# Exercise 12- no answers

**L13**-  Special Vaccines
**L1-11**- Review of the whole course

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Immunoengineering BIOENG-399

# 1. What are ways to preferentially target lymph nodes for vaccine? (multiple answers possible)

A. Albumin hitchhiking

B. Immunize through mucosa

C. Use nanoparticles of more than 100nm of diameter

D. Target dendritic cells with anti-CD40 antibodies

# 2. What is **TRUE** the « proton sponge » effect of biomaterials? (multiple answers possible)

A. Amine groups from the biomaterial are protonated at lower pH, bringing H+ and counterions into endosome and increasing osmotic pressure

B. Amine containing biomaterial are used as pH stabilizer by absorbing endosomal H+

C. It is used to burst the endosome and foster antigen presentation on HMC-I on APC

D. Antigen is rendered more immunogenic by protonation

# 3. What are main differences between RNA and DNA vaccines? (multiple answers possible)

A. DNA can enter the cell easily

B. DNA is more stable than RNA

C. They work on the same principle

D. RNA can integrate the genome more easily

# 4. What are the advantages of mRNA-based vaccines? (Multiple answers possible)

A. Easy and fast to be manufactured

B. easy storage/transport

C. Simple design made only of raw RNA

D. Cheap

# 5. What are the principle behind mRNA vaccines?

A.  mRNA coding an antibody targeting a pathogen enters plasma cells and make them produce neutralizing antibodies

B.  mRNA coding a pathogen's protein makes the patients cell express this antigen transiently

C.  mRNA is retrotranscribed into DNA, incorporated into the genome and make cells express an antigen indefinitly

# 6. Tolerogenic vaccines are...

A. Vaccines that promote the formation of effector T cells

B. Vaccines that promote immune reaction toward pathological self-antigens

C. Vaccines that dampen autoimmune diseases

D. Vaccines that promote the formation of anergic and regulatory T cells by strong TCR/peptide-MHC stimulation

# Review of the whole course

# 7. Which antibodies should we use to measure OVA-reactive CD8+ T cells in a tumor which express OVA?

A. CD19 , peptides from OVA bound to tetramer

B. CD3, CD8

C. CD3, CD4, CD8, CD45

D. CD3, CD8, peptides from OVA bound to tetramer

# 8. For the cancer immunity cycle, which one is correct?

A. Cancer cell death →priming and activation →trafficking of T cells to tumors → cancer antigen presentation → infiltration of T cells into tumors →recognition of cancer cells by T cells → killing of cancer cells

B. Cancer cell death→cancer antigen presentation→priming and activation→trafficking of T cells to tumors→infiltration of T cells into tumors→recognition of cancer cells by T cells → killing of cancer cells

C. Cancer cell death →cancer antigen presentation → trafficking of T cells to tumors →infiltration of T cells into tumors→priming and activation → recognition of cancer cells by T cells → killing of cancer cells

9. According to the understanding of cancer immunology, which of the following cells is antagonist of growing tumors? (multiple answers possible)

A. Regulatory T cells (Treg cells)
B. Type 1 helper cells (Th1)
C. M1 macrophage
D. Th2
E. M2 macrophage
F. CD8+ T cells
G. Myeloid-derived suppressor cells (MDSC)
H. NK cells

# 10.What is the reason behind Enhanced Permeation and Retention (EPR) in tumors?

A. Narrow fenestrations in the blood vessels of tumors

B. The large amount of lymphatic drainage

C. Wide fenestrations in the blood vessels of tumors

D. Both A and B

# 11. Which of these receptors are NOT on the T cell surface (multiple answers possible)

A. CD28

B. CTLA-4

C. PD-1

D. PD-L1

E. B7

# 11.Which of the following are ways to prevent systemic toxicity? (multiple answers possible)

A. Local injection of the drug

B. Hydrogel-mediated delivery

C. CpG DNA Nano-cocoon (DNC)

D. Microneedles

E. Cytokine fused to a tumor-targeted antibody

# 12. What is **TRUE** about CAR-T cells compared to TCR-T cells?

A.  The CAR is similar to a TCR, however the intracellular domain is switched to the intracellular domain of the IL2 receptor

B.  CAR-T cells are dependent on the recognition of target peptide in the MHC of target cells

C.  CAR-T cells do not target the intracellular proteome

D.  The CAR possesses several adjacent extracellular CD3 domains

# 13. Considering T cell metabolism, which of the following are **TRUE**? (multiple answers possible)

A. T cell diffrenciation state has no relation to metabolism

B. Naive and memory have a catabolic metabolism

C. Effector T cell have an anabolic metabolism

D. Arginin and tryptophan are not important in T cell metabolism

E. Enhancing reductive carboxylation fosters différenciation to memory T cells

# 14. Which of the following statement regarding B cell activation is **TRUE**?

A. A B cell is activated by a APC presenting a MHC-peptide

B. B cell activation requires CD40L presentation on CD4 T cells

C. Activation is done at the site of injection

D. Activation of B cells occurs before T cell activation