SHORT TERM SCIENTIFIC MISSION (STSM)
SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA17103
STSM title: Delivery of Antisense RNA Therapeutics
STSM start and end date: 29/03/2019 to 16/04/2019
Grantee name: Paweł Botwina

PURPOSE OF THE STSM:

Learning methods of synthesis, modification and testing nanoparticles as drug carriers and diagnostic instruments in *in vitro* and *in vivo* models. After STSM my goal is to transfer this knowledge to my research in the field of virology, where nanoparticles could be used in antisense RNA therapy in order to stop infection. Nanoparticles can be used as carriers of antisense RNA or serve as a tool for imaging or measuring the efficiency of antisense RNA delivery to cells.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

During STSM I participated in experiments and analyzes using gold nanoparticles. Gold nanoparticles have great therapeutic potential due to the ease of their modification, the lack of cytotoxicity and their efficient uptake by cells and tissues.
I learned the method of synthesis of gold nanoparticles, the chemical basis of their coating, modification and attachment of specyfic targets on their surface.
Then, by participating in experiments using cellular and animal models (mouse and rat), I learned how to use nano-molecules both as a targeted contrast in computed tomography (CT) imaging and as therapeutic agents. I learned the basics of CT imaging and image processing using the animal addiction model.
Another use of nanoparticles that I came across in STSM is to use it as trackers in stem cell therapy and exosome therapy.
During the last part of STSM, I synthesized 2 types of nanoparticles that will be tested *in vitro* after the addition of an antiviral drugs on their surface.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

The main result of the completed STSM was to obtain nanoparticles that will be used as carriers of antiviral drugs in vitro. Their task is to increase their bioavailability, inhibiting their removal from the cells.
Two types of nanoparticles have been prepared:
1. 20 nm, coated nanoparticles functionalized with PEG-COOH groups on the surface for the covalent binding of proteins, antibodies or other molecules.
2. Nanoparticles coated with PEG acid disulfide (n = 7) containing a disulfide bond. This will allow the constant release of the drug inside the cytoplasm, which may contribute to a longer therapeutic effect with a single administration.

FUTURE COLLABORATIONS (if applicable)

As described above, cooperation was established involving the testing of gold nanoparticles in antiviral therapies.

As instructed, I attach a photo together with a host.