**ST MARY’S UNIVERSITY**

**TWICKENHAM, LONDON**

MSc Degree Examination students registered for

Level **SEVEN**

Title**: Nutrient-Gene Interactions**

Code: **NGE7003**

Semester: **ONE**

Date: **January 16th 2020**

Time: **9:30AM – 12:30PM**

TIME ALLOWED: **THREE** HOURS

Section A:

Answer all questions in this section. There is one correct answer for each question (2 marks each). **Please provide your answers as a list in the booklet, not on this exam paper.**

1. Which of the following statement is correct?
2. When a mouse’s agouti gene is completely methylated, its coat is yellow and it is obese and prone to diabetes and cancer
3. When a mouse’s agouti gene is completely acetylated, its coat is yellow and it is obese and prone to diabetes and cancer
4. When a mouse’s agouti gene is completely un-methylated, its coat is yellow and it is obese and prone to diabetes and cancer
5. None of the above
6. Universal methyl donor involved in DNA methylation is:
7. 5-methyltetrahydrofolate
8. S-adenosylmethionine
9. Vitamin B12
10. Choline
11. Familial hypercholesterolaemia occurs when:
12. A large section of the lipoprotein lipase gene is missing
13. A large section of the lipoprotein lipase gene is added
14. A large section of the low density lipoprotein receptor gene is missing
15. A large section of the low density lipoprotein receptor gene is added
16. In healthy individuals, renin-angiotensin aldosterone system is:
17. Supressed when sodium intake is increased
18. Activated when sodium intake is increased
19. Activated when sodium intake is decreased
20. Both a and c are correct
21. The association between red meat intake and colorectal neoplasia appears to be stronger in:
22. Carriers of the “rapid” NAT2 alleles
23. Carriers of the “slow” NAT2 alleles
24. Carriers of the “medium” NAT2 alleles
25. None of the above
26. When histones are acetylated:
27. Chromatin is open and genes are potentially inactive
28. Chromatin is open and genes are potentially active
29. Chromatin is closed and genes are potentially inactive
30. Chromatin is closed and genes are potentially active
31. X-chromosome inactivation refers to:
32. The process of removing one of the two X chromosomes in females
33. The process of substituting one of the two X chromosomes for a Y chromosome in males
34. The process of inactivating one of the two X-chromosomes in females
35. None of the above
36. The concept that “our health is not only determined by what we eat, but also what our parents ate” was first demonstrated in:
37. The calico cat
38. Queen bees
39. The agouti mouse
40. None of the above
41. Allergenicity of genetically modified (GM) foods arises from:
42. The possibility that a new gene may create a new allergen
43. The possibility that a new protein may create a new gene
44. The possibility that a new gene may create a new protein
45. Both a and c are correct
46. Which micronutrient is a co-factor for methylenetetrahydrofolate reductase (MTHFR)?
47. B12
48. B2
49. B6
50. Folate
51. Which of the statements is correct for phenyl butyrate in royal jelly?
52. It is involved in histone acetylation
53. It is involved in DNA methylation
54. Both and a and b are correct
55. It is involved in histone deacetylation
56. Which of the following genes has been shown to interact with physical activity levels and moderate the risk obesity?
57. FTO
58. MC4R
59. CD36
60. All of the above
61. Nutrient-gene interactions are explored for the following reason(s):
62. To obtain a better estimate of the population-attributable risk for genetic and environmental factors by accounting for their joint interaction
63. To offer tailored preventive advice that is based on the knowledge that an individual carries susceptibility or resistance alleles
64. To determine which specific compounds in the complex mixture of compounds that humans are exposed to cause disease
65. All of the above
66. Heritability is:
67. The proportion of phenotypic variance attributable to genetic variance
68. The proportion of genotypic variance attributable to variance in phenotype
69. The proportion of genotypic variance attributable to variance in environment
70. None of the above
71. Which amino acids does APOE4 have at position 112 and 158?
72. Cysteine and arginine
73. Arginine and arginine
74. Cysteine and arginine
75. Arginine and alanine

Section B:

Answer **TWO** questions from this section (35 marks each)

1. Critically discuss the available evidence on gene – diet interactions in salt sensitivity of blood pressure (20 marks). Briefly discuss potential application of this research in current clinical practice (15 marks).
2. Provide a comprehensive overview of epigenetic processes and how they may affect gene expression (20 marks).  Discuss the evidence supporting the role of diet in epigenetics and cancer (15 marks).
3. Describe the role of apolipoproteins and cholesterol metabolism in development of atherosclerosis (15 marks). Critically discuss the interactions between genetics and diet on intermediary coronary heart disease risk factors (20 marks).

**END OF EXAMINATION**