Minutes of the seventh iGEM meeting

07/05/2010

Participants: Rahul Akkinen, Habib Bukhari, Svea Grieb, Victor Gordeev, Sarah Mansour, Adithya Nagarakodige, Mareike Roth, Lucas Schirmer, Jonathan Tam, Charanya Sampath Kumar,
Supervisors: Annelie Oswald, Andy Oats, Kaj Bernhardt

Organization

1. Sponsorship and Funding

- Svea, Lucas, Adithya, Jonathan, Victor and Mareike went to the "bonding Firmenkontaktmesse" on Monday and Tuesday. They handed out CVs and directly contacted interested companies.
- The group decided to also contact the local football team (Dynamo Dresden) and brewery (Feldschlößchen) to get money.
- Roth&Rau AG offered the iGEM team to use the special conditions of their company travelling agency to book all flights and accommodation. Susan is already informed about this and will come back to it in time.

2. Seminar with Raik Gruenberg

- Andy is hosting Raik Gruenberg on the 3.6. – 4.6.2010 as he wants to establish a group in Dresden. At the moment he is at the CRG (center of genomic regulation) Barcelona.
- Andy will use this time to also arrange an informal meeting (coffee or dinner) with the students from the iGEM team.
- Andy will also organize a talk from Raik Gruenberg where students are invited to come, most probably on the 4.6.2010.

3. Central storage for presentations

- Jonathan pointed out that it might be of advantage to have a central space for important information to which every student has access to.

4. Time line for the next 2 weeks (10.05.2010 – 20.05.2010)

- On the 20.05.2010 the group will decide on a final project. Resulting a timeline of tasks that will be due was generated:

Date	Task to be due
10.05.2010	Presentation of project ideas: Jonathan, Svea, Adithya, Rahul, Charanya Presentation of special task: Victor Vote on top ideas together with supervisors. Groups will be formed which work on the top ideas.
12.05.2010	Group outing: The group will go for bowling with dinner afterwards
14.05.2010	Presentation of top ideas including: • Working model – thorough plan • Feasible for 3 months work?

	• Which category does it fall in? • Is there an iGEM 2010 team working on this already? Presenation of project ideas: Victor
20.05.2010	**Decision on final project**

- The group also decided that new ideas are still necessary. To do so a presentation including the most important facts and a rough model should be prepared.

Project ideas

New project ideas were presented in form of a power point presentation followed by discussion with team members and supervisors.

1. Antimold foil

- Mareike presented a model for treating mold in houses and apartments.
- Motivation of the idea was that at the moment a complete reconstruction of the apartment as to be carried out. Secondly, mold in houses causes a series of diseases like infections, allergies and a generally weakened immune system.
- The foil targeting the mold must include at least 2 layers. The top layer is permeable to proteins and molecules which allows the exchange of fungal markers and the toxin yet not cells. A second layer embeds the microorganisms which is able to produce an antifungal toxin. Additionally it can also take up water therefore also eliminating the cause.
- Discussion: During the discussion several problems were pointed out. Layer 2 must be very thick in order to fulfill the task of water uptake. A microorganism that can live at lower temperatures must be found.
- Kaj and Andy pointed out that it might be easier to introduce the microorganism directly to wall paper in order to fight mold before it has been grown.
- Mareike will continue to work on a model based on the discussion points.

2. Sensor bricks

http://141.30.151.132/igem/index.php/Turmor_quorum_Sensing

- Lucas presented his current status at the project of tumor detection and quantification. He called the system “Sensor Brick”
- The main goal of the project would be:
  I. use the specificity of antibodies(IgG) as ligand binding domain
  II. for example quantification of leukemia cells or metastasis in blood
  III. wide range of receptors possible
  IV. establish a new IGEM standard for artificial membrane receptors in eukaryotic cells

- Lucas introduced all previous iGEM projects that had dealt with similar detection systems which included:
    - In 2008 Freiburg had an approach that used scFv (single chain variable domain) or sdAB (single domain antibody) bound to DNA origami and scFv bound to split-GFP by transmembrane domain. Upon interaction with the appropriate ligand (e.g. tumor cell) the transmembrane domains came in close contact and split GFP was unified and thereby active.
    - In 2008 the Illinois team tried to couple antibody fragment to a tyrosine kinase receptor. Lucas pointed out that a better approach would be to use a native B-cell receptor (antibody coupled to tyrosine kinase expressed on surface) and try to convert this to yeast cells.
    - In 2008 the Illinois team tried also to couple antibodies to a mating type receptor of yeast. This receptor belongs to the class of G-protein coupled receptors. This approach solves the problem of expression at cell surface in yeast as it is already found there. But nothing is known about the decrease in efficiency of the receptor when fused to antibody.
- Lucas will arrange a meeting with Dr. Bachmann again and will most probably also meet Dr. Hoflack to discuss some details with them.

3. Treating smoking while smoking

- Sarah introduced a system that would fight toxic substances from cigarettes directly during/after smoking.
- When approaching the problem of smoking there are usually two approaches: convincing people not to smoke and treating the complications caused by smoking after it had happened. Looking at one of the negative effects of smoking is lung cancer, which is mainly caused by tar or a group of compounds known as Polyaromatic hydrocarbons. They are lipophilic compounds and seven of them have been identified as human carcinogens, some are very carcinogenic and found in cigarettes, those compounds are also found in the air by pollution and fuel.
- The idea was to find a different approach that can help prevent or lower the effects of those compounds while smoking. Three techniques were thought of:
- Bacteria that would dissolve those compounds
- Liposomes or nanoparticles.
- In all cases, the administration should be by an inhaler.
- Liposomes was the idea presented, by finding the suitable receptor for these compounds: Aryl hydrocarbon receptors, liposomes can be tagged with those receptors and target those compounds. Later two mechanisms are proposed for their uptake and dissolution: by having a suitable solvent inside of the liposome that would trigger the molecules' uptake inside the liposome and later dissolved. Or by conjugating the receptor to porous proteins that would also uptake the molecules.

- Since the idea does not involve genetic engineering, the first approach would later be thought of to design bacteria that would specifically target those compounds and dissolve them.

4. Improve the enzymatic machinery for RNAi

- Habib introduced an idea which dealt with increasing specificity of gene silencing using RNA interference.
- To increase the specificity he had thought of 3 approaches:
  - Increasing the length of the RNA fragments which are produced by the DICER.
  - Introducing an extra domain which will be responsible for the recognition of specific RNA sequences.
- RNAi is used for gene regulation in cells. When dsRNA enters the cell an enzyme called DICER will cut the dsRNA into small 20-25nt long pieces. One of the two strands is incoorperated into an enzyme complex called RISC (RNA-induced silencing complex). The most studied pathway is the gene silencing. Where complementary mRNA is bound by the RISC complex and degraded. Therefore no translation will take place.
- He showed data where the cutting length of DICER had been decreased. A linker domain was thought to be increased in length without effecting DICER activity. But by changing DICER correspondingly also RISC must changed that an increased ssRNA can be incoorperated.