Quizlet

Chapter 1 Terminology

Study online at quizlet.com/_36z5wy

1. **Acetylation** — Addition of a chemical group derived from acetic acid. Acetyl group are added covalently to some proteins, such as histones, as a post-translational modification.
2. **Amino acid** — Organic molecule containing both an amino group and a carboxyl group. Those that serve as building blocks of proteins are alpha amino acids, having both the amino acid and carboxyl groups linked to the same carbon atom.
3. **Antibody** — Protein produced by B cells in response to a foreign molecule or invader microorganism. Binds tightly to the foreign molecule or cell, inactivating it or marking it for destruction. Can be used as a specific reagent to detect the protein it recognizes.
4. **Antigen** — A molecule that can induce and immune response or that can bind to an antibody or T-cell receptor.
5. **Antisense RNA** — RNA complementary to the RNA transcript of a gene. Can hybridize to the specific RNA and block its function.
6. **Autoradiography** — Method in which the position of a radioactive probe is detected by exposure to X-ray film. Used in conjuction with blotting techniques.
7. **Base pair** — Two nucleotides in an RNA or DNA molecule that are held together by hydrogen bonds.
8. **B cells (B lymphocytes)** — Type of lymphocyte that makes antibodies
9. **Chromatin** — Complex of DNA, histones and non-histone proteins found in the nucleus of a eukaryotic cell. The material of which chromosomes are made.
10. **Chromatography** — Broad class of biochemical techniques in which a mixture of substances is separated by charge, size, hydrophobicity, non covalent binding affinities, or some other property by allowing the mixture to partition between a moving phase and a stationary phase.
11. **Complementary** — Of nucleic acid sequences: capable of forming a perfect base-paired duplex with each other.
12. **Complementary DNA (cDNA)** — DNA copy of mRNA
13. **Cytoplasm** — Contents of a cell that are contained within its plasma membrane but in the case of eukaryotic cells outside the nucleus.
14. **Dicer** — Protein involved in the processing of miRNAs and siRNAs
15. **Differentiation** — Process by which a cell undergoes a change to an overtly specialized cell type.
16. **DNA methylation** — Addition of methyl groups to DNA. Extensive methylation of the cytosine base in CG sequences is used in vertebrates to keep genes in an inactive state.
17. **Drosha** — Protein involved in the processing of microRNAs
18. **Enhancer** — Regulatory DNA sequence which can increase the rate of transcription of a structural gene that can be many thousands of base pairs away.
19. **Enzyme** — Protein that catalyses a specific chemical reaction
20. **Erythrocyte (Red blood cell)** — Small hemoglobin-containing blood cell of vertebrates that transports oxygen to, and carbon dioxide from, tissues. No longer synthesizes globin or other proteins.
21. **Gain-of-function mutation** — Mutation that increases the activity of a gene, or makes it active in inappropriate circumstances. Usually dominant.
22. **Genome** — The totality of genetic information belonging to a cell or an organism; in particular, the DNA that carries this information.
23. **Genomic DNA** — DNA constituting the genome of a cell or an organism. Often used in contrast to cDNA.
24. **Germ cell** — A cell in the germ line of an organism, which includes the haploid gametes and their specific diploid precursor cells. Germ cells contribute to the formation of a new generation of organisms and are distinct from somatic cells, which form the body and leave no descendants.
25. **Germ line** — The cell lineage that consists of the haploid gametes and their specific diploid precursor cells.
26. **Growth factors** — Extracellular signal protein that can stimulate a cell to grow. They often have other functions as well, including stimulating cells to survive or proliferate.
27. **Heavy chains (H chains)** — The larger of the polypeptide chains in an immunoglobin or other protein molecule.
28. **Histone deacetylase 1 (HDAC)** — Enzymes able to remove acetyl groups from histones.
29. **Homologous** — Genes, proteins or body structures that are similar as a result of a shared evolutionary origin.

30.	**Hormone**	Signal molecule secreted into bloodstream, which can then carry it to distant target cells
31.	**HP 1**	Heterochromatin protein 1. Involved in producing the tightly packed structure of heterochromatin.
32.	**Immune system**	System of lymphocytes and other cells in the body that provides defense against infection.
33.	**Immunoglobulin (Ig)**	An antibody molecule able to recognize specific proteins.
34.	**Insulin**	Polypeptide hormone that is secreted by Beta cells in the pancreas to help regulate glucose metabolism in animals.
35.	**Light chains (L chain)**	One of the smaller polypeptides of a multi-subunit protein such as myosin or immunoglobin.
36.	**Long noncoding RNAs**	(lncRNAs) RNA of 200 bases or more which cannot encode a protein but can regulate gene expression.
37.	**MALDI**	Matrix-assisted laser desorption-ionization method for determining the molecular weight of a peptide.
38.	**Mass spectrometry**	Technique for identifying compounds on the basis of their precise mass-to-charge ratio. Powerful tool for identifying proteins and sequencing polypeptides.
39.	**Messenger RNA**	RNA molecule that specifies the amino acid sequence of a protein. Produced in eukaryotes by processing of an RNA molecule made by RNA polymerase as a complementary copy of DNA. It is translated into a protein in a process catalyzed by ribosomes.
40.	**Micro RNAs**	Short eukaryotic RNAs, produced by the processing of specialized RNA transcripts coded in the genome, that regulate gene expression through complemetary base pairing with mRNA. Depending on the extent of the base pairing, miRNAs can lead either to destruction of the mRNA or to a block in its translation.
41.	**Northern blotting**	Technique in which RNA fragments separated by electrophoresis are immobilized on a paper sheet, and a specific RNA is detected by hybridization with a labeled nucleic acid probe.
42.	**Nuclear run-on assay**	Method for measuring the transcription rate of a particular gene by adding radioactive precursor to isolated nuclei and measuring its incorporation into the RNA transcript.
43.	**Nuclear transplantation**	Transfer of a nucleus from one cell to another by microinjection.
44.	**Nucleic acid**	RNA or DNA; a macromolecule consisting of a chain of nucleotides joined together by phosphodiester bonds.
45.	**Nucleus**	Prominent membrane-bounded organelle in eukaryotic cells, containing DNA organized into chromosomes.
46.	**Peptide**	Short polymer of amino acids.
47.	**Phenotype**	The observable character (including both physical appearance and behaviour) of a cell or organism
48.	**piRNAs**	Piwi-interacting RNAs. Short singel-stranded RNAs that regulate gene expression. Defined on the basis that they interact with piwi proteins and do not require the Dicer protein for their mutation.
49.	**Polyadenylation**	Addition of a long sequence of A nucleotides (the poly A tail) to the 3'end of a nascent mRNA molecule.
50.	**Polymerase**	Enzyme that catalyzes polymerization reactions such as the synthesis of DNA and RNA.
51.	**Polymerase chain reaction**	Technique for amplifying specific regions of DNA by the use sequence-specific primers and multiple cycles of DNA synthesis, each cycle being followed by a brief heat treatment to separate complementary strands.
52.	**Polytene chromosomes**	Giant chromosomes in which the DNA has undergone repeated replication and the many copies have stayed together.
53.	**Post-transcriptional control**	Any control of gene expression that is exerted at a stage after transcription.
54.	**Primers**	Oligonucleotide that pairs with a template DNA or RNA strand and promotes the synthesis of a new complementary strand by polymerase.
55.	**Promoter**	Region of DNA close to the transcription start site which directs transcription.
56.	**Protease**	Enzyme that degrades proteins by hydrolyzing some of the peptide bonds between amino acids.
57.	**Proteomics**	Study of all the proteins, including all the covalently modified forms of each, produced by a cel, tissue or organism. Proteomics often investigates changes in this larger set of proteins caused by changes in the environment or by extracellularsignals.
58.	**Pseudogene**	Nucleotide sequence of DNA that has accumulated multiple mutations that have rendered it inactive and nonfunctional.

59.	**Pulse labeling**	Process for determining the synthesis rate of RNA (or any other molecule) by adding radioactive precursor to cells for a brief period and measuring its incorporation into the RNA.
60.	**Quiescent**	Nondividing cells
61.	**Recombinant DNA**	Any DNA molecule formed by joining DNA segments from different sources.
62.	**Regulatory RNA**	RNA which cannot encode a protein but which regulates gene expression.
63.	**Reticulocytes**	Precursor to the mature red blood cellwhich lacks the nucleus but continues to synthesize globin from long-lived mRNA.
64.	**Reverse transcriptase**	Enzyme first discovered in retroviruses that makes a double-stranded DNA copy from a single stranded RNA template molecule.
65.	**Ribosome**	Particle composed of RNAs and ribosomal proteins that catalyzes the synthesis of protein using information provided by mRNA.
66.	**RNA polymerase**	Enzyme that catalyzes the synthesis of an RNA molecule on a DNA template from ribonucleoside triphosphate precursors. RNA polymerase I transcribes the gene encoding the 28S, 18S and 5.8S ribosomal RNA's RNA polymerase II transcribes the protein-coding genes RNA polymerase III transcribes the genes encoding transfer RNAs, 5S ribosomal RNA RNA polymerase IV and V are found ONLY in plants and are involved in transcriptional repression by siRNAs
67.	**Robe**	Defined fragment of DNA or RNA, radioactively or chemically labeled, used to locate specific nucleic acid sequences by hybridization.
68.	**siRNAs**	Small interfering RNAs. Short double-stranded RNAs that inhibit gene expression by directing destruction of complementary mRNAs. Production of siRNAs is triggered by double-stranded RNA.
69.	**Somatic cell**	Any cell of plant or animal other than the germ cell.
70.	**Southern Blotting**	Technique in which DNA fragments separated by electrophoresis on immobilized on a paper sheet. Specific fragments are then detected with a labeled nucleic acid probe.
71.	**Stop codons**	Codons in the mRNA which produces termination of its translation rather than the insertion of another amino acid.
72.	**Totipotent**	Describe a cell that is able to give rise to all the different cell types in an organism.
73.	**Transcriptomics**	Study of all the mRNA's of a cell, tissue or organism.
74.	**Transposons**	DNA element that can move from one position in the genome to another.
75.	**Tubulin**	The protein subunit of microtubules
76.	**URNAs**	Family of small uridine-rich RNAs. Several such s U1, U2, U4, U5 and U6 are involved in RNA splicing. Also known as snRNA.
77.	**Variable region**	Region of an immunoglobin light or heavy chain that differs from molecule to molecule and forms the antigen binding site.
78.	**Western blotting/ immunoblotting**	Techniques by which proteins are separatedny electrophoresis and immobilized on a paper sheet and then analyzed, usually by means of a labeled antibody.
79.	**Yeast**	Common name for several families of unicellular fungi. Includes species used for brewing and bread-making, as well as pathogenic species. Among the simplest of Eukaryotes.

Quizlet

Chapter 3 terminology

Study online at quizlet.com/_37peq0

1. **5-azacytidine** — Analog of the C nucleotide in DNA which cannot be methylated. Used to probe the consequences of the loss of DNA methylation on C residues.
2. **Active demethylation** — Process in which DNA is actively demethylated by TET enzymes
3. **Air** — Long noncoding RNA which regulates the genomic imprinting of several genes
4. **Argonaute** — Family of proteins found in the RISC and RITS complexes which play a key role in the repression of gene expression by miRNAs and siRNAs
5. **Barr body** — Inactive X chromosome whose very condensed chromatin structure makes it visible by microscopy.
6. **Basal transcription factors** — Any of the proteins whose assembly at the promoter is required for the binding and activation of RNA polymerase and the initiation of transcription.
7. **Bromodomain** — Protein domain found in many proteins which can convert chromatin to a more open structure
8. **CBP** — CREB-binding protein. Transcriptional co-activator for a variety of transcriptional activators. Originally identified on the basis of its binding to the CREB transcription factor.
9. **Chromatin immunoprecipitation** — ChIP. Technique by which chromosomal DNA bound by a particular protein can be isolated and identified, by precipitating it by means of an antibody against the bound protein
10. **Chromodomain** — Protein domain found in many proteins which can convert chromatin to a more tightly packed structure.
11. **Citrullination** — Modification of arginine residues in histones and other proteins to produce the amino acid citrulline which is not coded for in the genetic code
12. **CpG island** — Region of DNA with a greater than average density of CG sequences; these regions generally remain unmethylated
13. **Cyclic AMP** — (cAMP) Nucleotide that is generated from ATP by adenylyl cyclase in response to various extracellular signals. It acts as small intracellular signaling molecule, mainly by activating cAMP-dependent protein kinase. It is hydrolyzed to AMP by a phosphodiesterase.
14. **DNase I hypersensitive sites** — Sites within chromatin which are highly sensitive to digestion with DNaseI. Frequently located at target sites for transcription factor binding.
15. **Epigenome** — Features such as DNA methylation or histone modification which are superimposed onto the genomic DNA sequence
16. **Estrogen response element (ERE)** — DNA sequence which binds the estrogen receptor and mediates the activation of genes in response to estrogen
17. **GAGA factor** — Transcription factor involved in chromatin remodeling/ gene activation. A member of the trithorax family
18. **Genetic code** — Set of rules specifying the correspondence between nucleotide triplets (codons) in DNA or RNA and amino acids in proteins
19. **Genomic imprinting** — Phenomenon in which a gene is either expressed or not expressed in the offspring depending on which parent it is inherited from.
20. **Glycosylation** — Modification of histones and other proteins by addition of sugar residues
21. **GRE (glucocorticoid response element)** — DNA sequence which binds the glucocorticoid receptor and mediates the activation of genes in response to glucocorticoid
22. **Heat-shock factor** — (HSF) Transcription factor which is activated by heat or other stresses when activated. It binds to the heat shock element in the genes encoding heat shock proteins and activates their transcription
23. **Helix-turn-helix** — DNA binding structural motif present in many gene regulatory proteins, consisting of two alpha-helices held at a fixed angle and connected by a short chain of amino acids, constituting the turn. Distinct from the helix-loop-helix motif.
24. **Homologous chromosomes** — The maternal and paternal copies of a particular chromosome in a diploid cell

25. **Hybridization** In molecular biology, the process whereby two complementary nucleic acid strands form a base-paired duplex DNA-DNA, DNA-RNA, RNA-RNA molecule. Forms the basis of a powerful experimental technique for detecting specific nucleotide sequences.

26. **Inner cell mass** Cluster of undifferentiated cells in the early mammalian embryo from which the whole of the adult body is derived

27. **Maintenance methylase** Enzyme which can recognize and methylate CG sites in DNA which are methylated only on one strand of DNA. It then fully methylates them.

28. **MeCP2** Regulatory protein which binds specifically to methylated DNA

29. **MeF2** Myocyte enhancer factor two Family of transcription factors

30. **OGT enzyme** Enzyme able to glycosylate histones and other proteins by addition of O-linked N-acetylglucosamine

31. **Oligonucleotides** Short DNA sequence

32. **Oogenesis** Formation and maturation of oocytes in the ovary

33. **p300** Transcriptional co-activator for a variety of transcriptional activators. Closely related to CBP. Named on the basis of its molecular weight of 300 kDa

34. **Pioneer transcription factors** Regulatory protein which can bind to tightly packed chromatin and open its structure so that other regulatory proteins can bind

35. **Polycomb complex** Multiprotein complex which produces a closed chromatin structure, incompatible with transcription

36. **Regulatory gene** Gene encoding a protein that regulate processes such as gene transcription or RNA splicing.

37. **Restriction fragment** Fragment of DNA generated by the action of restriction enzyme(s)

38. **RISC** RNA-induced-silencing-complex. Protein complex which plays a key role in post-transcriptional repression by miRNAs and siRNAs

39. **RITS** RNA-induced-transcriptional-silencing-complex. Protein complex which play a key role in transcriptional repression by siRNAs

40. **Small regulatory RNAs** Small RNAs between 20 and 31 bases in length which regulate gene expression

41. **Steroid** Hydrophobic lipid molecule with a characteristic four-ringed structure; derived from cholesterol. Many important hormones such as glucocorticoid, estrogen and testosterone are steroids that activate intracellular nuclear receptors

42. **SV40** Simian virus 40. Small DNA virus which infects monkeys and has been widely used in studies of eukaryotic gene regulation

43. **TATA Box** AT-rich sequence in the promoter region of many eukaryotic genes that bind the general transcription factor TBP and hence specifies the position at which transcription is initiated.

44. **TBP** Transcription factor which plays a key role in transcription by all three RNA polymerases. Binds to the TATA box

45. **TET** Ten eleven translocase enzymes which are able to produce the active demethylation of methylated C-residues in DNA

46. **Transdifferentiation** Process in which one differentiated cell type can differentiate, proliferate, and then differentiate into a different cell type.

47. **TSIX** Long noncoding RNA which is transcribed from the active X-chromosome utilizing the opposite DNA strand to that used to probe the XIST RNA

48. **X Inactivation** Inactivation of one copy of the X chromosome in the somatic cells of female mammals

49. **X-inactivation center** (XIC) Site in an X chromosome at which inactivation is initiated and spreads outwards

50. **XIST** Long noncoding RNA whose transcription initiates in the X-inactivation center and which is critical for the process of X-inactivation

NORTHERN BLOTTING

Method

1. Isolate total mRNA from cell types A and B

2. Separate mRNA by electrophoresis

3. Transfer mRNA to nylon membrane

4. Label a gene-specific probe to detect mRNA by hybridisation

SOUTHERN BLOTTING

Method

1. Isolate DNA from various tissue types

2. Digest DNA with restriction enzyme(s) gel electrophoresis to obtain thousands of fragments

3. Separate DNA fragments from samples by agarose gel electrophoresis

4. Analyse all samples for comparative purposes

5. Transfer to membrane

6. Hybridize with gene-specific probe

WESTERN BLOTTING

Method

1. Obtain proteins from various tissue types
2. Denature proteins with heat & SDS
3. Separate proteins by SDS-PAGE
4. Transfer proteins to membrane
5. Submerge membrane in a solution containing the mono-specific antigen against protein-X
6. Visualise binding