

**BIOGRAPHICAL SKETCH**

Provide the following information for the key personnel in the order listed on Form Page 2  
Photocopy this page or follow this format for each person.

NAME	POSITION TITLE		
Mark C. Fishman	Director, Cardiovascular Research Center; Chief, Cardiology Division; Professor of Medicine		
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Yale College, New Haven, CT (summa cum laude)	BA	1972	Physiology
Harvard Medical School, Boston, MA (magna cum laude)	MD	1976	Medicine

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

**Clinical Training:**

1976-1979 Intern, Resident, Cardiology Fellow: Massachusetts General Hospital  
1982 Chief Resident in Medicine, Massachusetts General Hospital (MGH)

**Research Training:**

1979-1981 Research Associate with Dr. Phil Nelson and Dr. Marshall Nirenberg, NIH  
1985-1986 Visiting Scientist with Dr. Philip Leder, Dept. of Genetics, Harvard Medical School

**Current Appointments:** Professor of Medicine, Harvard Medical School; Physician (MGH);

Director, Cardiovascular Research Center (MGH); Chief, Developmental Biology Laboratory (MGH);  
Chief, Cardiology Division (MGH)

**Honors, Awards, National Committees and Advisory Panels:**

Yale College: Fellows Prize (1971); Yale Scholar of the House (1971); DeVane Prize for Outstanding  
Scholar of the House (1972); Honors with Exceptional Distinction (1972); Phi Beta Kappa (1972)

Harvard Medical School: Lambert Research Award (1976); Alpha Omega Alpha (1976)

Certificate of Merit, National Institutes of Health (1981)

Established Investigator, American Heart Association (1983)

Basil D. O'Connor Research Award, March of Dimes (1984)

NIH/NHLBI, grant Review Committees: RFA (1989); Program Project (1990); Training Awards (1992)

Visiting Professor, University of Leuven, Belgium (1990)

External Reviewer Rijkuniversiteit, Gent, Belgium (1991)

Rita Levi-Montalcini Lectureship (awarded by European Neuroscience Association), Vienna, Austria (1994)

Keith Minor Ford Lectureship, Rochester University (1996)

National Research Council of National Academy of Sciences, Developmental Toxicology Committee (1997)

National Cancer Institute, Preclinical Models for Cancer Working Group (1997)

Simon Dack Lecturer, American College of Cardiology (1998)

Speaker, Colloque Wright pour la Science for the Canton, City and University of Geneva, Switzerland (1998)

**Selected Recent Publications (of 132 total):**

- Huang PL, Dawson TM, Bredt DS, Snyder SH, Fishman MC (1993) Targeted disruption of the neuronal nitric oxide synthase gene. **Cell** 75:1273-1286.
- O'Dell TJ, Huang P, Dawson TM, Dinerman JL, Snyder SH, Kandel ER, Fishman MC (1994) Endothelial NOS and the blockade of LTP by NOS inhibitors in mice lacking neuronal NOS. **Science** 265:542-546.
- Huang Z, Huang PL, Panahanian N, Dalkara T, Fishman MC, Moskowitz MA (1994) Effects of cerebral ischemia in mice deficient in neuronal nitric oxide synthase. **Science** 265:1883-1885.
- Lee RRK, Stainier DYR, Weinstein BM, Fishman MC (1994) Cardiovascular development in the zebrafish. II. Endocardial progenitors are sequestered within the heart field. **Development** 120:

3361-3366.

5. Strittmatter SM, Fankhauser C, Huang PL, Mashimo H, Fishman MC (1995) Neuronal pathfinding is abnormal in mice lacking the neuronal growth cone protein GAP-43. **Cell** 80:445-452.

6. Grabczyk E, Fishman MC (1995) A long purine-pyrimidine homopolymer acts as a transcriptional diode. **J. Biol. Chem.** 270:1791-1797.
7. Huang PL, Huang Z, Bloch KD, Fishman MC (1995) Hypertension in mice lacking the gene for endothelial nitric oxide synthase. **Nature** 377:239-242.
8. Weinstein BM, Stemple DL, Driever W, Fishman MC (1995) *gridlock*, a localized heritable vascular patterning defect in the zebrafish. **Nature Med.** 1:1143-1147.
9. Stainier DYR, Weinstein BM, Detrich HW III, Zon LI, Fishman MC (1995) *cloche*, an early acting zebrafish gene, is required by both the endothelial and hematopoietic lineages. **Development** 121: 3141-3150.
10. Nelson RJ, Demas GE, Huang PL, Fishman MC, Dawson VL, Dawson TD, Snyder SH (1995) Behavioral abnormalities in male mice lacking neuronal nitric oxide synthase. **Nature** 378:383-386.
11. Fishman MC (1995) Assembly of blood vessels in the embryo. In: **Atherosclerosis and Coronary Artery Disease** (V. Fuster, R. Ross, E. Topol, eds.) Lippincott-Raven Publishers, Chapter 21, pp. 379-383.
12. Carpenter C, Honkanen AA, Huang P, Asaad M, Dorso CR, Cheung H-S, Mashimo H, Goss KA, Fishman MC (1996) Cystic renal disease in mice rendered mutant in angiotensin-converting enzyme. **Nature** 380:292.
13. Weinstein BM, Fishman MC (1996) Cardiovascular morphogenesis in zebrafish. **Cardiovasc. Res.** 31:E17-E24.
14. Driever W, Fishman MC (1996) The zebrafish: Heritable disorders in transparent embryos. **J. Clin. Invest.** 97:1788-1794.
15. Eder PS, Srinivasan A, Fishman M, Altman S (1996) The RNA subunit of ribonuclease P from the zebrafish *Danio rerio*. **J. Biol. Chem.** 271:21031-21036.
16. Behar O, Golden JA, Mashimo H, Schoen FJ, Fishman MC (1996) Semaphorin III is needed for normal patterning and growth of nerves, bones, and heart. **Nature** 383:525-528.
17. Stainier DYR, Fouquet B, Chen J-N, Warren KS, Weinstein BM, Meiler S, Mohideen MAPK, Neuhauss SCF, Solnica-Krezel L, Schier AF, Zwartkruis F, Stemple DL, Malicki J, Driever W, Fishman MC (1996) Mutations affecting the formation and functions of the cardiovascular system in the zebrafish embryo. **Development** 123:285-292.
18. Weinstein BM, Schier AF, Abdelilah S, Malicki J, Solnica-Krezel L, Stemple DL, Stainier DYR, Zwartkruis F, Driever W, Fishman MC (1996) Hematopoietic mutations in the zebrafish. **Development** 123:303-309.
19. Pack M, Solnica-Krezel L, Malicki J, Neuhauss SCF, Schier AF, Stemple DL, Driever W, Fishman MC (1996) Mutations affecting development of zebrafish digestive organs. **Development** 123:321-328.
23. Knapik EW, Goodman A, Atkinson OS, Roberts CT, Shiozawa M, Sim CU, Weksler-Zangan S, Trolliet MR, Futrell C, Innes BA, Koike G, McLaughlin MG, Pierre L, Simon JS, Vilallonga E, Roy M, Chiang P-W, Fishman MC, Driever W, Jacob HJ (1996) A reference cross DNA panel for zebrafish (*Danio rerio*) anchored with simple sequence length polymorphisms. **Development** 123:451-460.
24. Chen J-N, Fishman MC (1996) Zebrafish *tinman* homolog demarcates the heart field and initiates myocardial differentiation. **Development** 123:3809-3816.
25. Baker K, Warren KS, Yellen G, Fishman MC (1997) Defective "pacemaker" current ( $I_h$ ) in a zebrafish mutant with a slow heart rate. **Proc. Natl. Acad. Sci. USA** 94:4554-4559.
26. Fishman MC, Chien KR (1997) Fashioning the vertebrate heart: Earliest embryonic decisions. **Development** 124:2099-2117.
27. Chen J-N, van Eeden FJM, Warren KS, Chin AJ, Nusslein-Volhard C, Haffter P, Fishman MC (1997) Left-right pattern of cardiac BMP4 may drive asymmetry of the heart in zebrafish. **Development** 124:4373-4382.
28. Fishman MC, Olson EN (1997) Parsing the heart: Genetic modules for organ assembly. **Cell** 91:153-156.
29. Serbedzija GN, Chen J-N, Fishman MC (1998) Regulation in the heart field of zebrafish. **Development** 125:1095-1101.
30. Knapik EW, Goodman A, Ekker M, Chevrette M, Delgado J, Neuhauss S, Shimoda N, Driever W, Fishman MC, Jacob HJ (1998) A microsatellite genetic linkage map for zebrafish (*Danio rerio*). **Nature**

**Genetics** 18:338-343.

31. Warren KS, Fishman MC (1998) "Physiological genomics": mutant screens in zebrafish. **Am. J. Physiol.** 275:H1-H7.