

FROM GENES TO PROTEINS

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Proteins are responsible for a wide range of tasks, including:

1. carrying oxygen in your blood (a protein called *hemoglobin*),
2. digesting your food (such as *amylase*, *pepsin*, and *lactase*),
3. defending your body from invading microorganisms (*antibodies*),
4. and speeding up chemical reactions inside your body.

Specially designed proteins even give elasticity to your skin (*elastin*) and strength to your hair and fingernails (*keratin*).

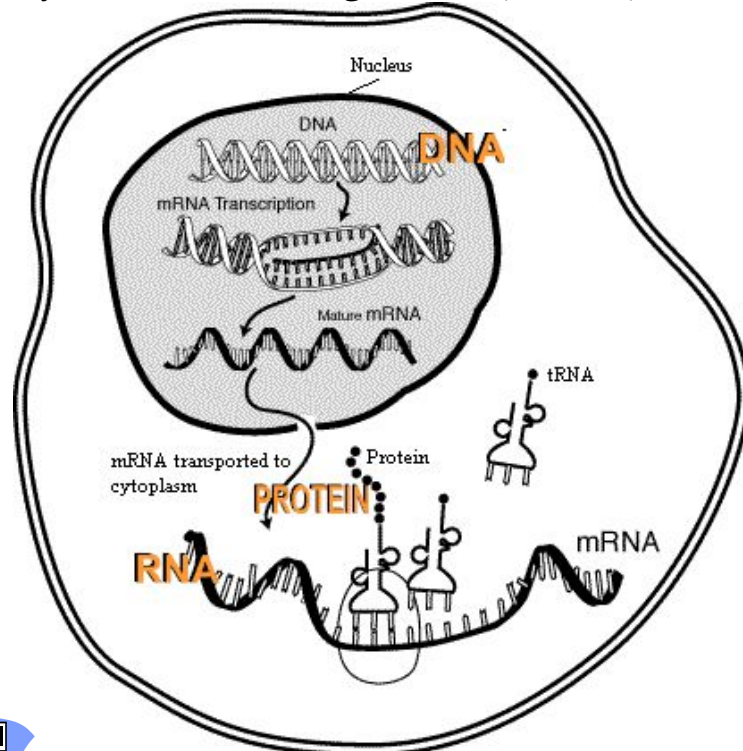


Image Source: <http://scripts.mit.edu/~aidanc/popgen/images/dogma.jpg>

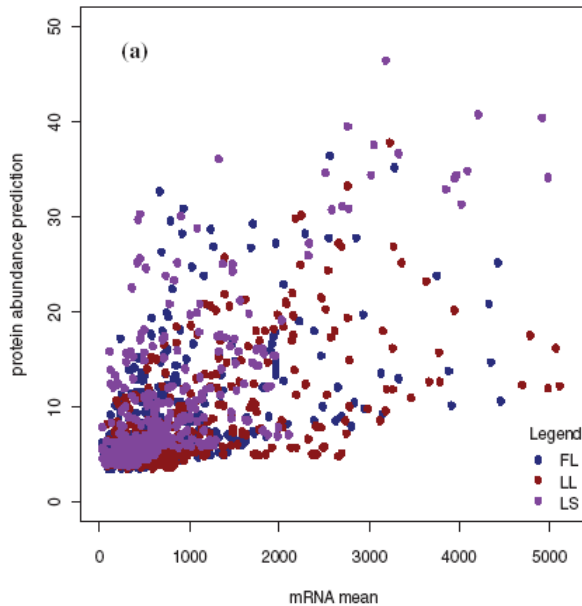
Protein production starts in the cell's command center, the nucleus. Your **genes**, which are made of DNA, contain the instructions for making proteins in your body, although many other factors—such as your diet, activity level, and environment—also can affect when and how your body will use these genes.



Reference: From the National Institute of Health Office of Science Education
<http://publications.nigms.nih.gov/insidethecell/index.html>

Data Tables and Graphs



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Graph of Gene and Protein Expression for a bacteria.

Example: This graph shows gene expression on the x axis (labeled mRNA mean) and protein abundance on the y axis.

Based on the previous information, we know that proteins come from the information coded in the genes. This is the reason we have labeled the variables as follows:

-  Independent = Gene Expression
-  Dependent = Protein Abundance



Graph Image Source: W. Torres-Garcia, W. Zhang, G.C. Runger, R. Johnson, and D. R. Meldrum, *Bioinformatics*, May 2009; Vol 25; No.15; p. 1905-1914.

Graph the following using Microsoft Excel:

1. Group of Genes in charge of Metabolism

Gene ID	Gene Expression	Protein Expression
Gene0402	20951	125
Gene1295	16569	56
Gene1559	2753	39
Gene0404	2753	33
Gene0607	1232	14
Gene2449	1437	19
Gene3156	329	12
Gene2776	2145	10
Gene0421	85	3
Gene0665	755	4

2. Group of Genes in charge of Synthesis

Gene ID	Gene Expression	Protein Expression
Gene0809	304	1
Gene0508	546	1
Gene1579	583	2
Gene0237	432	3
Gene0504	966	3
Gene0927	802	3
Gene0870	897	4
Gene1304	1626	5
Gene1306	1674	5
Gene1317	1907	7

1) Graphs:

