

Biological Psychology

Workgroup 3: Immunology

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Does stress affect the immune system?

Contents of the presentation:

Questions!

- 1) The situation in which one had experienced stress and got sick afterwards
- 2) Describing the particular disease
- 3) Components involved
- 4) Immune responses
- 5) The mediating role of stress

1(5) The situation in which one had experienced stress and got sick afterwards

Slide 1

- ❖ The stress situation
The period in which one had to make exams.

- ❖ Major stress-factor:
The uncertainty of passing the exams.

- Which was a prolonged stress situation of four weeks.

- ❖ Time between the stressor and illness related symptoms:
About 3 days

2(5) Describing the particular disease

Slide 2

Herpes is caused by the herpes simplex virus

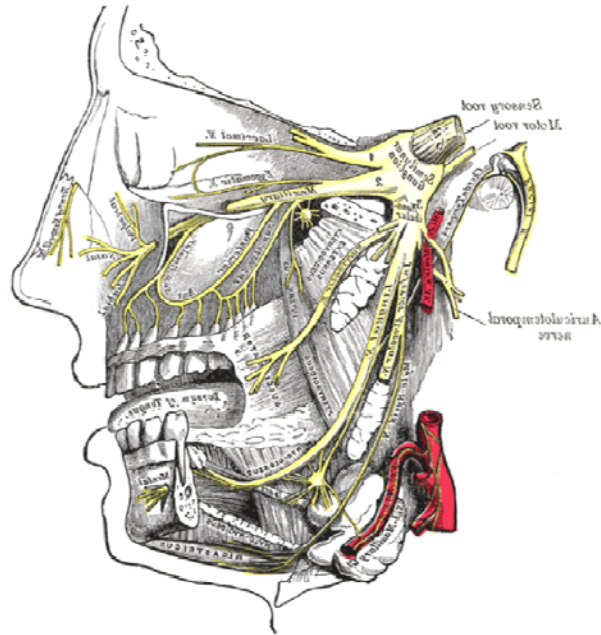
When under stress, the immune system is decreased in its capability to react to pathogenic viruses or bacteria. This gives the virus a good opportunity to (re)activate.

A person exposed to more stress has more chance of experiencing returning symptoms of herpes simplex.

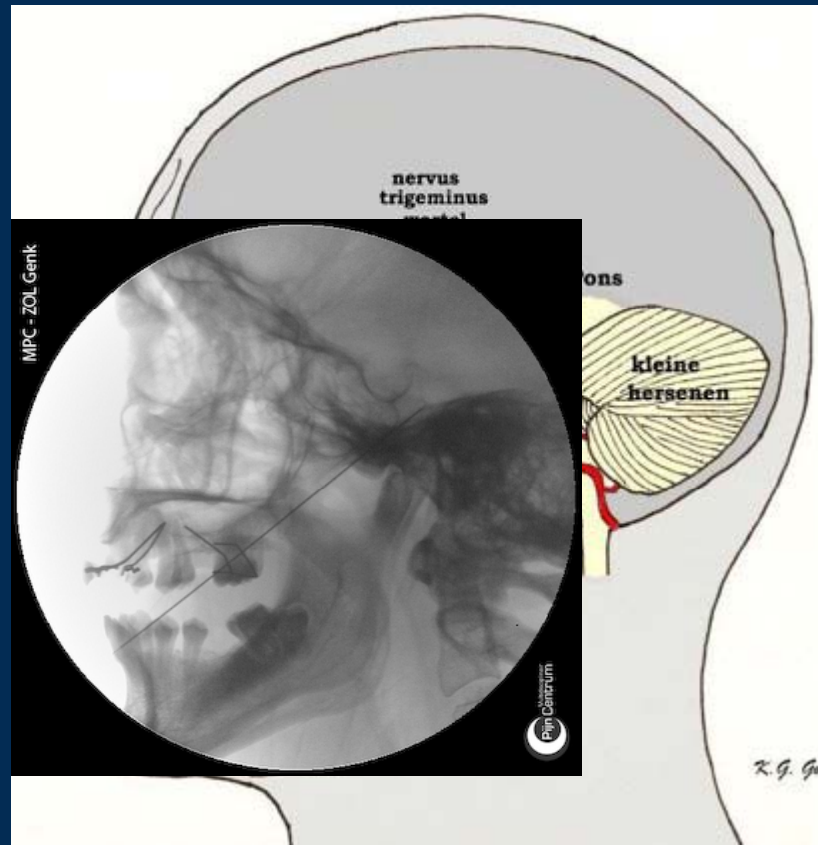
After contamination the virus remains in the *Gasserian ganglion* of the nervus trigeminus; the nerve involved in the innervation of the tongue and the face, beyond the range of the immune system (latent HSV-1 in sensory neurons is invisible to the immune system) -> 90% of people eventually become infected with HSV-1.

Mood: depressed; low mood and aversion to activity

2(5) Describing the particular disease



Gasserian ganglion = frontal (anterior) part of the entire nervus trigeminus, dissection into 3 branches (co)forming the upper and lower sensory system of the facial structure



3(5) Components involved

Primary Initial Response

The initial immune response (IR) is complex and not completely understood but antibodies (IgM / IgG) to HSV antigens can be detected within 4 - 8 days of initial infection.

Epidermal infection = viral antigens on dendritic cells and macrophages to CD4+ Th1 cells → initiate viral clearance by secreting cytokines such as IFN-gamma → recruitment and activation of macrophages and natural killer (NK) cells + antibody-dependent cell-mediated cytotoxicity.

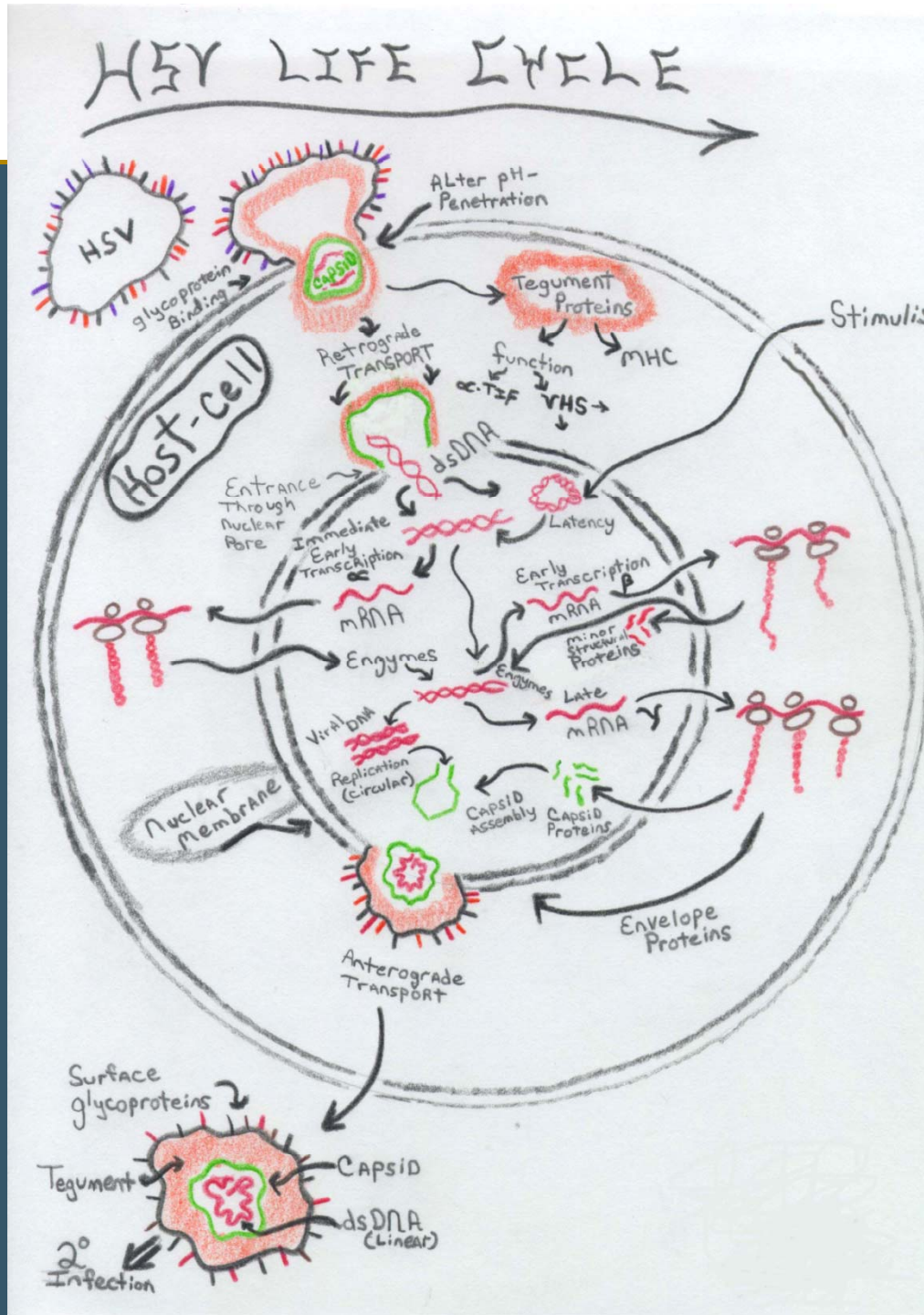
Slide 3

Secondary Initial Response

HSV antigen is thought to be taken up by Lagerhan's cells and presented on MHC II effectively stimulating specific resident memory CD4+ Th cells which are also stimulated by IFN-gamma.

Lagerhan's coordinate a proper Th1 immune response (IR).

T-lymphocytes along with macrophages are the main mediators of the protective immune response against recurrent HSV



Slide 4

Nonspecific local
inflammatory
response to
bacteria

Based on innate
response

1: Entry of bacteria into tissue (injured tissue -> chemicals -> following events:

2: Vasodilation of the microcirculation in the infected area

3: Large increase in protein permeability of the capillaries and venules in the infected area → diffusion of protein and filtration of fluid into the interstitial fluid

4: Chemotaxis: leukocytes from venules into the interstitial fluid of infected area

5: Destruction of bacteria in the tissue.

6: Tissue repair

Widmaier, Raff, &
Strang (2008).
*Vander's Human
Physiology*.⁸

4(5) Immune responses

Nonspecific local inflammatory response to bacteria

Based on adapted response

Cells:

1: The immune cells CD8 T attack virus-infected cells with lytic granules

2: Transport of lytic granule contents into infected cells typically initiates a process that leads to a form of cellular suicide called apoptosis.

Neurons:

1: the lytic granules attack the viral infection in neurons without killing them. The neuron and the virus survive, but the infection can't spread to other cells

2: Recurrences of cold sores, eye disease and other forms of herpetic lesions occur if the balance shifts and the virus can bypass surveillance by the immune system.

5(5) The mediating role of stress

Slide 5

Stress is able to (re)activate and replicate a latent virus.

Current research displays a high number of stressors associated with higher levels of antibodies aimed to prevent the reactivation/replication of latent viruses such as HSV-1.

The production of antibodies increases when viruses replicate. Antibody levels are therefore used as an indirect indicator for the virus reaction.

Several studies illuminate the association between chronic stress and illness related/evoked symptoms caused by a HSV-1-infection. Short-term arousal and stress, together with a declined mood state (depression) are not expected to have an empirical influence.

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Meerkeuzevraag - groep

- What are Cytokines?
- A. General term for protein extracellular messengers that regulate immune responses.
- B. Type of leukocyte responsible for specific immune defenses.
- C. Any cell capable of engulfment of particles by a cell
- D. Protein component of photo pigment