机密★启用前

江苏大学2007年硕士研究生入学考试试题

科目代码： 476 科目名称： 细胞生物学

考生注意：答案必须写在答题纸上，写在试卷、草稿纸上无效!

一、 将下列英文名词翻译成中文并作解释（共6题，每题5分，共30分）

1. **cell differentiation** 2. **contact inhibition** 3. **transgene**

4. **totipotency** 5. **green fluorescent protein** 6. **apoptosis**

二、 简答题（共2题，每题10分，共20分）

1. 细胞学说的内容 2. 细胞生物学的研究领域

三、问答题（共3题，每题20分，共60分）

1. 论述真核细胞基因表达的调控方式。

2. 描述3种细胞表面受体类型及其大致的作用方式。

3. 真核细胞的细胞周期包括哪几个时期，各有什么特点？简要说明减数分裂有什么特征及细胞周期长短检测的方法。

四、将下列英文翻译成中文（40分）

The simple gas nitric oxide (NO) is a major paracrine signaling molecule in the nervous, immune, and circulatory systems. Like the steroid hormones, NO is able to diffuse directly across the plasma membrane of its target cells. The molecular basis of NO action, however, is distinct from that of steroid action; rather than binding to a receptor that regulates transcription, NO alters the activity of intracellular target enzymes.

Nitric oxide is synthesized from the amino acid arginine by the enzyme nitric oxide synthase. Once synthesized, NO diffuses out of the cell and can act locally to affect nearby cells. Its action is restricted to such local effects because NO is extremely

unstable, with a half-life of only a few seconds. One well-characterized example of NO action is signaling the dilation of blood vessels. The first step in this process is the release of neurotransmitters, such as acetylcholine, from the terminus of nerve cells in the blood vessel wall. These neurotransmitters act on endothelial cells to stimulate NO synthesis. NO then diffuses to neighboring smooth muscle cells where it reacts with iron bound to the active site of the enzyme guanylyl cyclase. This increases enzymatic activity, resulting in synthesis of the second messenger cyclic GMP, which induces muscle cell relaxation and blood vessel dilation.

The polypeptide growth factors include a wide variety of signaling molecules that control animal cell growth and differentiation. The first of these factors(nerve growth factor, or NGF)was discovered in the 1950s. NGF is a member of family of polypeptides that regulate the development and survival of neurons. During the course of experiments on NGF, Stanley Cohen serendipitously discovered an unrelated factor(called epidermal growth factor, or EGF)that stimulates cell proliferation. EGF, a 53-amino-acid polypeptide has served as the prototype of a large array of growth factors that play critical roles in controlling animal cell proliferation, both during embryonic development and in adult organisms.

A good example of growth factor action is provided by the activity of platelet-derived growth factor(PDGF) in wound healing. PDGF is stored in blood platelet and released during clotting at the site of a wound. It then stimulates the proliferation of fibroblasts in the vicinity of the clot, thereby contributing to regrowth of the damaged tissue. Members of another large group of polypeptide growth factors regulate the development and differentiation of blood cells and control the activities of lymphocytes during the immune response. Other polypeptide growth factors remain associated with the plasma membrane rather than being secreted into extracellular fluids, therefore functioning specifically as signaling molecules during direct cell-cell interactions.

Peptide hormones, neuropeptides, and growth factors are unable to cross the plasma membrane of their target cells, so they act by binding to cell surface receptors. As might be expected from the critical roles of polypeptide growth factors in controlling cell proliferation, abnormalities in growth factor signaling are the basis for a variety of diseases, including many kinds of cancer. For example, abnormal expression of a close relative of the EGF receptor is an important factor in the development of many human breast and ovarian cancers.