

※ 考生請注意：本試題 可 不可 使用計算機

Please answer each question based on the corresponding paragraphs listed.

A. The flu is a viral infection caused by the influenza virus, a respiratory virus. The common cold is also a viral infection caused by the adenovirus or coronavirus and there are many, many subsets with a lot of variability. That's why it's said there's no cure for the common cold [and] there's no real vaccine. The flu is known to be from influenza and is preventable with vaccination.

1. What causes the flu? (10%)
2. What are the differences between the flu and the common colds? (20%)
3. Are there cures available for the common cold, and why? (10%)

B. A prion is an infectious agent that is composed primarily of protein. To date, all such agents that have been discovered propagate by transmitting a mis-folded protein state; as with viruses the protein itself does not self-replicate on its own, rather it induces existing polypeptides in the host organism to take on the rogue form. The mis-folded form of the prion protein has been implicated in a number of diseases in a variety of mammals, including bovine spongiform encephalopathy (BSE, also known as "mad cow disease") in cattle and Creutzfeldt-Jakob disease (CJD) in humans. All known prion diseases affect the structure of the brain or other neural tissue, and all are currently untreatable and are always fatal. In general usage, prion refers to the theoretical unit of infection. In scientific notation, PrP refers to the endogenous form of prion protein (PrP), which is found in a multitude of tissues, while PrP^{Sc} refers to the misfolded form of PrP, that is responsible for the formation of amyloid plaques and neurodegeneration.

4. A prion is an infectious agent of what diseases? (10%)
5. What is the pathogenesis of the prion-induced diseases? (10%)
6. Please describe the differences between PrP and PrP^{Sc}. (10%)

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系所組別：細胞生物與解剖學研究所

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C. Kassie Rose, 30 years old, faces a frightening prospect: if a genetic coin toss fails to go her way, she could lose her mind within a decade or two. A mutation that causes Alz heimer's disease runs in her family, the DeMoes of North Dakota. The odds of any DeMoe harboring the mutation are 50-50, and if the mutation is present, the chances of developing early-onset Alzheimer's—the type that erodes memory before age 65—are 100 percent.

Five of the six DeMoe siblings—Rose's father and her aunts and uncles—have the mutation. One man is in a nursing home in his mid-50s; a second, younger, is on his way. A sister in her late 40s is already noticing her first symptoms. The next generation is tortured with the decision of whether to get tested. Rose, for now, chooses not to know. After all, she is unlikely to benefit much from the information: Alz heimer's remains incurable and, largely, unpreventable as well.

7. What is Kassie's concern described here? (10 %)
8. What are Kassie's chances to have this problem before age 65? (10%)
9. What can Kassie do to prevent this problem from happening? (10%)

(The End)