2
GC 610	Strategic Management	3
GC 605	Performance Improvement	2
GC 720	Scientific Writing	2
GC 526	Presentation Skills	2
MI 582	Diagnostic Microbiology	4
GC 600	Management Skills	3
GC 620	Fundamentals of Financial Management	3
GC 515	Quality Measures & Outcome Analysis	3
Required Elective and Track Course Credit Hours		10
Total MPH Program Credit Hours		40

***DIVISION OF MATERNAL-FETAL MEDICINE
FELLOWSHIP FACULTY***

Vincenzo Berghella, M.D. is the Director of the Division of Maternal-Fetal Medicine and the Maternal-Fetal Medicine Fellowship Program and is certified in Maternal-Fetal Medicine. He has completed his residency in Obstetrics and Gynecology at New York Downtown Hospital and his fellowship in Maternal-Fetal Medicine at Thomas Jefferson University. His interests are in preterm labor and cervical insufficiency.

Jason Baxter, M.D. graduated from Princeton University with a Bachelors in Science and Engineering. He received his medical degree from the University of Texas Medical Branch. He completed his residency in Obstetrics and Gynecology at Abington Memorial Hospital and his fellowship in Maternal-Fetal Medicine at Thomas Jefferson University. He completed an NIH-sponsored fellowship in Human Investigation, receiving a Masters in Clinical Pharmacology from Thomas Jefferson University. His research interests include cesarean delivery and placental disorders.

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