

Sung Eun Choe

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Research Fellow
Genetics Division, Department of Medicine
Brigham and Women's Hospital

Department of Genetics
Harvard Medical School

Objective

To perform scientific research in bioinformatics and computational biology in a leading-edge biotechnology or pharmaceutical company.

Education

- Harvard College A.B. 1992 Biology
- Harvard University Ph.D. 2000 Biophysics

Awards

- 1988-1994 National Scholar, Harvard University (awarded to the top 10% of the entering freshman class).
- 1992 Magna cum laude. A.B. in Biology, Harvard College
- 1992-5 National Science Foundation Graduate Fellow.
- 2003-4 National Research Service Award (NIH postdoctoral fellowship)

Expertise

- Fluent in the following **computer programming languages**:
 - ✓ C, Perl (including Bioperl)
 - ✓ The statistical programming language R (including Bioconductor).
 - ✓ Matlab
 - ✓ Visual Basic for generating Excel Add-ins
 - ✓ I have some experience with HTML, MySQL, and Java.
- In-depth understanding of **statistical methods for analysing expression profiling data**.
 - ✓ Conducted a comparative analysis of some popular statistical methods, using a novel control dataset. Please visit: <http://www.elwood9.net/spike>.
 - ✓ Developed **custom meta-analysis methods** to dissect the contributions of multiple signaling pathways to the development of fly muscle progenitors. Manuscript available upon request.
 - ✓ Thorough familiarity with **clustering methods** and **functional enrichment calculations**.
- Experience with **genomic sequence analysis**.
 - ✓ Identification of candidate enhancer sequences, combining evidence from phylogenetic footprinting, known transcription factor binding motifs, and expression profiling data.
- Strong background in **probability and statistics**.
- Extensive education in **math and physics**.
 - ✓ Graduate-level coursework, including abstract algebra, theory of equations, calculus on manifolds, quantum theory, solid state physics, and statistical thermodynamics.
- Comprehensive training in **experimental biochemistry and biophysics**.
 - ✓ Protein biochemistry (including assays to study protein folding kinetics and protein-protein interactions)
 - ✓ Protein purification (ion exchange chromatography and HPLC)
 - ✓ DNA engineering (cloning techniques, PCR, etc)
 - ✓ Mass spectroscopy
 - ✓ Nuclear magnetic resonance
 - ✓ ELISAs, immunoprecipitation assays, and immunohistochemistry.

Work experience**2000-present Postdoctoral Fellow Brigham and Women's Hospital/Harvard Medical School, Boston, MA
Division of Genetics (BWH) and Laboratory of Dr. George Church (HMS)**

- Participated in numerous collaborations with experimental researchers at the BWH Division of Genetics, HMS, and Children's Hospital, often developing custom methods to suit their specific biological questions.
- Identified an optimized method for detecting differential expression in expression profiling data, using a new control dataset in which the fold changes are known for every feature on the chip.
- Applied this method to expression profiling datasets involving a variety of biological systems, such as *Drosophila* muscle development, mouse uterine development, and zebrafish hematopoiesis.
- I am currently attempting to correlate expression profiling data with other genome-scale datasets, such as protein-interaction networks and signaling pathway information.

**2000 Postdoctoral Associate Whitehead Institute for Biomedical Research, MIT, Cambridge, MA
Laboratory of Dr. Paul Matsudaira**

- Temporary postdoctoral associate in cell biology. Characterized the beta-actin binding site on the surface of the protein T-fimbrin, using reactive cysteine biochemistry.

**1992-2000 Graduate Student Biophysics Program, Harvard University, Cambridge, MA
Laboratories of Dr. Eugene Shakhnovich and Dr. Gerhard Wagner**

- Development of a computational model of protein folding. Predictions were experimentally tested by characterizing the kinetics of folding of a protein domain, villin 14T (in collaboration with Dr. Paul Matsudaira, Whitehead Institute, MIT).

**1992 Technical Assistant National Institutes of Health, Bethesda, MD
Laboratory of Dr. Angela Gronenborn**

- Summer technical assistant. Purified N-15-labelled protein G from *E. coli*, for NMR structural dynamics studies.

**1989-1992 Research Assistant Beth Israel Hospital, Boston, MA
Laboratory of Dr. Marsel Mesulam**

- Neuroanatomy laboratory; quantified the laterality of cortical innervation from three limbic system nuclei in the rat brain. Also contributed to histology and immunohistochemistry of brain samples from Alzheimers patients.

**1988 Technical Assistant Georgetown Medical School, Washington, D.C.
Laboratory of Dr. Andrew Pachner**

- Summer technical assistant. Immunology laboratory: characterization of a mouse model for myasthenia gravis.

Publications

1. **Choe SE**, Boutros M, Michelson AM, Church GM, Halfon MS (2005). Preferred analysis methods for Affymetrix GeneChips revealed by a wholly-defined control dataset. *Genome Biology* 6(2): R16.
2. Estrada B*, **Choe SE***, Gisselbrecht S, Michaud S, Raj L, Busser B, Halfon MS, Church GM and Michelson AM (2005). Dissecting mesoderm development with a targeted compendium of gene expression profiles. Submitted.
3. Weber GJ, **Choe SE**, Dooley KA, Paffett-Lugassy NN, Zhou Y, and Zon LI (2005). Hematopoiesis: Mutant specific gene programs in the zebrafish. Submitted.
4. Anderson LM, **Choe SE**, Yukhananov RY, Hopfner RL, Church GM, Pratt RE, Dzau VJ (2003). Identification of a novel set of genes regulated by a unique liver X receptor-alpha -mediated transcription mechanism. *J Biol Chem.* 278(17):15252-60.
5. Yao MW, Lim H, Schust DJ, **Choe SE**, Farago A, Ding Y, Michaud S, Church GM, Maas RL (2003). Gene expression profiling reveals progesterone-mediated cell cycle and immunoregulatory roles of Hoxa-10 in the preimplantation uterus. *Mol Endocrinol.* 17(4):610-27.
6. **Choe SE**, Li L, Matsudaira PT, Wagner G, and Shakhnovich EI (2000). Structure of the transition state for the folding of villin 14T. *J. Mol. Biol.* 304: 99-115.
7. **Choe SE**, Matsudaira PT, Osterhout J, Wagner G, and Shakhnovich EI (1998). Folding Kinetics of Villin 14T, A Protein Domain with a Central Beta-Sheet and Two Hydrophobic Cores. *Biochemistry* 37(41): 14508-14518.
8. Pachner AR, Itano A, Ricalton N, **Choe S** (1991). Chronic murine experimental myasthenia gravis: strength testing and serology. *Clin Immunol Immunopathol.* 59(3):398-406.

* these authors contributed equally to this study.