HiYield Paper A(2)

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Question 1
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI001
Psychometric assessments
With the descriptions given below, identify the type of neuropsychological tests from the list provided;

This consists of ten tests, including the trail making test and critical flicker frequency test — Choose...

This consists of 120 items plus several alternative tests, applicable to the ages between 2 years and adulthood. — Choose...

This test results can reveal whether a subject has amnestic Korsakoff's syndrome — Choose...

This is a test of intelligence, considered to be free of sociocultural bias. — Choose...

Check

Explanation:

Halstead-Reitan battery of neuropsychological tests consists of ten tests, including the trail making test and critical flicker frequency test. It was developed in an attempt to improve the reliability of the criteria used to diagnose brain damage. The trial-making test is a test of visuomotor perception and motor speed and the critical flicker frequency tests visual perception.

Stanford-Binet intelligence scale- this test is most commonly used in the individual examination of children. It is helpful to assess intelligence and consists of 120 items plus several alternative tests, applicable to the ages between 2 years and adulthood.

Wechsler memory scale- screens for verbal and visual memory and, therefore, yields a memory quotient. So the results can reveal whether a patient has amnestic Korsakoff's syndrome.

Raven's progressive matrices is a test of performance intelligence, considered to be free of cultural bias or language bias.

The correct answer is: This consists of ten tests, including the trail making test and critical flicker frequency test – Halstead-Reitan battery of neuropsychological tests, This consists of 120 items plus several alternative tests, applicable to the ages between 2 years and adulthood. – Stanford-Binet intelligence scale, This test results can reveal whether a subject has amnestic Korsakoff's syndrome – Wechsler memory scale, This is a test of intelligence, considered to be free of sociocultural bias. – Raven's progressive matrices

Question 2
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI002
Neuropsychological evaluation
A 54-year man presents with one year history of progressive change in personality and behaviour profile. He has become gradually apathetic and depressed and experiences recurrent frontal headaches. He also experiences occasional word-finding difficulties. EEG shows unilateral frontal slowing. You are considering an intracranial space-occupying lesion.

Which test would give a fast estimate of his current performance IQ? — Choose...

The test indicates that his current performance IQ is in the low average range. How would you estimate the IQ level before he may have sustained any brain damage in recent months / years? — Choose...

The estimate of his premorbid IQ is 15 points higher than his current performance IQ. It is recommended that he has a full WAIS IQ assessment to measure both performance and verbal IQ. On the WAIS, his verbal IQ is found to be impaired over and above his performance IQ. Which test is a part of the WAIS verbal subtests? — Choose...

An MRI scan shows a large meningioma compressing dorsolateral prefrontal cortex on the left. Which test result is most likely to be impaired? — Choose...

Check

Explanation: Raven's matrices are used to estimate performance IQ - they are useful especially when cultural or language boundaries exist for neuropsychological testing. It taps on general intelligence with visuospatial problem-solving.

NART (National adult reading test) tests premorbid IQ.

Digit span is a part of verbal subtests of WAIS (Wechsler adult intelligence scale).

WCST (Wisconsin card sorting test) is a standard test for executive functions affected by frontal lesions.

The correct answer is: Which test would give a fast estimate of his current performance IQ? – Raven's progressive matrices, The test indicates that his current performance IQ is in the low average range. How would you estimate the IQ level before he may have sustained any brain damage in recent months / years? – National Adult Reading Test, The estimate of his premorbid IQ is 15 points higher than his current performance IQ. It is recommended that he has a full WAIS IQ assessment to measure both performance and verbal IQ. On the WAIS, his verbal IQ is found to be impaired over and above his performance IQ. Which test is a part of the WAIS verbal subtests? – Digit span, An MRI scan shows a large meningioma compressing dorsolateral prefrontal cortex on the left. Which test result is most likely to be impaired? – Wisconsin Card Sorting Test

Question 3
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI003
Brain structure and function
For each lesion described below choose possible clinical correlates

A right-handed man with left frontal lobe lesion — Choose...

A right-handed man with right parietal lobe lesion Choose...

A right-handed man with left parietal lobe lesion Choose...

Check

Explanation: The effects of left frontal disease include right hemiplegia, motor speech disorder (expressive dysphasia due to Broca's lesion) with agraphia, sympathetic apraxia of left hand, loss of verbal associative fluency and perseveration. The effects of a unilateral disease of non-dominant parietal lobe include visuospatial disorders, topographic memory loss, anosognosia, dressing and constructional apraxia. Gerstmann syndrome (finger agnosia, right-left confusion, dysgraphia, and dyscalculia) is a feature of dominant parietal lobe lesion.

The correct answer is: A right-handed man with left frontal lobe lesion
– Expressive dysphasia, A right-handed man with right parietal lobe lesion
– Constructional apraxia, A right-handed man with left parietal lobe lesion
– Finger agnosia

Question 4

Not answered

Marked out of 5.00

Flag question

HiY Neurosciences EMI004

Cognitive function tests

Select one best for each of the following situations;

Executive function Choose...

Non-verbal intelligence Choose...

Brain damage Choose...

Tests of visual memory Choose...

Tests of verbal memory Choose...

Check

Explanation: The Wisconsin Card Sorting Test (WCST) is useful to measure executive functions and is useful to detect prefrontal lobe pathology. It contains stimulus cards of different colours, shapes, and numbers. Subjects are asked to sort these into groups according to a single principle (e.g., to sort by colour, ignoring form and number). Persons with damage to the frontal lobes or to the caudate and some persons with schizophrenia give abnormal responses.

Raven's progressive matrices test is useful to measure non verbal intelligence. It involves color pattern matching exercises and is independent of education and cultural influence.

Halstead & Reitan developed a battery of tests that was used to determine the location and the effects of specific brain lesions.

Rey-Osterreith test is a test of visual memory that involves the subject to copy a complex figure made of basic geometric shapes and then to draw it from memory.

Paired associates test is a test of verbal memory, available for paired and unpaired words.

The correct answer is: Executive function – Wisconsin card sorting test, Non-verbal intelligence – Raven's progressive matrices, Brain damage – Halstead-Reitan Battery, Tests of visual memory – Rey-Osterrieth test, Tests of verbal memory – Paired associate learning test

Question 5

Not answered

Marked out of 5.00

Flag question

HiY Neurosciences EMI005

Cognitive test domains

Select one best answer for each of the following situations;

Measures working memory Choose...

Measures set shifting abilities and response inhibition Choose...

Measures visuospatial and perceptuomotor speed Choose...

Measures pre-morbid intelligence Choose...

Screening measure for signs of organic dysfunction Choose...

Check

Explanation:

Working memory refers to the very limited capacity, which allows us to retain information for a few seconds and depends on the intact function of the dorsolateral prefrontal cortex. Digit span is a relatively pure test of attention and is dependent on working memory, but it is not a specific test; it is impaired in acute confusional states, focal left frontal damage, aphasia, and late stages of dementia, but not affected in Korsakoff's syndrome or medial temporal lobe damage (Kipps and Hodges, 2005). Normal digit span is 7 +/- 2 depending on age and general intellectual ability. In the elderly, or intellectually impaired, 5 can be considered normal. Reverse span is usually one or two less than forward span (5 ± 2 digits.

Stroop test: It measures set shifting abilities and response inhibition. It is a test of frontal function and selective attention ability.

Trail making test: It consists of two parts. In part, A simple number sequence is used to join the dots. Test B uses alternating numbers and letters and is thought to be more sensitive to frontal lobe dysfunction. It tests visuomotor tracing, attention and conceptualisation and most importantly, set shifting (test B).

National adult reading test taps on previous word knowledge before becoming ill (or sustaining brain injury) - hence it is used to estimate the premorbid IQ.

The Bender Visual Motor Gestalt Test is a test of visuomotor coordination that is useful for both children and adults. Children <3 cannot reproduce the test designs meaningfully. It is most frequently used in adults as a screening measure for organic dysfunction e.g. after head injury.
Excerpt from Cognitive assessment for clinicians -- Kipps and Hodges (2005). Retrieved from http://jnnp.bmj.com/content/76/suppl_1/i22.full

The correct answer is: Measures working memory – Digit span, Measures set shifting abilities and response inhibition – Stroop test, Measures visuospatial and perceptuomotor speed – Trail making test, Measures pre-morbid intelligence – National adult reading test, Screening measure for signs of organic dysfunction – Bender Visual Motor Gestalt Test

Question 6
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI006
MMSE
Identify one cognitive process, which is tested by different items of MMSE

Repetition of 3 objects (Apple, Table & Penny) after a distraction task — Choose...
Spell the word 'WORLD' backwards — Choose...
Months of the year backwards — Choose...
Carrying out a 3 stage command such as 'Take this paper in your right hand, fold it in half and put it on the floor.' — Choose...
What day of the week is today? — Choose...

Check

Explanation: Repetition of 3 objects (Apple, Table & Penny) after a distraction task tests retention and recall abilities. Attention can be tested in a number of ways including serial 7s, digit span, spelling "world" backwards, and recitation of the months of the year in reverse order or continuous performance tests. Although serial 7s is commonly used, it is frequently performed incorrectly by the elderly, as well as by patients with impaired attention (Kipps and Hodges, 2005). Serial subtraction by seven is frequently said to be a measure of concentration (intense one-task orientation). It does not test inattention, which is a term often used in the context of spatial neglect. A reverse-order month of the year is a highly over-learned sequence and is a preferred measure of sustained attention.

The 3-stage command tests language comprehension.

Excerpt from Cognitive assessment for clinicians -- Kipps and Hodges (2005). Retrieved from http://jnnp.bmj.com/content/76/suppl_1/i22.full

The correct answer is: Repetition of 3 objects (Apple, Table & Penny) after a distraction task – Retention & Recall, Spell the word 'WORLD' backwards – Attention & Concentration, Months of the year backwards – Attention & Concentration, Carrying out a 3 stage command such as 'Take this paper in your right hand, fold it in half and put it on the floor.' – Language-understanding, What day of the week is today? – Orientation to time

Question 7
Not answered
Marked out of 8.00
Flag question

HiY Neurosciences CXEMI007
Behavioural tests
For each of the following functions, choose the most relevant behavioural tests;

1. Visuospatial memory (Choose 3 answers)
2. Sensorimotor gating (Choose 1 answer)
3. Depression models (Choose 2 answers)
4. Anxiety (Choose 2 answers)

Check

Explanation:

The radial arm maze was designed by Olton and Samuelson in 1976 to measure spatial learning and memory in rats.

The Morris water navigation task is an experimental procedure employed in to study spatial learning and memory. It was developed by Edinburgh-based neuroscientist Richard G. Morris in 1981 to show that hippocampal lesions impaired spatial learning.

The T-maze is a popular test for the investigation of spatial learning and memory in rodents.

Latent inhibition test is a test for sensorimotor gating.Latent inhibition is defined as an animal's unconscious capacity to ignore stimuli that experience has shown is irrelevant to its needs.

Yoked shock test is associated with the concept of 'Learned helplessness', which is an explanatory model for depression.

The behavioural despair test (also called the Porsolt test or forced swimming test) is a test used to measure the effect of antidepressant drugs on the behaviour of laboratory animals (typically rats or mice).

The light/dark box test measures the anxiety-related behaviour (Crawley, Neurosci Biobehav Rev. 9:37-44, 1985). The light/dark test may be useful to predict anxiolytic-like or anxiogenic-like activity in mice. Classic anxiolytics (benzodiazepines), as well as the newer anxiolytic-like compounds (e.g. serotonergic drugs or drugs acting on neuropeptide receptors), can be detected using this paradigm. It has the advantages of being quick and easy to use, without requiring the prior training of animals.

The elevated plus maze is a test for anxiety-like behavior (fear/anxiety). A mouse is placed in the center of the maze and the number of entries and amount of time spent in the open and closed arms are recorded during a brief trial.
(Ref: The mouse light/dark box test. Bourin M, Hascoet M. For pictorial representations see www. dsm.fujitahu.ac.jp/E/behaviorcore/test_intro/test_intro_e.htm ; Also see http://www.ncbi.nlm.nih.gov/pubmed/12600702)

The correct answer is:
Visuospatial memory (Choose THREE answers) - Radial arm maze task, Morris water maze task , T-maze test,

Sensorimotor gating (Choose ONE answer) - Latent inhibition test,

Models of depression (Choose TWO answers)- Yoked shock test,Forced swim test

Anxiety (Choose TWO answers)- Light-dark box, Elevated plus maze

Question 8
Not answered
Marked out of 6.00
Flag question

HiY Neurosciences CXEMI008
Inheritance patterns in psychiatry
For the following inheritance patterns identify the associated disorder from the given list.

1. Complex non-Mendelian pattern of inheritance (Choose TWO)
2. Autosomal recessive pattern (Choose TWO)
3. Trinucleotide repeat mutations (Triplet)- (Choose TWO)

Check

Explanation: Both schizophrenia and autism are complex non-Mendelian disorders where no clear autosomal or sex-linked pattern could be demonstrated in pedigrees. Wilson disease shows an autosomal recessive pattern of inheritance. Fragile X syndrome is associated with a large sequence of triplet repeats of CGG sequence. In Huntington's the genetic defect is an excessive trinucleotide repeat of CAG sequence on chromosome 4.

The correct answer is:
Complex non-Mendelian pattern of inheritance (Choose TWO) - Autism, Catatonic Schizophrenia,

Autosomal recessive pattern (Choose TWO) - Wilson's disease,Phenylketonuria

Trinucelotide repeat (Choose TWO) - Fragile X syndrome, Huntington's disease

Question 9
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI009
Molecular genetic processes
Identify processes using descriptions given below

This is a process by which one gene give rise to more than one proteins — Choose...

These are different ways in which proteins can be modified (two answers) — Choose...

This is a distinct process by which protein is formed from mRNA — Choose...

Check

Explanation:

Alternate or differential splicing is a process by which the exons of transcripted mRNA are pasted or reconnected in multiple ways during RNA splicing, thus enabling single gene to code for many proteins.

Post-Translational Modifications occurring at the peptide terminus of the amino acid chain play an important role in translocating them across biological membranes. Many proteins, particularly in eukaryotic cells, are modified by the addition of carbohydrates, a process called glycosylation. The addition of a phosphate group, phosphorylation, is also a post-translational modification process.

Translation refers to production of proteins from RNA. It takes place in cytoplasm on ribosomes where specific m-RNAs are involved.

Excerpt from Post-Translational Modifications: An introduction. Retrieved from Protein Folding and Processing - The Cell - NCBI Bookshelf. Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK9843/

The correct answer is: This is a process by which one gene give rise to more than one proteins – Alternate Splicing, These are different ways in which proteins can be modified (two answers) – Phosphorylation, Glycosylation, This is a distinct process by which protein is formed from mRNA – Translation

Question 10
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI010
The risk of schizophrenia to relatives
A lady with schizophrenia is keen to know the risk of schizophrenia to her family members. What is the lifetime risk in percentage to each of the following relatives?

Her brother — Choose...

Her mother — Choose...

Her child if she marries someone without schizophrenia — Choose...

An adopted child of her second brother. This child has the velocardiofacial syndrome. — Choose...

Check

Explanation: If one parent has schizophrenia, the risk to the child is 13%. If both parents have schizophrenia, then the risk is 46% - close to monozygotic twin risk. The risk to a half sibling is 4%. Please note that being a sibling or being a child of someone with schizophrenia carries the same risk. Adopted children carry the same risk as the general population unless they carry genetic influences, which inflate (VCFS) or deflate (Down's) the risk.

The correct answer is: Her brother – 10-15, Her mother – 5-10, Her child if she marries someone without schizophrenia – 10-15, An adopted child of her second brother. This child has the velocardiofacial syndrome. – 25-30

Question 11
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI011
Classifying mutations
For the following mutations, select the most appropriate term

An increase in the size of a triplet repeat — Choose...

Substitution of one amino acid for another — Choose...

A 5 base pair deletion in an axon — Choose...

A to T point mutation — Choose...

Check

Explanation: A silent mutation causes no change in protein product - this is possible because a single amino acid is often coded by more than one triplet sequence.

In a silent mutation, one triplet sequence is replaced by a different sequence but without changing amino acid product.

In missense mutation, the new mutant codon specifies a different amino acid with variable effects on final protein product. For example, haemophilia, sickle cell anaemia.

In nonsense mutation, the new codon is UUA UGA or UAG, which signals 'stop' to the amino acid sequence resulting a in a nonfunctional protein.

In frame shift mutations, the deletion or insertion is not in multiples of three codons e.g. a segment of 5 bases deletion mutations.

Point mutations are usually substitutions where one base is replaced by another. It could be termed as transition if a purine is replaced by another purine or a pyrimidine replaced by another pyrimidine (e.g. A to G). It is called transversion if a purine is replaced by a pyrimidine or vice versa (e.g. A to T).

The correct answer is: An increase in the size of a triplet repeat – Expansion, Substitution of one amino acid for another – Missense, A 5 base pair deletion in an axon – Frame-shift, A to T point mutation – Transversion

Question 12
Not answered
Marked out of 3.00
Flag question

HiY Neurosciences EMI012
Differences among genetic studies
Select the type of study for each description given below

Identify a specific disease locus — Choose...

Establish chromosomal location of a disease locus — Choose...

Implicate molecular pathways — Choose...

Check

Explanation:

Twin and adoption studies are useful to differentiate the effects of genes and environment. The search for a disease gene typically begins with linkage analysis. This type of study helps to find out the approximate location of the gene in relation to another DNA sequence (called a genetic marker) whose position is already known.

Transgenesis defines any process that involves the transfer of a gene from one species to another. It is often used in the context of inserting modified mouse genes in the mouse genome to study gene function. Transgenesis and gene targeting represent the two most direct and powerful approaches for analysing gene function in higher organisms.

Association studies are more straightforward where a case-control design is often adapted, and a sample of cases affected by a disorder is compared with controls. The frequency of alleles at the marker locus is then compared in the two groups. This method, though helpful to identify the likelihood of a specific locus being associated with a disease, cannot make strong causal inferences.

The correct answer is: Identify a specific disease locus – Association studies, Establish chromosomal location of a disease locus – Linkage studies, Implicate molecular pathways – Transgenic studies

Question 13
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI013
Genetic syndromes
From the mechanisms and chromosomal loci below choose one right option from given list:

Uniparental disomy and paternal deletion of a locus at chromosome 15 — Choose...

Robertsonian translocation 14:21 — Choose...

CTG trinucleotide repeats — Choose...

Trisomy 13 — Choose...

Trisomy 18 — Choose...

Check

Explanation:

The Prader-Willi (PWS) and Angelman (AS) syndromes are phenotypically distinct but genetically overlapping neurodevelopmental disorders associated with chromosome 15q11-q13 imprinting. Nearly 70% of patients with PWS have a deletion in their paternally derived 15q11-q13. Maternal uniparental disomy (inheriting both copies from the mother when the embryo is formed) occurs in most of the remaining patients (25%). Most patients with Angelman's syndrome have a deletion in their maternally derived 15q11-q13. Paternal uniparental disomy occurs in about 4% of Angelman's syndrome.

The Robertsonian translocation 14:21 is unbalanced, and the baby has three copies of the long arm of chromosome 21 instead of two. This causes translocation Down's syndrome.

The myotonic dystrophy mutation, identified as an unstable deoxyribonucleic acid (DNA) sequence (CTG) prone to increase the number of trinucleotide repeats, produces clinical manifestations of the disease in skeletal muscle, the heart and many organ systems (Novelli et al., 1993).

Trisomy 13 causes Patau syndrome while 18 causes Edward's syndrome.

Excerpt from Novelli G, et al., The dynamic genomics of myotonic dystrophy and its clinical relevance: an overview. Biomed Pharmacother. 1993;47(8):321-30.

The correct answer is: Uniparental disomy and paternal deletion of a locus at chromosome 15 – Prader-Willi syndrome, Robertsonian translocation 14:21 – Down's syndrome, CTG trinucleotide repeats – Myotonic dystrophy, Trisomy 13 – Patau syndrome, Trisomy 18 – Edward's syndrome

Question 14
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI014
Genetic deletion syndromes
Choose the most appropriate deletion for each description below

Obesity, short stature, small limbs, decreased IQ with hyperphagia and skin picking. — Choose...

Congenital supravalvular aortic stenosis, elfin facies with microcephaly, sometimes appears disinhibited in social settings. — Choose...

Developmental delay, low IQ, jerky movements especially hand-flapping, frequent smiling, and seizures. — Choose...

Feeding problems due to difficulty swallowing and sucking, cat-like cry with poorly developed facial features. — Choose...

Check

Explanation:

Skin picking associated with Lesch-Nyhan syndrome, Prader-Willi syndrome, or mental retardation.Hyperphagia/food foraging/obsession with food along with a short stature in case 1 supports a diagnosis of Prader-Willi Syndrome. Paternal 15q11 deletion is associated with this condition.

Williams's syndrome (case 2) is a developmental disorder classically characterized by the triad of typical facial features, infantile hypercalcemia, and supravalvular aortic stenosis. Deletion of elastin gene at chromosome 7q11 is associated with both the familial autosomal dominant pattern and the more frequent de novo sporadic cases of this syndrome.

The earliest description of the Angelman syndrome (case 3) by the physician Harry Angelman in 1965, included several children having "flat heads, jerky movements, protruding tongues, and bouts of laughter."

Cri du chat syndrome is associated with a deletion in chromosome 5.

The correct answer is: Obesity, short stature, small limbs, decreased IQ with hyperphagia and skin picking. – Chr15q11-13 paternally inherited, Congenital supravalvular aortic stenosis, elfin facies with microcephaly, sometimes appears disinhibited in social settings. – Chr7q11, Developmental delay, low IQ, jerky movements especially hand-flapping, frequent smiling, and seizures. – Chr15q11-13 maternally inherited, Feeding problems due to difficulty swallowing and sucking, cat-like cry with poorly developed facial features. – Chr 5p12

Question 15

Not answered

Marked out of 5.00

Flag question

HiY Neurosciences CXEMI015

Types of genetic studies

Choose the appropriate methods of answering each of the following questions from the list above

1. You are interested in finding out whether a condition is familial or not. (Choose ONE) [ ]

2. What is the relative contribution of genetic and environmental factors in this disease?'(TWO options) [ ] [ ]

3. A researcher wants to localize the genes responsible for a disease or condition (Choose ONE) [ ]

4. A researcher wants to study the life time incidence of a genetic disease (Choose ONE) [ ]

Check

Explanation: The family study method is a simple genetic investigation. It involves acquiring psychiatric history related to the proband's family. A comparison can be then made as to how many relatives are affected in one group compared to another. Twin and adoption studies are useful to differentiate the effects of genes and environment. The search for a disease gene typically begins with linkage analysis. This type of study helps to find out the rough location of the gene relative to another DNA sequence (called a genetic marker), which has its position already. Studying the whole population, not a selected group of high-risk pedigrees or families, is required to establish lifetime incidence of a disease.

http://genome.wellcome.ac.uk/doc_WTD020778.html

The correct answer is:
You are interested in finding out whether a condition is familial or not. (Choose ONE) - Family study,

What is the relative contribution of genetic and environmental factors in this disease? (TWO options)- Twin studies, Adoption studies,

A researcher wants to localize the genes responsible for a disease or condition (Choose ONE)- Linkage analysis,

A researcher wants to study the life time incidence of a genetic disease (Choose ONE)- Population studies

Question 16

Not answered

Marked out of 8.00

Flag question

HiY Neurosciences CXEMI016

Genes implicated in neuropsychiatric disorders

For each condition below choose the appropriate gene/s from the list above

1. CADASIL (ONE) [ ]

2. Schizophrenia (THREE) [ ] [ ] [ ]

3. Parkinson's disease (THREE) [ ] [ ] [ ]

4. FTD (ONE) [ ]

Check

Explanation:

Genetic studies of Parkinson's (PD) implicate genes including SNCA (4q21 - encodes a-synuclein), Leucine-rich repeat kinase 2 (LRRK2), parkin and PTEN-induced kinase 1 (PINK1).

Mutations in the gene encoding the microtubule-associated protein tau gene (MAPT) linked to chromosome 17q21 have been known to produce familial FTD associated with Parkinsonism,amyotrophy, disinhibition, and dementia (FTDP-17) (Rosenberg, 2007). Another mutation at a proximal site on the same chromosome involves progranulin and results in ubiquitin-positive inclusions rather than tauopathypathology. Arch Neurol. 2008; 65(4):460-464.

CADASIL (Cerebral Autosomal Dominant Arteriopathy with Sub-cortical Infarcts and Leukoencephalopathy) is "an inherited form a of cerebrovascular disease that occurs when the thickening of blood vessel walls blocks the flow of blood to the brain". Through positional cloning, Notch3 was found to be the gene responsible for the disorder, and mutations have been demonstrated in more than 90% of CADASIL patients.

Dysbindin, DISC 1 and neuregulin are associated with schizophrenia.
Excerpt retrieved from http://www.ninds.nih.gov/disorders/cadasil/CADASIL.htm and http://www.jci.org/cgi/content/full/105/5/561
Rosenberg RN. Progranulin and Tau Gene Mutations Both as Cause for Dementia: 17q21 Finally Defined. Arch Neurol. 2007;64(1):18-19.

The correct answer is:
CADASIL (ONE)- NOTCH3,

Schizophrenia (THREE)- DISC1,Dysbindin, Neuregulin

Parkinson's disease (THREE)- LRRK2, PINK1, Alpha-synuclein,

FTD (ONE) - MAPT

Question 17
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI017
Inheritance of diseases
Choose one best option for the most common mechanism from the given list for each description below:

Tumours on the surface of the brain with patchy sclerosis of the brain surface. Visceral tumours are also noted — Choose...

Progressive dementia and movement disorder beginning in middle adulthood; depression and frank psychosis may also occur — Choose...

Hyperuricemia, movement disorder and intense self-mutilation in a stereotyped fashion. Impaired renal function and cerebral palsy are also noted. — Choose...

Male phenotype but infertile with eunuchoid appearance. Small testes with Barr body on cytological examination — Choose...

Check

Explanation: Tuberous sclerosis most commonly occurs as a result of spontaneous mutations, though an autosomal dominant pattern is noted in familial cases. Huntington disease is trinucleotide repeat disease with autosomal dominant inheritance. Lesch-Nyhan syndrome is an X-linked recessive condition. Kleinfelter syndrome results from an aneuploidy due to nondisjunction.

The correct answer is: Tumours on the surface of the brain with patchy sclerosis of the brain surface. Visceral tumours are also noted – Spontaneous mutations, Progressive dementia and movement disorder beginning in middle adulthood; depression and frank psychosis may also occur – Autosomal dominant, Hyperuricemia, movement disorder and intense self-mutilation in a stereotyped fashion. Impaired renal function and cerebral palsy are also noted. – X-linked recessive, Male phenotype but infertile with eunuchoid appearance. Small testes with Barr body on cytological examination – Non disjunction of chromosomes

Question 18
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI018
Genetic variations in disease
For the following genetic changes, identify the associated disorder from the given list.

Deletion in chromosome 15 — Choose...

Trisomy 18 — Choose...

Chromosome X deletion affecting purine metabolism — Choose...

ZNF804A polymorphism — Choose...

Check

Explanation:

Lesch-Nyhan syndrome is an extremely rare condition, due to a mutation in HPRT gene (hypoxanthine-guanine phosphoribosyl transferase) on the short arm of chromosome Xq26-27, with a nearly total loss of the enzyme leading to hyperuricaemia.

ZNF804A is one of the strongest candidate genes for schizophrenia observed in genome-wide association studies, yet its physiological role in disease pathophysiology is currently unknown.
Excerpt retrieved from http://www.ncbi.nlm.nih.gov/pubmed/20664580

The correct answer is: Deletion in chromosome 15 – Prader-Willi syndrome, Trisomy 18 – Edward syndrome, Chromosome X deletion affecting purine metabolism – Lesch-Nyhan syndrome, ZNF804A polymorphism – Schizophrenia

Question 19
Not answered
Marked out of 3.00
Flag question

HiY Neurosciences EMI019
Cell biology
Using descriptions given below, identify the type of enzymes from the list

Used in experiments to decrease gene expression — Choose...

Provides a bridge between m-RNA and amino acids — Choose...

Enzymes which attaches amino acids to t-RNA — Choose...

Check

Explanation:

Small interfering RNA (Si-RNA) is a class of double-stranded RNA molecule, involving in RNA interference pathway, where it interferes with expression of a specific gene.

T-RNA is a small RNA molecule that transfers a specific active aminoacid to growing polypeptide chain at the ribosomal site of protein synthesis during translation. It also has a terminal site for amino acid attachment.

Aminoacyl t-RNA synthetase is an enzyme that catalyze the esterification of a specific amino acid or its precursors to one of all its compatible cognate t-RNA to form an aminoacyl t-RNA.

The correct answer is: Used in experiments to decrease gene expression – Si- RNA, Provides a bridge between m-RNA and amino acids – t-RNA, Enzymes which attaches amino acids to t-RNA – Aminoacyl t-RNA synthetase

Question 20
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI020
Clinical genetics
Choose one option for each of the following descriptions

This occurs exclusively in females and the gene associated is MECP2 at Xq28 — Choose...

The penetrance is greater in males than females. The gene sequence has been cloned and designated as FMR-1 Choose...

Congenital disorder caused by a micro deletion of chromosome 22, associated with learning disability and schizophrenia Choose...

Autosomal dominant condition with NFl gene 17q11.2 involved. The gene product is thought to be a tumour suppressor gene Choose...

X-linked recessive condition due to a mutation in HGPRT gene Choose...

Check

Explanation: Rett syndrome occurs only in females. Although the etiology is unknown it is though to be associated with MECP2 at Xq28.

Fragile X syndrome is the most common inherited cause of learning disability. The penetrance is greater in males than females. The fragile X mental retardation 1 (FMR-1) gene is responsible for fragile X syndrome caused by abnormal trinucleotide CGG repeat at a fragile site on the X chromosome (Xq27.3).

Velocardiofacial syndrome is also known as DiGeorge's syndrome. It is a congenital disorder caused by a microdeletion of chromosome 22.

Neurofibromatosis: Autosomal dominant condition with 50% new mutations. More than 90% patients have paternal NF1 allele mutated. NFL gene is located at17q11.2. The gene product is neurofibromin, thought to be tumour suppressor gene.

Lesch Nyhan syndrome is an X-linked recessive condition due to a mutation in HGPRT gene on the short arm of chromosome Xq26-27. There is a defect in hypoxanthine guanine phosphoribosyl-transferase with an accumulation of uric acid; Note that a partial HGPRT deficiency results in recurrent gout.

The correct answer is: This occurs exclusively in females and the gene associated is MECP2 at Xq28 – Rett's syndrome, The penetrance is greater in males than females. The gene sequence has been cloned and designated as FMR-1 – Fragile X syndrome, Congenital disorder caused by a micro deletion of chromosome 22, associated with learning disability and schizophrenia – Velocardiofacial syndrome, Autosomal dominant condition with NFl gene 17q11.2 involved. The gene product is thought to be a tumour suppressor gene – Neurofibromatosis, X-linked recessive condition due to a mutation in HGPRT gene – Lesch-Nyhan syndrome

Question 21
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI021
Location of genetic deletions
Identify the site of deletion that has occurred in each of the following disorders. The numbers provided in the list correspond to human chromosomal numbers.

Angelman syndrome Choose...

Criduchat syndrome Choose...

Velocardiofacial syndrome Choose...

Smith Magenis syndrome Choose...

Williams syndrome Choose...

Check

Explanation: Angelman syndrome is caused due to a deletion in 15q12 of maternal origin; 80% due to deletion of maternally derived chromosome 15. In Prader-Willi syndrome there is a deletion in 15q12 of paternal origin; 75% deletion of paternally derived chromosome 15.

Criduchat syndrome is due to a partial deletion 5p15.2.

The velocardiofacial syndrome is associated with micro deletion of chromosome 22q11.2; 90% arise denovo, with 10% having an affected parent.

Smith-Magenis syndrome is associated with a complete or partial deletion of 17p11.2.

Williams's syndrome is also known as 'hypercalcemia with supravalvular aortic stenosis'. Clinical features include short stature, growth retardation, unusual facial features including a broad forehead, elfin like facies, hoarse voice, and cardiovascular abnormalities (supravalvular aortic stenosis). Verbal skills are often better than motor and visual spatial skills.

The correct answer is: Angelman syndrome – 15, Criduchat syndrome – 5, Velocardiofacial syndrome – 22, Smith Magenis syndrome – 17, Williams syndrome – 7

Question 22
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI022
Neuroanatomical regions
Identify one brain area that is most important in the following functions;

Reward processing Choose...

Emotions Choose...

Dysdiadachokinesia Choose...

Executive functions Choose...

Check

Explanation:

The area of the brain implicated in reward system regulation is nucleus accumbens. The area of the brain involved in mediating emotional response such as fear the is amygdala.

Cerebellum has the important role of preparing a motor plan and predicting balance needed between muscle groups to carry out the intended action smoothly. Cerebellar lesions produce ataxia, dysdiadochokinesia, coarse intentional tremors, along with hypotonia, past pointing and pendular knee jerk. Dysdiadochokinesia refrs to impaired ability to perform rapid, alternating movements.

The dorsolateral prefrontal cortex is responsible for executive functions such as planning, judgement, and decision-making.

The correct answer is: Reward processing – Nucleus Accumbens, Emotions – Amygdala, Dysdiadachokinesia – Cerebellum, Executive functions – Dorsolateral prefrontal cortex

Question 23
Not answered
Marked out of 8.00
Flag question

HiY Neurosciences CXEMI023

Neuropsychology

A trainee psychologist is keen to test different areas of cognitive domains. Choose the two most appropriate tests for each of the following brain functions

1. Executive functions (Choose TWO)
2. Attention (Choose TWO)
3. Visuospatial function (Choose TWO)
4. Intelligence (Choose TWO)

Check

Explanation:

The Tower of London test and Wisconsin Card Sorting Test are well-known tests used in applied clinical neuropsychology for the assessment of executive functioning specifically to detect deficits in planning.

Attention can be tested in a number of ways including serial 7s, digit span, spelling "world" backwards, and recitation of the months of the year in reverse order or continuous performance tests.

Clock drawing task and Rey complex figure test are useful to test visuospatial functions.

The Wechsler Adult Intelligence Scale (WAIS) is the most widely used intelligence test in clinical practice. National adult reading test taps on previous word knowledge before becoming ill - hence used to estimate premorbid IQ

The correct answer is -

1. Executive functions (Choose TWO) - Tower of London test, Wisconsin card sorting test,
2. Attention (Choose TWO) -Continuous performance test, Digit Span Test
3. Visuospatial function (Choose TWO) - Rey complex figure test, Clock drawing test,
4. Intelligence (Choose TWO) - National Adult Reading Test, WAIS

Question 24
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI024

Neuroanatomical localization

Identify one brain area that is most important in the following functions;

Fear — Choose...
Production of speech — Choose...
Comprehension of language — Choose...
Initiation of physical movement — Choose...

Check

Explanation: Amygdala plays an important role in emotional learning, fear conditioning and modulation of memory consolidation.

Broca's area, which is linked to the production of speech, is located in the posterior part of the inferior frontal gyrus in the dominant hemisphere; destruction results in expressive dysphasia.

Wernicke's area is located in the posterior section of the superior temporal gyrus in the dominant cerebral hemisphere.

The frontal lobe can be anatomically divided into the precentral cortex, prefrontal cortex and the orbitofrontal cortex.

The precentral cortex lodges the primary motor cortex and is involved in motor planning, initiation and control.

The correct answer is: Fear – Amygdala, Production of speech – Left inferior frontal cortex, Comprehension of language – Posterior superior temporal lobe, Initiation of physical movement – Precentral cortex

Question 25
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences CXEMI025

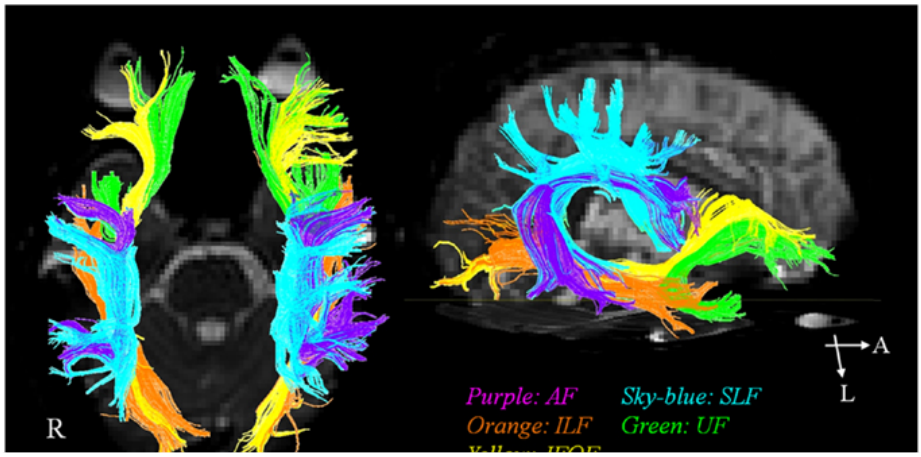
Neuroanatomy- Connecting bundles

Identify the tracts, which play a potential role in each of the following;

1. The tract of fibres that connect frontal and temporal lobes (Choose TWO)
2. Dominant structures involved in stereotactic brain mapping (Choose TWO)
3. This tract plays a crucial role in object recognition (ONE)

Check

Explanation: The uncinate fasciculus (green bundle in the image below) is a 'U' shaped white matter tract in the brain that connects part of limbic system such as temporal pole, hippocampus and amygdala in the medial temporal lobe with prefrontal regions including the ventromedial and orbitofrontal cortex. It also connects the inferior frontal gyrus with temporal lobe. The superior longitudinal fasciculus (sky-blue in the image below) is a long anteroposterior association fibre bundle that is lateral to the centrum ovale in each hemisphere and connects the frontal, temporal, parietal and occipital lobes.



(Diffusion Tensor Image from Jang 2010: Frontiers in Human Neuroscience. http://journal.frontiersin.org/Journal/10.3389/fnhum.2013.00749/full).

The anterior commissure (AC) and posterior commissure (PC) are two dominant anatomic structures serve as indirect localization of intracerebral anatomy and is crucial in stereotactic brain mapping. The inter commissural line has also been used as a reliable reference line for stereotactic surgery. In terms of brain mapping in stereotactic surgery the gold standard continues to rely on probabilistic and indirect targeting, relative to a stereotactic reference, i.e., mostly the anterior (AC) and the posterior (PC) commissures. For a visual representation, see http://en.wikipedia.org/wiki/File:Gray720.png.

The Inferior longitudinal fasciculus (orange in the image below) plays a potential role in object recognition. Studies using diffusion tensor imaging suggest an association between integrity loss and object recognition deficits. Moreover, the severity of clinical impairment is reflected in the degree of loss of ILF integrity. (Ref: Orbitus et al., Dev Med Child Neurol. 2012 Jan;54(1):38-43.)

The correct answer is:
The tract of fibres that connect frontal and temporal lobes (Choose TWO) - Superior longitudinal fasciculus, Uncinate fasciculus,

A dominant structure involved in stereotactic brain mapping (Choose TWO) - Anterior commissure,Posterior commissure

This tract plays a crucial role in object recognition (Choose ONE) - Inferior longitudinal fasciculus

Question 26
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI026
EEG changes in neuropsychiatry
For each of the following psychiatric conditions, identify the EEG changes most likely to occur

Creutzfeldt-Jacob disease: Choose...
Absence seizures: Choose...
Myoclonic epilepsy: Choose...
Huntington's dementia: Choose...
Hepatic encephalopathy: Choose...

Check

Explanation:

CJD- Generalized periodic 1-2 Hz sharp waves are seen in nearly 90% patients with sporadic CJD. Less often in familial / hormonal transplant-related forms. It is not seen in the variant form.

Absence seizures (Petit mal seizures)- Regular 3 Hz complexes.

Myoclonic epilepsy- Generalized multiple spike-wave discharges.

Huntington's disease- an initial loss of alpha; later flattened trace.

Diffuse generalized slowing in metabolic and endocrine disorders.

Triphasic waves: 1.5 to 3.0 per second high-voltage slow-waves especially in hepatic encephalopathy

The correct answer is: Creutzfeldt-Jacob disease – Periodic generalized 1-2 Hz sharp waves, Absence seizures – Regular 3 Hz complexes, Myoclonic epilepsy – Generalized multiple spike-wave discharges, Huntington's dementia – Flattened trace, Hepatic encephalopathy – Triphasic waves

Question 27
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI027
EEG changes and psychiatric presentations
For each of the following conditions, identify the most likely EEG findings reported

Alzheimer's disease: Choose...
Partial seizures: Choose...
Schizophrenia: Choose...
Psychopathy: Choose...
Delirium: Choose...

Check

Explanation:

In Alzheimer's disease, there is reduced alpha wave. EEG is rarely normal in advanced dementia, which may be helpful in differentiating pseudo-dementia from dementia.

In partial seizures, there are largely localised spike or spike-wave discharges.

There is no characteristic EEG pattern reported in schizophrenia.

There is increased incidence of EEG abnormalities in people with aggressive behaviour, antisocial personality disorder and psychopathic disorders. Immature posterior temporal slow waves are reported in psychopathy.

In delirium, there are generalised increased delta waves and some alpha wave activity in EEG.

The correct answer is: Alzheimer's disease – Reduced alpha waves, Partial seizures – Large localised spikes or sharp waves, Schizophrenia – No characteristic pattern, Psychopathy – Immature posterior temporal slow waves, Delirium – Some alpha and generalised increased delta waves

Question 28

Not answered

Marked out of 5.00

Flag question

HiY Neurosciences EMI028

EEG waves

Match the frequencies with their EEG wave forms;

<4 Hz — Choose...

>13 Hz — Choose...

8-13 Hz — Choose...

4-8 Hz, occurring during sleep — Choose...

7-11 Hz, occurs over motor cortex — Choose...

Check

Explanation:

Delta waves (<4 Hz): These are not seen in waking EEG. It is common in deeper stages of sleep; the presence of focal/generalized delta in awake EEG is a sign of pathology.

Beta waves (> 13 Hz) are seen at a frontocentral position in the normal waking EEG.

Alpha waves (8-13 Hz) are dominant brain wave frequency, which occurs when eyes closed and relaxing. It disappears with anxiety, arousal, eye opening or focused attention. The Dominance of alpha waves reduces with age.

Theta waves (4-8 Hz) are a small amount of sporadic waves seen in wake EEG at the fronto-temporal area. It is prominent in drowsy or sleep EEG. Excessive theta in awake EEG is a sign of pathology.

Mu waves (7-11 Hz) occurs over the motor cortex. It is related to motor activity, characterised by arch like waves; gets attenuated by a movement of the contralateral limb.

The correct answer is: <4 Hz – Delta waves, >13 Hz – Beta waves, 8-13 Hz – Alpha waves, 4-8 Hz, occurring during sleep – Theta waves, 7-11 Hz, occurs over motor cortex – Mu waves

Question 29

Not answered

Marked out of 9.00

Flag question

HiY Neurosciences EMI029

EEG & Psychotropics

Identify EEG changes caused by each of the following classes of psychotropic medications;

Antipsychotics — Choose...

Antidepressants — Choose...

Anticonvulsants — Choose...

Benzodiazepines — Choose...

Check

Explanation:

With antipsychotics there is a slowing of beta activity with an increase in alpha, theta and delta activity with antidepressants too there is a slowing of beta activity with an increase in alpha, theta and delta activity.

Lithium causes slowing of alpha and paroxysmal activity.

Anticonvulsants have no effect on awake EEG.

With benzodiazepines, there is an increase in beta and a decrease in alpha waves. Overdose leads to diffuse slowing.

The correct answer is: Antipsychotics
– Increase in alpha and slow wave activity, Antidepressants
– Increase in alpha and slow wave activity, Anticonvulsants – No effect on awake EEG, Benzodiazepines
– Increased beta but decreased alpha activity

Question 30

Not answered

Marked out of 9.00

Flag question

HiY Neurosciences EMI030

EEG & Recreational drugs

Identify EEG changes caused by each of the following classes of psychotropic medications;

Alcohol — Choose...

Opioids — Choose...

Marijuana — Choose...

Cocaine Choose...

Barbiturates Choose...

Check

Explanation:

With primarily sedating drugs such as benzodiazepines, barbiturates and opioids, decreased alpha wave activity is noted. With primarily recreational drugs such as alcohol, cannabis, cocaine, nicotine and caffeine there is an increase in alpha wave activity.

With alcohol, there will be increased alpha activity and increased theta activity. Withdrawal from alcohol increases beta activity. Note that while delirium tremens is associated with beta (fast) wave activity - other deliria have increased slow waves.

Opioids- Decreased alpha activity; increased voltage of theta and delta waves; in opioid overdose, slow waves are predominant.

Marijuana (cannabis) - there is increased alpha activity in the frontal area of the brain.

Cocaine- there is increased alpha activity. Barbiturates- there is decreased alpha activity and increased beta activity.

The correct answer is: Alcohol
– Increased alpha and theta activity, Opioids
– Increase in theta and delta activity, Marijuana – Increased alpha activity, Cocaine – Increased alpha activity, Barbiturates
– Increased beta but decreased alpha activity

Question 31
Not answered
Marked out of 9.00
Flag question

HiY Neurosciences CXEMI031

Chemistry of Neurotransmitters
Match the following chemical groups with the neurotransmitters in the list

1. Monoamines (3 answers)
2. Aminoacids (3 answers)
3. Peptides (3 answers)

Check

Explanation:

Neurotransmitters include monoamines, aminoacids and peptides.

Monoamines include dopamine, serotonin, norepinephrine, epinephrine, acetyl choline and histamine.

Aminoacids include GABA, glycine and glutamate.

Peptides include endorphins, cholecystokinin, angiotensin-2, neurotensin and corticotrophin-releasing hormone.

The correct answer is:
Monoamines (3 answers) - Serotonin,Dopamine, Norepinephrine

Aminoacids (3 answers) - Glutamate, Glycine, GABA,

Peptides (3 answers) - Cholecystokinin, Endorphins, Angiotensin

Question 32
Not answered
Marked out of 4.00
Flag question

HiY Neurosciences EMI032
Enzymes involved in disorders
Choose one option from the above list of enzymes involved in each of the following disorders.

Alzheimer's disease Choose...

Huntington's disease Choose...

Epilepsy Choose...

Depression Choose...

Check

Explanation:

Acetylcholinesterase is the breakdown enzyme involved in the synthesis of acetylcholine, and reduced cholinergic function is involved in the pathogenesis of Alzheimer's disease.

Glutamic acid decarboxylase is the enzyme involved in the production of GABA, which has an important role in the etiology of many disorders like epilepsy and Huntington's disease.

Tryptophan hydroxylase is the synthesis enzyme for serotonin, whose low levels are associated with increased depression, aggression, suicide and impulsivity.

The correct answer is: Alzheimer's disease – Acetylcholinesterase, Huntington's disease – Glutamic acid decarboxylase, Epilepsy – Glutamic acid decarboxylase, Depression – Tryptophan hydroxylase

Question 33
Not answered
Marked out of 6.00
Flag question

HiY Neurosciences CXEMI033

Transmitters and their receptors
Choose the correct neurotransmitter involved in the activity of each of the following receptors

1. NMDA receptor (Choose TWO)
2. Muscarinic receptor

3. Anandamide receptors

4. Mu receptors

5. Nicotinic receptors

Check

Explanation: NMDA receptors are made up of subunits with distinct binding sites for glutamate, glycine, and magnesium ion. Acetylcholine activates both muscarinic and nicotinic receptors.

Muscarinic receptors are G-protein-coupled, and there are five subtypes (M1, M2, M3, M4, and M5).

Nicotinic receptors are ion channels; they are predominantly seen in the peripheral parasympathetic system and are less common than muscarinic receptors in CNS. Nicotinic receptors in the CNS mediate attention.

Anandamide (weak ligand) and 2-arachnidonylglycerol (strong) are formed from arachidonic acid and ethanolamine. They both belong to the endocannabinoid family. The two types of cannabinoid receptors, central (CB1) and peripheral (CB2), bind tetrahydrocannabinol (THC), the active ingredient of marijuana. Anandamide lowers intraocular pressure, decreases activity level, and relieves pain.

Opiate receptors include the following subtypes: mu receptor, acted upon by morphine, opiate alkaloids, b-endorphin, and enkephalins ,delta receptor acted upon by enkephalins, kappa receptor acted upon by dynorphin and sigma receptor that is different from the other opiate receptors in that naloxone does not reverse the agonist activity on this subtype.

The correct answer is:
NMDA receptor (Choose TWO) - Glycine, Glutamate,

Muscarinic receptor- Acetylcholine,

Anandamide receptors- Endocannabinoids,

Mu receptors- Opioids,

Nicotinic receptors- Acetylcholine

Question 34
Not answered
Marked out of 9.00
Flag question

HiY Neurosciences EMI034
Chemical precursors
Identify the precursors for the following neurotransmitters;

Precursors of dopamine Choose...

Precursor of serotonin Choose...

Precursor of noradrenaline Choose...

Precursor of acetylcholine Choose...

Precursor of histamine Choose...

Check

Explanation: L-Dopa & tyrosine are the precursors for both dopamine and noradrenaline. The source of serotonin is tryptophan from which 5-hydroxytryptophan is synthesized before 5-hydroxy tryptamine (serotonin) is produced. The sources of acetylcholine are choline and acetyl-coenzyme A. The precursor material for histamine is histidine.

The correct answer is: Precursors of dopamine – Tyrosine, Precursor of serotonin
– L-tryptophan, Precursor of noradrenaline
– Tyrosine, Precursor of acetylcholine – Choline, Precursor of histamine – Histidine

Question 35
Not answered
Marked out of 3.00
Flag question

HiY Neurosciences EMI035
Chemical transmitters
Identify the appropriate enzymes using descriptions below

Secreted by hypothalamus and enhances food intake Choose...

Secreted by stomach and stimulates hunger Choose...

Considered as an internal measure of energy state Choose...

Check

Explanation: NPY is involved in the regulation of energy balance, memory and learning, and epilepsy. NPY mediated activity increases food intake and the proportion of energy stored as fat and decreases physical activity and nociceptive ability of the brain. It is secreted by the hypothalamus.

Ghrelin is produced by the fundus of the stomach and epsilon cells of the pancreas. Ghrelin stimulates hunger; its levels increase before and decrease after having meals. Ghrelin has a neurotrophic effect in the hippocampus and aids cognitive adaptation to changing environments and learning.

Leptin plays a key role in regulating energy intake and expenditure, by regulating appetite and metabolism. It is considered to be an internal measure of energy state, and is one of the most important adipose derived hormones in human body.

The correct answer is: Secreted by hypothalamus and enhances food intake – Neuropeptide Y, Secreted by stomach and stimulates hunger – Ghrelin, Considered as an internal measure of energy state – Leptin

Question 36
Not answered
Marked out of 7.00

HiY Neurosciences EMI036
Breakdown enzymes for neurotransmitters
From the list above, identify the breakdown enzyme involved in the lifecycle of various neurotransmitters:

Flag question

Dopamine Choose...

Breaks down norepinephrine Choose...

Breaks down serotonin Choose...

Located on the postsynaptic membrane Choose...

Breaks down GABA Choose...

Check

Explanation: The breakdown enzymes of dopamine and norepinephrine include monoamine oxidase (MAO) & Catechol-o-methyl transferase (COMT).There are two types of MAO. MAO-A more selectively metabolizes norepinephrine and serotonin while MAO-B more selectively metabolizes dopamine. Acetylcholine is broken down by acetylcholinesterase enzyme. GABA is broken down into succinic semialdehyde and glutamate by GABA transaminase. Vigabatrin inhibits this enzyme.

The correct answer is: Dopamine – Monoamine oxidase B, Breaks down norepinephrine
– Monoamine oxidase A, Breaks down serotonin – Monoamine oxidase A, Located on the postsynaptic membrane
– Acetylcholinesterase, Breaks down GABA – Transaminase

Question 37

Not answered

Marked out of 6.00

Flag question

HiY Neurosciences EMI037

Breakdown products of neurotransmitters

From the list provided, identify the breakdown products involved in the synthesis of various neurotransmitters:

Dopamine Choose...

Norepinephrine Choose...

Serotonin Choose...

Acetylcholine Choose...

GABA Choose...

Check

Explanation: The breakdown products of norepinephrine are 3-methoxy-4-hydroxyphenylglycol (MHPG) & VMA - vanillyl mandelic acid. MHPG is the major metabolite in CNS while VMA is the major metabolite from peripheral nervous system/endocrine system. GABA is broken down to glutamate and eventually to succinic acid. Dopamine is broken down to homovanillic acid.

The correct answer is: Dopamine – Homovanillic acid, Norepinephrine
– Vanillyl mandelic acid, Serotonin – 5-hydroxyindole acetic acid, Acetylcholine – Choline, GABA – Succinic acid

Question 38

Not answered

Marked out of 10.00

Flag question

HiY Neurosciences EMI038

Functions of neurotransmitters

For each of the following neurotransmitters, identify their main functions.

Acetylcholine Choose...

Dopamine Choose...

Serotonin Choose...

GABA Choose...

Noradrenaline Choose...

Check

Explanation:

Main functions of acetylcholine: Modulates arousal, learning, memory, rapid eye movement sleep, pain perception, and thirst and parasympathetic mediation.

Main functions of dopamine: motivation, novelty seeking, reward circuitry and motor movement gating in basal ganglia.

Main functions of serotonin: mood, the perception of pain, feeding, sleep-wake cycle, motor activity, sexual behaviour, and temperature regulation.

Main functions of GABA: Mediates anxiety, seizure cessation, and actions of benzodiazepines, barbiturates, and alcohol.

Main functions of noradrenaline: Arousal, anxiety, mood regulation, autonomic mediation

The correct answer is: Acetylcholine
– Learning, Dopamine
– Motivation, Serotonin – Feeding, GABA
– Anxiety, Noradrenaline
– Arousal

Question 39

Not answered

Marked out of 6.00

HiY Neurosciences CXEMI039

Localisation of innervations

Identify the predominant localization of innervations for each of the following neurotransmitter systems in the brain

Flag question

1. Norepinephrine

2. Serotonin (Choose TWO)

3. GABA

4. Glutamate

5. Acetylcholine

Check

Explanation:

The main area of localization of norepinephrine neurons is locus coeruleus with extensive projection on to neocortex and other brain areas.

Serotonin is most commonly found in the periphery (gut, platelets) but cannot cross blood brain barrier. The neurons are localized in median and dorsal raphe nuclei with widespread cortical projections and in the spinal cord.

GABA neurons do not appear as discrete pathways but widely distributed throughout the brain especially as interneurons. GABA is the most common inhibitory amino acid neurotransmitter. It is seen in 60% of the synapses of the brain.

Glutamate is the major excitatory neurotransmitter that is widely distributed in neocortical projections, hippocampus, and cerebral cortex.

The localization of acetylcholine is in the ascending system of cholinergic neurons originating in the reticular formation and cholinergic cells in the nucleus basalis of Meynert.

The correct answer is:
Norepinephrine- Locus coeruleus,

Serotonin (Choose TWO)- Median raphe nuclei, Dorsal raphe nuclei,

GABA- No discrete pathways,

Glutamate- Hippocampus,

Acetylcholine- Nucleus basalis of Meynert

Question 40

Not answered

Marked out of 7.00

Flag question

HiY Neurosciences EMI040
Disorders & neurotransmitters
For each of the disorders, identify the neurotransmitter involved.

Schizophrenia Choose...

Depression Choose...

Anxiety disorders Choose...

Alzheimer's dementia Choose...

Parkinson's disease Choose...

Check

Explanation:

In schizophrenia, the dopaminergic activity is thought to be high in the mesolimbic area leading to positive symptoms, but it may be low in the mesocortical area leading to anhedonia and negative symptoms.

In depression, the levels of serotonin and norepinephrine are low. In anxiety disorders, levels of norepinephrine are affected.

GABA mediates anxiety and GABA dysregulation is implicated in various anxiety disorders.

There is reduced cholinergic function in Alzheimer's dementia. The levels of dopamine are low in Parkinson's disease.

The correct answer is: Schizophrenia – Dopamine, Depression – Serotonin, Anxiety disorders
– GABA, Alzheimer's dementia – Acetylcholine, Parkinson's disease – Dopamine

Question 41

Not answered

Marked out of 5.00

Flag question

HiY Neurosciences EMI041
Serotonin receptor & action
For each of the following actions, identify the serotonin receptor most likely to be responsible

Regulation of circadian rhythm Choose...

Antiemetic effect Choose...

Anxiogenic and anorexic effect Choose...

Antidepressant action due to agonistic effect Choose...

Antimigraine effect Choose...

Check

Explanation: 5HT7 is thought to be relevant to the regulation of circadian rhythm with some suspected effect on biological symptoms of depression. 5HT3- antiemetic effect (on antagonism). 5HT2C- Anxiogenic and anorexic effect (agonists), 5HT1A- antidepressant (agonist), anxiolytics (partial agonist), 5HT1D- Antimigraine (on antagonism)

The correct answer is: Regulation of circadian rhythm – 5HT7, Antiemetic effect – 5HT3, Anxiogenic and anorexic effect – 5HT2C, Antidepressant action due to agonistic effect – 5HT1A, Antimigraine effect – 5HT1D

Question 42
Not answered
Marked out of 6.00
Flag question

HiY Neurosciences CXEMI042

Neuropathology
Identify 3 disorders for each of the following group of neuropathological changes.

1. Tauopathies
2. Synucleinopathies

Check

Explanation: Tauopathies are diseases with tau protein deposits. The disorders include Alzheimer's disease, Pick's disease, progressive supranuclear palsy, corticobasal degeneration, frontotemporal dementia with Parkinsonism (FTDP-17 MATP variant). Synucleopathies are diseases with alpha-synuclein deposits. The disorders include Parkinson's disease, Dementia of Lewy body type and multisystem atrophy.

The correct answer is:
Tauopathies (Choose THREE)- Alzheimer's disease, Pick's disease, Progressive supranuclear palsy,

Synucleinopathies (Choose THREE)- Parkinson's disease, Lewy body dementia, Multisystem atrophy

Question 43
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI043
Neuropathological findings in various disorders
Identify the most likely neuropathological finding for each of the following conditions:

Autism — Choose...
Multi-infarct dementia — Choose...
Punch drunk syndrome — Choose...
Huntington's disease — Choose...
Parkinson's disease — Choose...

Check

Explanation:

In autism, hypoplasia of cerebellar vermis and to some extent the cerebellar hemispheres is documented. Purkinje cell count in the cerebellum is significantly reduced.

Multi-infarct dementia is a type of vascular dementia characterized by multiple cerebral infarcts in the brain. Often the dementia is more acute in onset, with step-wise progression, and the patients may have multiple neurological deficits.

Punch drunk syndrome is also called as boxer's encephalopathy, often occurring due to repeated head injury and commonly seen in boxers. Thinning of the corpus callosum is a characteristic finding seen in boxer's encephalopathy.

In Huntington's disease, pathologically there is severe loss of small neurons in the caudate and putamen with subsequent astrocytosis. With the loss of cells, the head of the caudate becomes shrunken, and there is atrophy of the corpus striatum.

In Parkinson's disease, there is a depigmentation of the substantia nigra.

The correct answer is: Autism – Hypoplasia of the cerebellar vermis, Multi-infarct dementia – Multiple cerebral infarcts, Punch drunk syndrome – Thinning of the corpus callosum, Huntington's disease – Atrophy of the corpus striatum, Parkinson's disease – Depigmentation of cells in basal ganglia

Question 44
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI044
Neuropathological findings (2)
Identify the most common neuropathological finding for the following conditions:

Wilson's disease — Choose...
Tardive dyskinesia — Choose...
Alzheimer's disease — Choose...
Binswanger's disease — Choose...
Creutzfeldt Jacob disease — Choose...

Check

Explanation:

Wilson's disease is due to copper deposits in the lenticular nuclei (pallidum and putamen) leading to brick red pigmentation in basal ganglia.

Tardive dyskinesia is due to dopamine D2 receptor supersensitivity in the basal ganglia and is one of the long term side effects of antipsychotics (esp. conventional antipsychotics).

The gross changes seen in Alzheimer's disease include diffuse atrophy, flattened cortical sulci and enlarged cerebral ventricles.

Binswanger's disease is a type of vascular dementia (subcortical arteriosclerotic encephalopathy) resulting from multiple small white matter infarctions that do not appear on the gray matter regions of the cortex.

In CJD, there are no characteristic gross morphological features of dementia because of the typical short course of the disease. But pathological changes such as vacuolization can be noted at the histological level.

The correct answer is: Wilson's disease – Brick red pigmentation in basal ganglia, Tardive dyskinesia – Dopamine D2 receptor supersensitivity in the nigrostriatal pathway, Alzheimer's disease – Diffuse global atrophy, Binswanger's disease – Small infarctions of the white matter that spare the cortical regions, Creutzfeldt Jacob disease – No characteristic gross morphological changes

Question 45
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI045
Pathophysiology (1)
For the following conditions, identify the pathophysiological mechanism involved;

Korsakoff's psychosis: Choose...
Binswanger's disease: Choose...
Alzheimer's disease: Choose...
Narcolepsy: Choose...
CJD: Choose...

Check

Explanation: Korsakoff's syndrome is a neurological disorder characterized by severe memory impairment, confusion, anterograde and retrograde amnesia. The primary cause of the disorder is alcohol abuse, leading to a deficiency in thiamine (vitamin B1). A prolonged shortage of thiamine can result in neuronal loss and micro-haemorrhages in the paraventricular and the periaqueductal gray area as well as mamillary bodies. Thiamine is a cofactor for the enzymes transketolase, pyruvate dehydrogenase (PDH) and alpha-ketoglutarate dehydrogenase (a-KGDH). Reduced levels of thiamine results in a decrease in function of the three enzymes, thus disrupting cell function and would ultimately lead to apoptosis in Korsakoff's syndrome.

Binswanger's disease causes subcortical dementia and is a severe form of cerebrovascular disease with periventricular white matter damage that may occur in patients around 50 years of age.

Beta-amyloid precursor protein gene found on the long arm of chromosome 21 is implicated in early-onset Alzheimer's disease.

Orexins A and B (aka hypocretins) are closely related neuropeptides derived from a single gene. They act on OX1 and OX2 receptors in the lateral hypothalamus and other brain areas involved in stress regulation. Loss of hypocretin neurons is seen in patients with narcolepsy.

CJD is the commonest form of prion dementia affecting 1 in every 3 million people per year and typically presents in the 6th or 7th decade of like with personality change followed by a rapidly progressive dementia accompanied by ataxia, choreoathetosis movements and myoclonus.

The correct answer is: Korsakoff's psychosis – Mamillary body alpha-ketoglutarate, Binswanger's disease – Subcortical leukomalacia, Alzheimer's disease – Beta-amyloid precursor protein, Narcolepsy – Loss of hypocretin neurons, CJD – Prion proteins

Question 46
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI046
Pathophysiology (2)
For the following conditions, identify the pathophysiological mechanism involved;

Parkinson's disease: Choose...
Wilson's disease: Choose...
Multisystem atrophy: Choose...
Corticobasal degeneration: Choose...

Check

Explanation:

Alpha-synuclein deposits are seen in most patients with Parkinson's disease. Autosomal dominant mutations in Human Leucine Rich Repeat Kinase 2 (LRRK2 mutations) gene represent the most common monogenetic cause for Parkinson's disease and explain up to 7% of familial PD cases. The patients' usually show the late onset of disease and are indistinguishable from idiopathic patients with respect to clinical and pathological features.

Wilson's disease is a rare recessively inherited defect in a copper transporter protein, which causes defective incorporation of copper into apo-ceruloplasmin and failure to excrete copper in bile. Multiple system atrophy (MSA) is a degenerative neurological disorder classified as a synucleinopathy. Alpha-synuclein deposits are seen in patients with multisystem atrophy.

MSA is a degenerative disorder involving nerve cells in specific areas of the brain that results in problems with movement, balance and other autonomic functions, e.g., bladder control or blood pressure regulation. The cause of MSA is unknown. The typical age of onset is in the late 50s to early 60s.

Tau deposits are seen in corticobasal degeneration. It is a progressive neurological disorder characterized by "nerve cell loss and atrophy (shrinkage) of multiple areas of the brain including the cerebral cortex and the basal ganglia. Symptoms are similar to those found in Parkinson disease, such as poor coordination, akinesia (an absence of movements), rigidity (a resistance to imposed movement), disequilibrium (impaired balance); and limb dystonia (abnormal muscle postures)" (NINDS).

Corticobasal Degeneration Information Page. Retrieved from http://www.ninds.nih.gov/disorders/corticobasal_degeneration/corticobasal_degeneration.htm

The correct answer is: Parkinson's disease
– Alpha synucleinopathy, Wilson's disease – Ceruloplasmin deficiency, Multisystem atrophy – Alpha synucleinopathy, Corticobasal degeneration – Tau protein

Question 47
Not answered
Marked out of 5.00
Flag question

HiY Neurosciences EMI047
Microscopic features
You are working in the neuroscience department, and you have a special interest in Alzheimer's disease. For each of the definitions given below, identify the neuropathological terms used to describe them.

Fibrils of multimeric chains of peptides deposited extracellularly with a beta-pleated sheet conformation: Choose...
Rod shaped eosinophilic bodies in the cytoplasm of neurons: Choose...

Abnormally phosphorylated tau proteins — Choose...

Small vacuoles with central granules in the cytoplasm of neurons, especially in the temporal lobes — Choose...

Accumulation of beta A4 peptide predominantly in the walls of blood vessels in the cerebral cortex. — Choose...

Check

Explanation:

Senile plaques: Amyloids are fibrils of multimeric chains of peptides deposited extracellularly. They have a beta-pleated sheet structure. The peptide involved is called Aß (beta A4) peptide. Amyloid is insoluble. Plaques vary in appearance, and two main subtypes are recognized- diffuse plaques and neuritic plaques.

Hirano bodies: Rod shaped eosinophilic bodies in the cytoplasm of neurons; may be set free in the extracellular space if the neuron dies. Hirano bodies are aggregates of actin and associated proteins occurring intracellularly. They are frequently seen in hippocampal pyramidal cells.

Neurofibrillary tangles: Composed of cytoskeletal elements, primarily abnormally phosphorylated tau protein. Tau is a peptide required for microtubule assembly. Microtubules are essential to transport of materials down axons.

Granulovascular degeneration of the neurons: small vacuoles with central granules, in the cytoplasm of neurons especially in the temporal lobes.

Cerebral amyloid angiopathy (CAA): This is the accumulation of Aß in the walls of arteries and arterioles in the brain and overlying leptomeninges. CAA pathology is seen in nearly 30% of the elderly people but over 90% of patients with AD, in whom the angiopathy is much more severe.

The correct answer is: Fibrils of multimeric chains of peptides deposited extracellularly with a beta-pleated sheet conformation – Senile plaques, Rod shaped eosinophilic bodies in the cytoplasm of neurons – Hirano bodies, Abnormally phosphorylated tau proteins – Neurofibrillary tangles, Small vacuoles with central granules in the cytoplasm of neurons, especially in the temporal lobes – Granulovascular degeneration, Accumulation of beta A4 peptide predominantly in the walls of blood vessels in the cerebral cortex. – Cerebral amyloid angiopathy

Question 48

Not answered

Marked out of 4.00

Flag question

HiY Neurosciences EMI048

Ascending & Descending Tracts

For each of the following spinal column tract, identify the types of sensations that each carries with it.

Anterior spinothalamic tract — Choose...

Lateral spinothalamic tract — Choose...

Anterior and posterior spinocerebellar tract — Choose...

Lateral corticospinal tract — Choose...

Check

Explanation: The anterior spinothalamic tract carries light touch and pressure sensations. The lateral spinothalamic tract carries pain & temperature sensation. The anterior & posterior spinocerebellar tract carries proprioceptive, pressure and touch sensation. The lateral corticospinal tract carries fibers responsible for performing voluntary movements in the body.

The correct answer is: Anterior spinothalamic tract – Light touch and pressure sensations, Lateral spinothalamic tract – Pain and temperature sensation, Anterior and posterior spinocerebellar tract – Proprioception and pressure and touch sensation, Lateral corticospinal tract – Voluntary movement

Question 49

Not answered

Marked out of 7.00

Flag question

HiY Neurosciences EMI049

Diagnosis of Creutzfeldt-Jacob disease

Identify the different methods of diagnosis of CJD.

Macroscopic finding in advanced CJD — Choose...

Characteristic microscopic finding in CJD — Choose...

This staining is helpful to identify abnormal prion proteins in tissues — Choose...

This abnormal protein can be found in the CSF by immuno-assay — Choose...

This is the most supportive diagnostic test in variant CJD — Choose...

Check

Explanation:

There are no characteristic gross pathologic features of CJD because of the typical short course of the disease. Persons living beyond six months to a year may have some degree of generalized cerebral atrophy. Microscopically CJD shows a spongiform encephalopathy secondary to neuropil vacuolisation. Many round or oval vacuoles, either single or multiloculated, are seen in the neuropil of cortical gray matter. The vacuoles may combine to form microcysts. Neuronal loss and gliosis are also noted in CJD. Prion protein (PrPc) is a normal neuronal cell surface encoded by a gene on chromosome 20. This is converted via a conformational change to an abnormal form designated as PrPSc. This abnormal form is protease-resistant and can accumulate in the central nervous system of affected persons. This accumulation triggers a further conversion of normal PrPc to PrPSc and accounts for the degenerative changes in the cerebral cortex. These abnormal PrPs can be transmitted person-to-person via pituitary extracts, corneal transplants, dural grafts, and contaminated electrodes from neurosurgical procedures. The PrP can be identified in tissues with immunoperoxidase staining. An abnormal protein called 14-3-3 can be found in the CSF by immunoassay, but this protein is non-specific and may be found in association with viral encephalitis and stroke too. It is less frequent in variant than typical CJD. In familial cases of CJD, the typical EEG changes are often lacking, and the 14-3-3 protein is absent from CSF half the time. The MRI (especially the FLAIR sequence) is the most useful supportive diagnostic test in variant CJD. A particular abnormality in the posterior thalamic region (pulvinar sign) is seen in 90% cases. This sign is highly sensitive and specific for variant CJD.

Excerpt retrieved from http://path.upmc.edu/cases/case86/dx.html

The correct answer is: Macroscopic finding in advanced CJD
– Mild generalized cerebral atrophy, Characteristic microscopic finding in CJD

– Microcysts, This staining is helpful to identify abnormal prion proteins in tissues – Immunoperoxidase, This abnormal protein can be found in the CSF by immuno-assay – 14-3-3, This is the most supportive diagnostic test in variant CJD – MRI scan

Question 50

Not answered

Marked out of 6.00

Flag question

HiY Neurosciences CXEMI050

Basal ganglia lesions

Identify the pathophysiological changes identified in various disorders

1. Obsessive compulsive disorder
2. Huntington's chorea (2 answers)
3. Tourette's syndrome
4. Fahr's disease
5. Hemiballismus

Check

Explanation:

In OCD, there is both reduced, and increased volumes of caudate nuclei reported.Patients have higher caudate blood flow. Increased caudate metabolism has been found to reduce after effective treatment of the OCD.

Huntington's chorea- there is degeneration of the striatum (mainly caudate nucleus) & selective loss of GABAergic neurons.

Striatal dopaminergic dysfunction is a feature of Tourette's syndrome featured by multiple motor tics and vocal tics in children.

Fahr's disease is caused by progressive calcium deposition in the basal ganglia. (early onset - schizophreniform psychoses and catatonic symptoms; later onset - dementia and choreoathetosis).

Subthalamic nucleus damage (especially infarctions) can lead to hemiballismus.

Ref: Ring, HA & Serra-Mestres, J. Neuropsychiatry of the basal ganglia.
J Neurol Neurosurg Psychiatry 2002;72:1 12-21

The correct answer is:
Obsessive compulsive disorder- Increased caudate blood flow,

Huntington's chorea (2 answers)- Degeneration of the striatum, Selective loss of GABAergic neurons,

Tourette's syndrome- Striatal dopaminergic dysfunction,

Fahr's disease- Calcium deposition in the basal ganglia,

Hemiballismus- Subthalamic nucleus lesion

Finish review