A microarray is made up of many different 1 stem cells 2 differentiated cells 3 tissue types 4 DNA sequences*	**The nervous system develops from which germ layer?** 1 endoderm 2 ectoderm* 3 gastroderm 4 mesoderm	**A spot that fluoresces on a microarray indicates a gene that is** 1 expressed* 2 not expressed 3 mutated 4 not mutated
Melton and his colleagues discovered that the primary source of new beta cells is 1 pancreatic stem cells 2 pre-existing beta cells* 3 adult stem cells 4 pre-existing alpha cells	**Insulin is primarily secreted by** 1 embryonic stem cells 2 pluripotent stem cells 3 pancreatic beta cells* 4 pancreatic alpha cells	**When injected into mice during Melton's pulse-chase analysis, tamoxifen caused** 1 islet cells to differentiate 2 a chemical to be expressed by cells that contained an engineered marker* 3 labeled beta cells to secrete insulin 4 an increased number of adult stem cells to differentiate into beta cells

One of the characteristics that distinguishes adult stem cells from embryonic stem cells is that they

1 do not replicate indefinitely in culture*
2 are undifferentiated
3 are able to yield specialized cell types
4 are able to make identical copies of themselves

If the Oct-4 and SOX2 genes receive a signal to stop expressing, which event would most likely take place?

1 Differentiation of mesoderm and endoderm cells would cease.
2 The endocrine pancreas would not form.
3 ES cells would begin to differentiate.*
4 An ES would divide to produce 2 undifferentiated ES cells.

A specific genomic sequence that corresponds to a unit of inheritance is know as a

1 hormone
2 gene*
3 cell signal
4 transcription factor

Which symptom is characteristic of type 2 diabetes?

1 individual becomes insulin resistant*
2 affects children and young adults
3 glucose quickly leaves the blood
4 liver and fat tissue take up glucose

Proteins that bind to specific DNA sequences are known as

1 hormones
2 genes
3 nucleotide bases
4 transcription factors*

One symptom of diabetes is the presence of

1 low levels of glucose in the intestine
2 high levels of glucose in muscle cells
3 low levels of glucose in the blood
4 high levels of glucose in the blood*

The cDNA sample used in a typical microarray experiment is 1 made of RNA nucleotides 2 very unstable 3 fluorescently labeled* 4 extremely radioactive	**The pancreas develops primarily from which germ layer?** 1 endoderm* 2 ectoderm 3 gastroderm 4 mesoderm	**The immune system attacks and destroys beta cells in** 1 type 1 diabetes* 2 type 2 diabetes 3 diabetes mellitus 4 adult-onset diabetes
Beta cells are located in 1 the liver 2 bone marrow 3 the pancreas 4 fat tissue	**A specific genomic sequence that corresponds to a unit of inheritance is a** 1 gene* 2 transcription factor 3 cytoplasmic factor 4 cell organelle	**Two tissues types that develop from the mesoderm are** 1 skin and nerve 2 muscle and blood* 3 pancreas and gut tube 4 liver and lung

Identify two types of cells found in the islets of Langerhans. * alpha, beta, delta, and gamma OR * those that produce insulin, glucagons, somatostatin, and pancreatic polypeptide	**What is the name of the disease that results when an individual's immune system attacks and destroys the cells that normally produce insulin?** * type I Diabetes	**ACTA1 has been identified as a housekeeping gene. Without knowing specifically what the gene does, what would microarray analysis tell you about it?** * That it is expressing in most cells of an organism most of the time.
Describe where in the body the pancreas is located. * in the gut near the stomach and intestines	**Explain why embryonic stem cells are defined as being pluripotent rather than totipotent.** * Totipotent cells can differentiate into any cell type and have the potential to develop into an entire organism. Pluripotent cells only form cells of the three germ layers and not extraembryonic tissue such as the placenta.	**What is the cDNA sequence that will hybridize with the DNA sequence**: **AATCCG** * TTAGGC

Identify the two processes responsible for tissue turnover in an organism. * differentiation of stem cells * duplication of existing differentiated cells	**What molecule serves as the template for synthesizing the cDNA that is hybridized to a microarray?** * mRNA	**What is the difference between multipotent and pluripotent stem cells?** * Pluripotent stem cells can differentiate into any cell type, where multipotent stem cells can only differentiate into closely related cell types.
Identify a problem associated with using adult stem cells in the search for possible cell-based therapies for type 1 diabetes. * Adult stem cells do not appear to be involved in beta cell formation * It is questionable that researchers would be able to obtain such adult stem cells.	**Identify a problem associated with using differentiated beta cells in the search for possible cell-based therapies for type 1 diabetes.** * There may be no beta cells left in the patient since they are destroyed by the body's own immune system. * Beta cell transplants require the use of immunosuppressant drugs.	**What must researchers remove in order to get embryonic stem cells to spontaneously differentiate in culture?** * The factors that allow stem cells to self-renew.

Meselson and Stahl confirmed that the mechanism for DNA replication is 1 conservative 2 semiconservative* 3 dispersive 4 semidispersive	**Identify the type of two-phase technique used to examine cellular processes that take place over a period of time.** * Pulse-chase experiment	**The purpose of the *label* in a pulse-chase experiment is to provide** * a way to follow a specific pathway/metabolic process. * a way to measure or visualize a pathway or metabolic process
Briefly describe what takes place during the pulse phase of a pulse-chase experiment. * cells are exposed to a labeled compound. * The labeled compound is incorporated into the molecule or pathway being studied.	**Which term best describes the heavy and light isotopes of nitrogen used by Meselson and Stahl in their experiment?** 1 the pulse 2 the chase 3 a label* 4 radioactive	