Sheet no :5

Refer to slide no : 5

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This sheet will be written as extra information on each slide, sorry for that:

Slide #4
Most of genetic diseases are autosomal recessive diseases. Patients with autosomal dominant diseases will die at early age “before they get married”, so they can’t transmit the disease to the next generation.

Slide #5
If a disease is suspected to have a genetic background “many diseases have similar clinical manifestations, if we want to differentiate between these diseases to know what disease has a genetic background”, we should study the “family pedigree”, we should know if the disease has been found in more than one person, if it has appeared in different generations, we should look for relative marriages.

Slide #6 Same.

Slide #7
-After suspecting that a disease has a genetic background several questions should be asked to the family of the patient.
 -Some diseases are present in certain races more than other races, lactose intolerance, for example, is present in high rates in Arabs, while thalassemia is present in the Mediterranean region more than in other regions.
-Large families can give more information about a certain genetic disease, compared to a small family.

Slide #8
symbols used in drawing a family pedigree.
-Proband: the first person to discover the disease in. “in certain family”.
-Multiple unions: more than one wife.

Slide #9
It is just an example on family pedigree.

Slide #10
Another example on family pedigree, here 5 generations are present, the disease was discovered in a male in the fourth generation.

Slide #11
As you know, each gene has two copies “two alleles (paternal and maternal)”, these alleles are both functional. If one of these alleles is affected, it can be transmitted to the next generation, and because the allele in this case is a dominant allele, then the disease will be expressed in this individual, even though he has another allele which is normal “not affected”. So in autosomal dominant diseases one allele is enough to result in the disease, and here there are no carriers “the person is either healthy or diseased”.
-According to the example in the slides “the picture” 50% of the children will be affected.
-An affected child should have an affected parent.

Slide #12
-When both alleles are affected in “autosomal dominant” disease (homozygous) then the person will usually die early in life.
-No skipping of generations: each generation should contain an affected individual.

Slide #13
An example on autosomal dominant disease, Waardenburg syndrome. From the pedigree in the photo in the slides we can know that the disease is “autosomal dominant disease” because it met the criteria present in slide #12.

Slide #14
-There are some dominant diseases with really mild clinical manifestations, there are even some cases where the person can’t be recognized if he has the disease or not, unless a chromosomal analysis is done, of course.

Slide #15
These conditions make a disease difficult to analyze.

Slide #16
Germline Mosaicism: a normal individual with a new mutation in “testis or ovaries” leading to the formation of normal and abnormal germ cells, If the abnormal germ cell is the one that formed the baby then the baby will be affected but if the normal cell has formed the baby then the baby will be normal.

Slide #17
examples of autosomal dominant diseases.

Slide #18
Diseases are not the only thing that has dominant and recessive alleles, some normal traits are either dominant or recessive, like freckles, widow’s peak, free earlobe, band or straight fingers, white hair.

Slide #19
Polydactyly: the number of fingers is more than normal.

Slide #20
Pedigree for Polydactyly.

Slide #21

-In this slide each pedigree resembles one of the points “star ( ) color indicates the pedigree refers to what point”.
-In the non-penetrance pedigree, the second generation doesn’t show manifestation of the disease but they have the mutation.

Slide #22
-Autosomal recessive: Here if one allele is affected it can’t produce the disease, there is carrier in this case and he is normal. In thalassemia, for example, hemoglobin gene will be affected, the carrier individual “one allele is affected and the other allele is normal” will produce less amount of hemoglobin compared to a completely healthy individual(both alleles are normal”, but the carrier will not have the disease because there is another allele which can compensate for the affected allele.
-If both parents carry the disease “have one affected allele and one normal allele”, then 25% of the children will be completely normal, 50 of the children will be carriers “so 75% of the children are normal (don’t express the disease)”, and 25% of the children will be affected. This is just statistics “probabilities”, in real life all the children can be normal, or they can be all affected.
-Autosomal recessive diseases are associated with specific ethnic groups. For example, Gaucher’s disease is present in Jews more than any other ethnic groups.

Slide #23
It is the pedigree of autosomal recessive disease, here a generation can be skipped “unlike autosomal dominant diseases” because in one generation all individuals can be carriers and there are no affected individuals.

Slide #24
people with the disease in the table are protected against malaria, maybe because oxygen concentration is not enough to grow malaria inside the RBC’s.

Slide #25 Same.
Slide #26 Same.

Slide #27 to be discussed later

Slide #28
-One example of co-dominance is blood groups, there are 4 blood groups “A, B, AB, O”, In “AB” blood group the “A” antigen and the “B” antigen have been expressed, this is what’s called co-dominance “both genes are expressed”.
-Epistasis: the function of a certain gene depends on the function of another gene. Blood groups are an example on epistasis also, the chemicals that determine the “B” group for example “fucose, galactose …” should bound to a chemical called “H” molecule “so H molecule should be synthesized then it binds the cell membrane of the RBC’s then the chemicals that determine the blood group come and bind to this “H” molecule (H molecule is controlled by a certain gene, and the chemicals that determine the blood group is controlled by another gene), So if the gene that is responsible for H molecule production is not functioning then although the chemicals are synthesized they can’t bind to the H molecule and they can’t determine the blood group “the blood group can’t be seen”.

Slide #29 hasn’t been discussed.

Slide #30 Same.

Slide #31
Pleiotropy: when the same gene is affected at different organs of the body, it’ll give different types of diseases.

Slide #32
CF: cystic fibrosis, If it’s present in sweat glands, there will be chlorine problem, If it’s present in the lung then mucus accumulation will happen, in the pancreas diabetes might result.

Slide #33
Here different genes produce the same clinical picture “opposite to pleiotropy”.

Slide #34+ #35 haven’t been discussed.

Slide #36
You don’t need to know these examples

Slide #37
In the photo, the dog has three colors each color is controlled by a gene according to the expressivity of the gene the dog’s color will be different

Slide #38 hasn’t been discussed

Slide #39
-The disease doesn’t appear in the child, it’ll appear later in life.
-Familial Alzheimer disease , and familial breast cancer, can’t be determined if they are autosomal recessive or they are autosomal dominant, because the onset of the disease is very much delayed “35 years in breast cancer and 60 years in Alzheimer disease”.

Slide #40 Same

Slide #41
-In siamese cats, their extremities have dark color “because the amount of blood that is circulating in the extremities is low” so the color of the extremities of the cat has changed due to environmental factors.
 -Sickle cell anemia patients are normal, but when they’re taken to high altitude the manifestations will appear immediately due to environmental causes.

Slide #42 Same.

Slide #43
-Anticipation: the severity will increase in each generation.
-In “anticipation” there is problem in an area that doesn’t undergo transcription, this are contains a repetition of three nucleotides for five times “in normal people”, if this repetition has increased to 19-30 some changes will appear, if the repetition has increased to thousands then a very sever type of disease will happen “the increase in repetitions happens when we move from one generation to the other .. this is my conclusion”

Slide #44
Three genes are responsible for osteogenesis imperfecta, and some of these genes may be normal, that’s why it’s considered mosaicism.

Slide #45 Same

Not from the slides…. Punnett square
 