

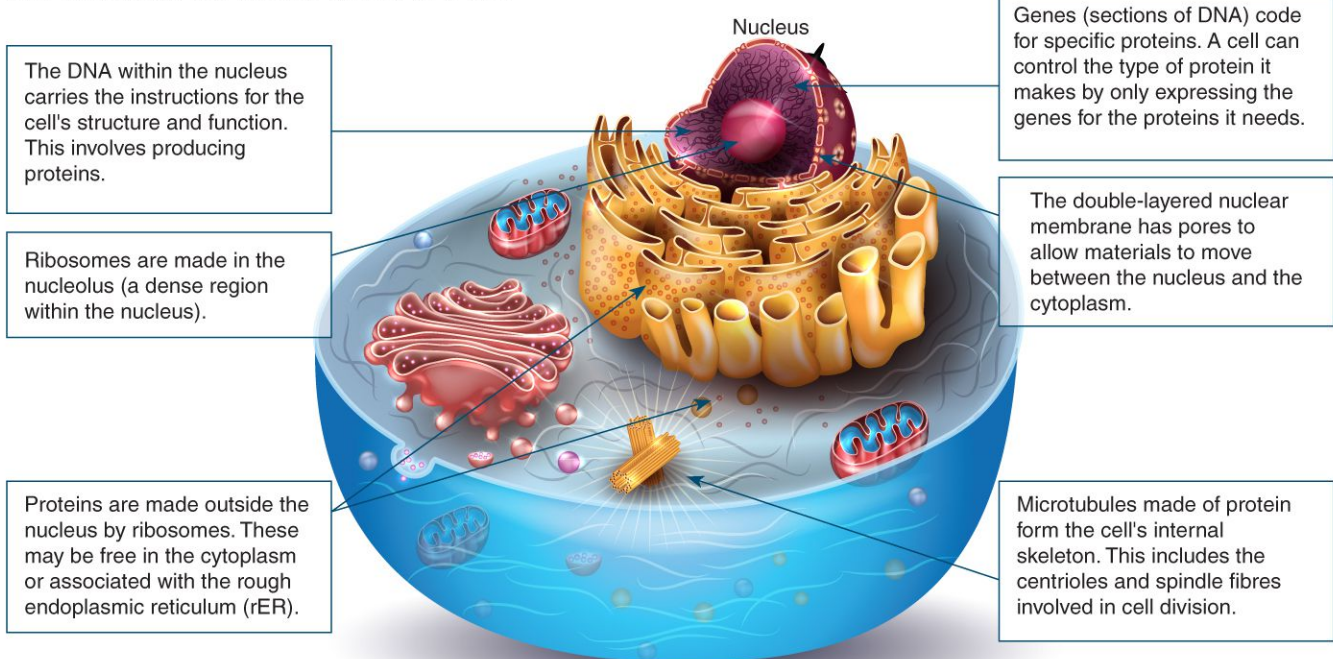
# 17 Protein Functional Diversity

**Key Idea:** Proteins carry out the essential functions of life and have structural, catalytic, and regulatory roles.

In eukaryotic cells, most of a cell's genetic information (DNA) is found in a large membrane-bound organelle called the nucleus. DNA provides the instructions that code for the formation of proteins and the nucleus directs all cellular activities by controlling the synthesis of proteins, which carry out most of a cell's work. A cell produces many different types

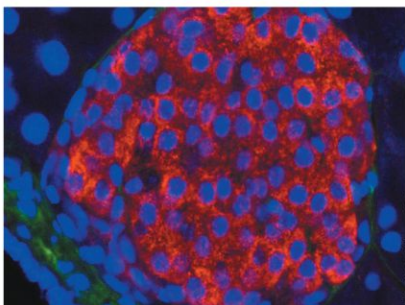
proteins, each with a specific task. Proteins have roles in structure, function, and regulation of the body's cells, tissues, and organs. Without a full complement of functional proteins, a cell can not carry out its specialised role. All of the proteins encoded by an organism's DNA is called its **proteome**. The proteome is larger than the genome because, as you saw earlier, cells are able to produce many different proteins from one set of instructions.

## The nucleus is the control centre of a cell

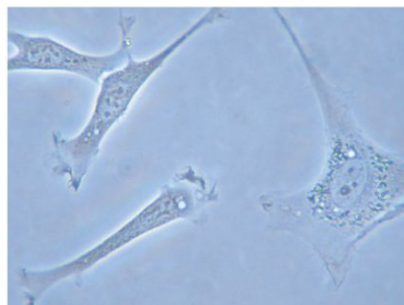


*A generalized animal cell*

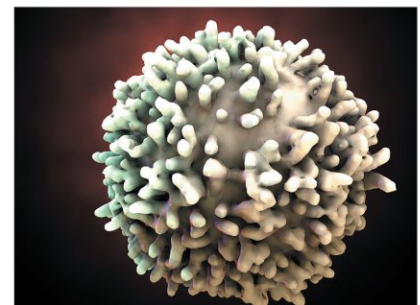
- ▶ While a generalized cell produces a range of proteins, some cells in the body are highly specialized to produce large amounts of a specific protein. This specialization defines their functional role. Three examples are pictured below.



Cells within specialised regions of the pancreas produce and release the protein hormone insulin. Insulin (red in photo) helps to regulate blood glucose.



Fibroblasts are specialised cells that continuously produce and secrete the materials that form connective tissue, including the protein collagen.



B lymphocytes (B cells) are white blood cells that are specialised to produce and secrete proteins called antibodies, which protect the body against diseases.

3. Suggest what might happen to a protein's functionality if it was incorrectly encoded by the DNA. Explain your answer:

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4. The opposite page shows six pictograms of proteins in action, six protein functions, six protein examples, and six photographs. These are not in any matched order. Cut out the 24 boxes and paste or tape them into the grid on the next page so that each pictogram is matched with its correct function, example, and illustrative photograph.

