More than a Messenger: The Secret Life of RNA
November 12, 2014

Introduction
DNA contains the information your cells need to perform their functions, but if every cell in your body contains identical DNA, how can one cell become a blood cell, another a muscle cell, and even another a brain cell?! The answer lies in RNA, the dynamic messenger of DNA’s information. RNA determines the fate and function of each cell in your body. Even more, recent research in the RNA field has yielded unexpected ways that it is utilized by the cell and exciting new opportunities to harness RNA against various diseases. This lecture will first introduce you to the world of RNA, explaining its major messenger roles and its dynamic regulation. Next, we will delve into some of the newly appreciated non-messenger roles of RNA. Finally, we will finish with how recent RNA technologies have generated novel therapeutics to treat diseases from cancers to Huntington’s Disease. Come, and get let in on the secret, the secret life of RNA!

Speakers

Radhika Mathur was born in India and moved to the California Bay Area at age 12. She double majored in Molecular Cell Biology and Economics at the University of California Berkeley, and is now a third year PhD candidate at Harvard Medical School. She works in the laboratory of Charles Roberts at the Dana-Farber Cancer Institute, and is focused on understanding the mechanisms by which epigenetic alterations can drive cancer. In her free time, she enjoys exploring Boston, playing with her kitten, and keeping up with politics and her favorite economists.

Matt Schwartz is a sixth year PhD candidate in Genetics and Genomics in the Biological and Biomedical Sciences Program at Harvard Medical School. Matt grew up in Cleveland and received his Bachelor of Arts in Biological Sciences from Northwestern University in Evanston, IL. He is currently studying the role of long noncoding RNAs in the growth and patterning of the developing chicken limb in Cliff Tabin’s lab in the Department of Genetics. Outside of the lab, Matt loves hiking and camping (especially in our national parks), cycling around Boston, going to concerts and music festivals, and is an avid reader.

Ilana Kelsey is from Maryland and received Bachelor of Science degrees in Biochemistry and in Biology from the University of Maryland. She is currently a fourth year Ph.D. candidate in Dr. Brendan Manning’s lab at the Harvard School of Public Health, where she studies a protein that controls cell growth and metabolism in cancer. When she’s not holding a pipette, she can be found blogging about science (http://scienceisntscary.wordpress.com/), swimming, attending theater productions, and combing used bookstores for her next great read.
**Glossary of Important Terms**

**DNA:** Long, double helix-shaped molecule that contains the genetic code of an organism and is present in every cell.

**Gene:** Segment of DNA containing the information necessary to make a single protein.

**RNA:** Molecule that is structurally similar to DNA, but is usually shorter and single-stranded.

**Transcription:** The process by which information contained on a gene is converted to a matching messenger RNA strand.

**Protein:** A type of molecule in cells that performs the jobs needed for cells to function - a sort of biological machine. It is created from a messenger RNA transcript.

**Gene Expression:** The process by which discrete segments of an organism's DNA, which encode particular functions, are first transcribed into RNA, and then in some cases, translated into protein.

**Transcriptome:** The full complement of an organism's RNA transcripts.

**Coding RNA:** RNA transcripts that are messengers (mRNA) that will lead to the production of protein.

**Noncoding RNA:** RNA transcripts which do not encode proteins, but which play some other function as an RNA to regulate gene expression. These have non-messenger functions.

**Mutation:** A change in the DNA sequence that may result in a change in the protein produced, even sometimes causing no protein to be produced at all.

**Drug:** Traditionally a chemical substance that has biological affects in the body, usually by turning on or off a specific protein.

**Small interfering RNA:** A small, man-made RNA molecule primarily used by researchers to silence gene expression; these RNAs are being explored as treatments for diseases caused by protein overexpression.

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