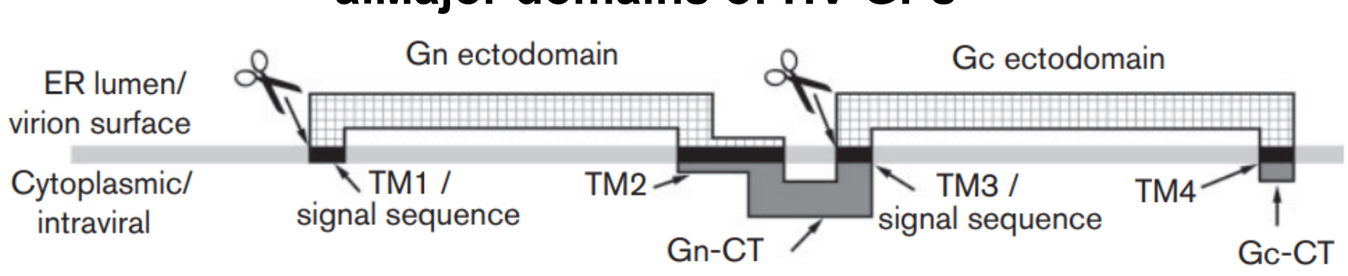
MASTER THESIS PROJECT: DECIPHERING THE INFLUENCE OF HOST FACTORS ON HANTAVIRUS GLYCOPROTEINS

Cell Membrane Biophysics

Introduction and Description of the Project

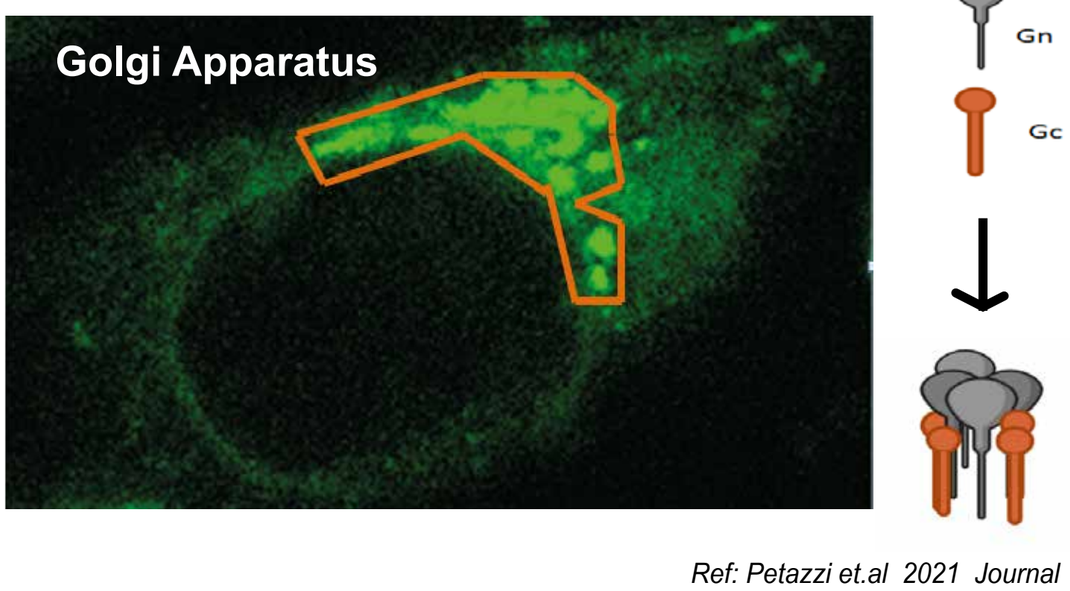
Hantaviruses (HVs) are a group of pathogenic zoonotic diseases that are spread from rodent excreta or urine sampling to humans via aerosol transmission. They are classfied geographically into Old World (OWHV) and New World (NWHV) HVs with NWHVs having fatality rates upto 40%. Several host entry factors have been proposed for the entry of the HV Glycoproteins (GPs) including the ß-integrins, decay-accelerating factor (DAF) and protocadherin-1(PCDH), with the last factor being specific for the NWHV. The general structure and assembly of HV GPs are briefly shown below

a.Major domains of HV GPs



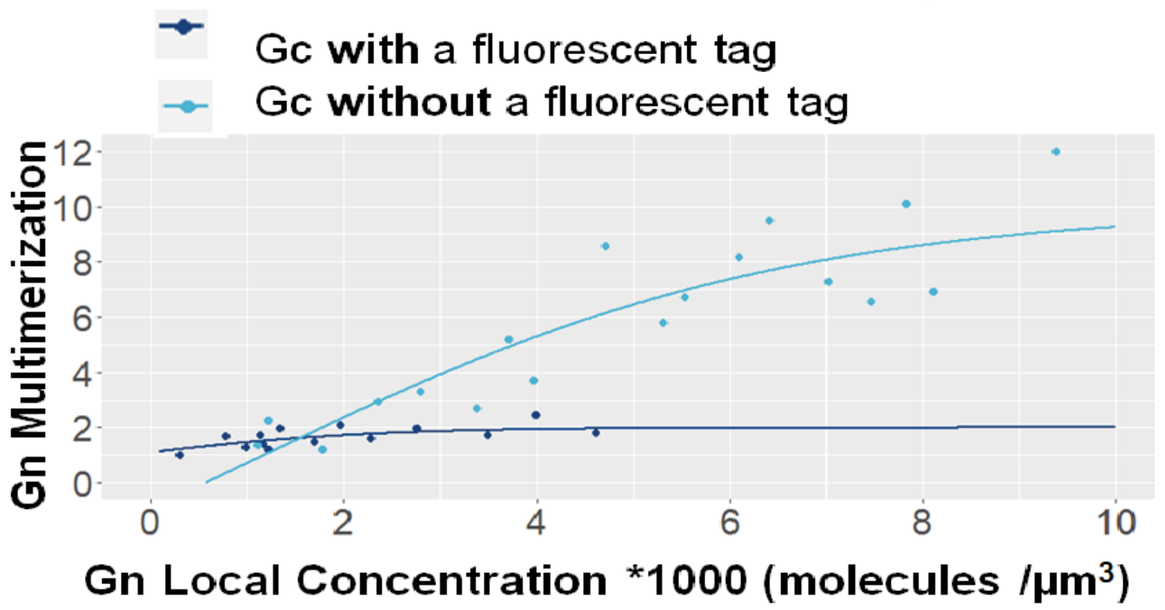
Ref: Hepojoki, J., Strandin, T., Lankinen, H. and Vaheri, A., 2012. Journal of General Virology

b. Live cell imaging of HV GPs Assembly at Golgi Apparatus



Ref: Petazzi et.al 2021 Journal of Virology

C. Multimerization curve of Puumala HV Gn in presence of Gc



In this project we focus on the GPs of Puumala HV, an OWHV strain predominately observed in Europe. Using techniques of quantitative fluorescence imaging we will probe the strenght of the interactions between the host factors (ß-integrins and DAF) in rodent and human endothetial cell lines. This will be supplemented by investigating the stochiometry of the host factors and the GPs complexes. The project outcomes would provide a rigorous quantatitve understanding of the mechanisms underlying how different host factors interact with the HV GPs.

Objectives of the Project and Techniques Used

The **main objectives** of the project are as follows:

a. Molecular cloning of the HV GPs ectodomain constructs (Plasmid Design and Cloning)
b. Reference experiments of the HV GPs ectodomain constructs including GP-GP fusion assay
c. Estimating HV GPs interaction and stochiometry of the complexes with the host factors (ß-integrins and DAF)
d. Experiments to be completed in CHO (rodent cell) and HEK (human cell) cell lines.

The techniques used for this project : Molecular cloning, Mammalian cell culture and Quantitative Fluorescence techniques like Number and Brightness and Fluorescence Correlation Spectroscopy. Prior experience in these techniques are not mandatory

Medium of Instruction: German and/or English

Interested in working on an **Interdisciplinary Project at the Interface Of Single Molecule Biophysics And Structural Virology** and to contribute to further the understanding of HV GP assembly mechanisms :

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