Event Calendar

Drugs & Beyond

The HPPS Compass

An introduction to HPPS

Interviewing the coordinator of HPPS: Dirk Rijkers

Overview of HPPS projects: finalized and recruiting

Dear HPPS community,

Today, we proudly present the first edition of Drugs and Beyond. This journal will come out three times a year, and will be available for the whole HPPS community. The purpose of the journal is to show what is currently happening in the HPPS community, and to communicate exciting new research in the broader pharmaceutical field nationally and internationally. In this first issue, we will start off with an introduction to our Honours Programme, and an interview with our coordinator dr. ir. Dirk Rijkers. We will promote a few available positions in current projects, and we will give a brief look into a few internships, which are done by HPPS students in the pharmacology, pharmaceutics, and epidemiology departments of the Utrecht Institute of Pharmaceutical Sciences.

After this introductory issue, future issues will focus more on specific topics in a variety of different scientific fields. We hope this will be helpful for new HPPS students, but also freshen up some important information for the current HPPS students. Enjoy!

The Drugs and Beyond team:
Laurence Cleenewerk, Lamyae Chemlal, Marije Voskamp, Merlin Prinsen, Heleen van der Veen, Kyra Fortuin and Ruben de Vries

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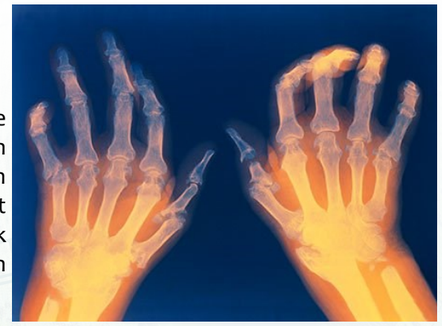
Next time…



The next issue of Drugs and Beyond will be released late November, and will cover one of the most common autoimmune disorders: Rheumatoid arthritis. We will explain how the disease works, how it is treated, and what the current state of drug discovery and research in this field is. We will talk to an expert and have a look at the research being done here in the Netherlands.

Besides this, you can look forward to many other exciting news, a new awareness calendar, interesting projects from your fellow HPPS colleagues, and more!

Don't forget to let us know if you would like to publish your project idea, thesis, abstract, project outcome, etc.

Email: hppsjournal@gmail.com

UPCOMING EVENTS

June-September 2018

- May 28th: • Update meeting / social event
- May 31st: • I love Holland excursion (SHA)
- June 4th: • Symposium GMO's & Poster presentations IDP (SHA)
- Mid-June: • Thematic event HPPS: Medicine X
- June 14th: • World Blood Donor Day
- June 29th: • URSPS
- July 28th: • World Hepatitis Day
- Aug. 1-7: • World Breastfeeding week
- Sept. (?): • HPPS Social Event (Last Week of September)
- Sept. 28th: • World Rabies Day

Honours Programme of Pharmaceutical Sciences (HPPS)

The Honours Programme of Pharmaceutical Sciences (HPPS) offers pharmacy students and students of the College of Pharmaceutical Sciences (CPS) the opportunity to broaden their spectrum on Pharmaceutical Sciences. It is meant for bachelor students who feel that the regular curriculum does not provide them enough challenge, or for those who would like to deepen or broaden their knowledge. In the programme, you can start projects of your own interests, and you get an impression of the ongoing research activities within the department. You can work with other students in the highly motivated community and develop your academic skills, research, and especially your leadership skills. The content of the programme will be unique for each student as you can follow your own interests.

There are no strict guidelines of what an Honours project should look like, as long as it is related to pharmaceutical sciences. However, this freedom is challenging for most new HPPS community members. What is allowed? How do I start up a new projects or join an ongoing project? How do I find a supervisor? Many questions are asked in the first few months of being an HPPS student. We are here to facilitate your entry into the stimulating environment, and give a little guidance with how to start a project.

In order to receive your Honours certificate, you have to collect extra ECTS on top of your regular study programme: 45 for Pharmacy students and 15 for CPS students, since CPS courses are Honours level. 1 ECTS equals 28 hours of work. It is essential that you keep track of every HPPS activity and the amount of hours you spend on them in an Excel sheet, as you will have to hand in the spreadsheet at the end of the 3rd year in order to obtain your Honours certificate. Remember that you will also need to keep track of the thematic events and update meetings you attend!

Pharmacy students need to 'upgrade' two courses to an Honours level by doing an extra project. In this way, they collect 15 ECTS. They also need to expand their bachelor thesis in the 3rd year, by including a practical part next to the literature search. This also accredits them 15 ECTS. The other 15 ECTS need to be collected outside of the regular curriculum. 7,5 ECTS are rewarded by the Science Honours Academy, where you will meet honours-students from other studies in science. The last 7,5 ECTS can be collected by doing projects or activities inside HPPS. You can think of organising events, doing literature search, or designing a new course.

CPS students need to collect all their ECTS outside of the curriculum. This part is identical to what Pharmacy students have to do. These credits can be obtained by doing any project or activity that has been approved by the HPPS committee.

Project recruitments

Our neuroscience blog Neuroscience-Unlimited is looking for new members to join our team!

Are you passionate about neuroscience?
Are you curious to find out what's happening in your nervous system?
Do you want to gain hands-on experience on science communication?

If you're interested please contact us on
neuroscienceunlimited@outlook.com

August

The World Breastfeeding Week is held every year from the 1st-7th August as a cooperation between the WABA, WHO, and UNICEF. This year, the slogan of the campaign is "Foundation of life". The campaign aims to highlight the nutritional and health benefits of breastfeeding, and to show women in the third-world countries how to properly breastfeed. (6,7)

BREASTFEEDING
Foundation of Life
WABA | WORLD BREASTFEEDING WEEK

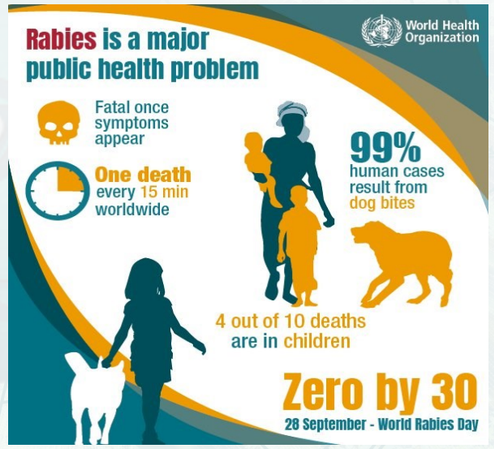
Formula milk was preferred by many women with higher social status, and by women in general in developed countries during the 20th century. However, the trend is starting to reverse. Breastfeeding has been shown to have multiple health benefits for both the child and the mother. The WHO suggests that children are exclusively breastfed until the age of 6 months, and continue to be breastfeed until they are at least 12 months old. Despite the effort put into campaigns and programs aiming to promote breastfeeding, global breastfeeding rates barely increased. This is largely due to societal circumstances. For example, public breastfeeding is still considered a taboo in many places, and a short maternity leave of working mothers reduces the length of breastfeeding by up to four times. (8)

Proper breastfeeding could reduce health complications of mothers and their children. Mothers who breastfeed for at least 12 months have a decreased risk for cardiovascular disease, diabetes, hyperlipidemia, and hypertension. Interestingly, women who never had children have a similar risk of developing these conditions than women who had breastfed for at least 12 months. Breastfeeding also
helps women lose the additional weight put on during pregnancy, which is related to a decreased risk of diabetes and metabolic disorders. The release of oxytocin during lactation can even help women cope with stress better on the long term. The most important benefit of breastfeeding is the reduced risk of ovarian and breast cancer in mothers. (9)

Some of the more well-known benefits of breastfeeding comprise improved immunity and higher IQ of the child. Children that are breastfed have less infections, a lower risk of developing allergies and asthma, and less hospitalizations due to respiratory or gastrointestinal infections. Additionally, breastfeeding also improves the mother-child bond, and reduces the risk for childhood obesity. (10)

September

On the 28th of September, the Global Alliance for Rabies Control organizes the World Rabies Day. The campaign focuses on endemic regions, and aims at spreading awareness on how the disease spreads and how it can be prevented in both animals and humans. (11)
Rabies is a virus that is mainly transmitted via the saliva of an infected animal or through nervous tissue. Infection with rabies almost always results in death, making rabies one of the diseases with the highest fatality rates with only 10 recorded cases of survival after appearance of symptoms.



(12,13) An infection with rabies usually becomes visible with early symptoms resembling an influenza infection. The symptoms that follow are of psycho-neurologic nature, including anxiety, cerebral dysfunction, confusion, and later on hallucinations and insomnia. (13)

Although it is a fatal disease, it is easily preventable mainly through vaccinations of dogs, as most human rabies cases result from a bite of an infected dog. However, in many regions in Africa and Asia, where funding and political engagement lack, rabies is still a feared disease. The main reason why rabies
still exists is a lack of knowledge of the inhabitants of the endemic regions concerning the prevention of rabies in dogs by vaccinating them. The rabies awareness day helps draw attention to this neglected disease to help educate the people living in the high-risk regions, and to mobilize the necessary resources to prevent the spread of the disease; for example, by vaccinating dogs. (12)

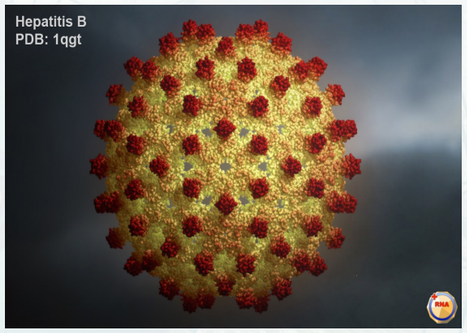
July

On the 28th of July, the WHO raises awareness for hepatitis. It is estimated that globally, around 300 million people live with hepatitis without being diagnosed. The campaign to "find the missing millions" aims to raise awareness for the disease by informing people about vaccination and screening strategies.(1) Hepatitis is the cause of 1.34 million deaths every year, which is as many deaths caused by HIV/AIDS or malaria.

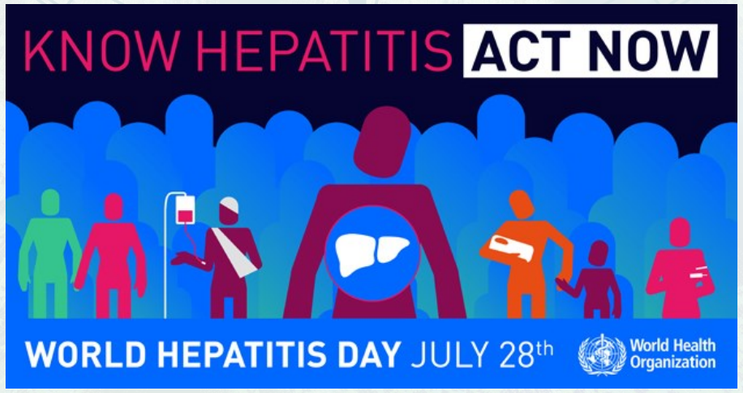
> "Hepatitis is the cause of 1.34 Mio. deaths every year, which is as many deaths caused by HIV/AIDS or malaria."

There are five types of hepatitis viruses (A-E), and all of them can cause acute hepatitis characterized by jaundice, fever, and nausea. Moreover, only two of the viruses (hepatitis B and C) can induce chronic hepatitis, which can lead to liver cirrhosis or carcinomas. Hepatitis B and C account for 80% of all liver cancers and for 96% of the hepatitis virus related deaths worldwide. (1,2) Between 80-90% of those infected with the virus are unaware of it, and they live with the high risk of developing serious liver diseases or transmitting the virus to others. (2) The mechanisms through which the chronic infection causes cancer are not fully understood. Hepatitis B and C viruses are thought to illicit an initial inflammatory response to fight the infection.

If the infection is not cleared, repeated cycles of inflammation leading to necrosis and regeneration potentially cause oncogenic mutations and genomic instabilities. Next to chronic inflammation, viral proteins can interact with the endoplasmic reticulum, and generating free radicals causing mutations. Integration of the viral genome in sensitive locations could produce oncogenes, and the activation of transcription factors altering the expression of genes responsible for growth-control are also mechanisms through which hepatitis viruses can cause cancer. (3,4)



The goal of health institutes worldwide is to eradicate hepatitis B and C by 2030. With a vaccine and treatment existing for hepatitis B and a cure for hepatitis C, this goal is indeed attainable. However, spreading knowledge about the disease and granting access to cheaper treatments is crucial. (2) For example, curing hepatitis C with the standard, 12 week treatment costs up to $90,000 in the US, although costs do vary depending on the country. (5)



HPPS Project Reports

The MedChem Practical Course project

By Khaled Essa

I am Khaled Essa, a 3rd year CPS student. I took the Medicinal Chemistry course in the first block of my third year, and since I am passionate about organic and medicinal chemistry, I really enjoyed the course. However, the course was only theoretical, so there were 7.5 ECTS "missing". Due to the limited elective options for international students, I resorted to writing a literature review to gain the remaining 7.5 ECTS of the first block. Halfway through the block, I was thinking of starting a new HPPS project. At the same time, the electives project (Yrea & Lisa) confirmed the need for more electives for CPS. Although I enjoyed the medicinal chemistry course, I felt that a practical part for this course would enhance the learning experience in this field. That is how the idea of creating a practical course for medicinal chemistry occurred to me. When I proposed the idea to some colleagues, they thought it was not feasible, and that it would take a lot of time to get it done. I was still confident that it can be realised, so I proposed the idea to Dirk and he welcomed it. He suggested I proposed the idea to the HPPS committee, who accepted it as a potential project. I then recruited a team of students highly interested in organic chemistry. After creating an initial outline of the course, we met with the potential teachers for this course and discussed the possible contents for the lab course. We then worked on a course manual, schedule, contents, reservation of labs, materials, and protocols, and we finally submitted the course to Osiris. Dr. Lucianne Groenink (programme coordinator of CPS) supported us through the process of our project and helped submitting the course to Osiris. I am very excited to inform you that the MedChem practical course can now be found on Osiris, and that you can sign up for it for the first block of the upcoming academic year! I would like to thank my team members Marinda, Anniek, and Patrycja, who without their serious efforts, this course would not exist. I also give many thanks to the teachers who guided us through the process, and helped us make this course a reality.

Internship in the United States

By Maarten Schreuder

Hi, I'm Maarten Schreuder, and I am currently in my 2nd year of CPS. In the summer of 2016, I did an internship in a biological lab in Philadelphia, United States. In the lab, I was doing research on inter-cellular signaling during an immunological synapse between APC cells and T-cells. During my five weeks there, I mainly prepared and maintained the cell lines for the research, but could also work on a smaller project on my own.
While arranging the internship, I noticed that the procedure and application is complicated, and it takes a lot of work and time. It is important to get started with arranging everything very early. In order to help other students arrange an internship, I will do an HPPS project around the internship. In this report, I will present my experience and a guideline on how to set up an internship abroad.

National Pharmacy Olympiad (NPO)

by Sander Lamme

The National Pharmacy Olympiad is a contest between all pharmacy students in the Netherlands (Utrecht, Groningen and Leiden) which takes place the 6th of June, in both Utrecht and Groningen. The idea was born when my predecessors noticed that a medicine olympiad existed and was very popular among students. However, pharmacy lacked such a contest. That is why they created a pilot, in which all pharmacy students in Utrecht could compete against each other and find out what is still to learn. It was a great success, and was appraised by both students and the department. The current board has the ambition to include all students in the Netherlands, keep the strong aspects of the pilot in place, and improve where necessary. Currently, the board consist of 2 HPPS members (Youssra Bais and me) and 7 members from both Leiden and Utrecht. Groningen is represented by the KNPSV. Scaling up an event like this proved to be a challenge, mainly because we got students from different universities with all slightly different curricula. That is why we first created a matrix based on the KNMP's "kennisdomeinen van de farmacie" (a detailed description of what a pharmacist should know).

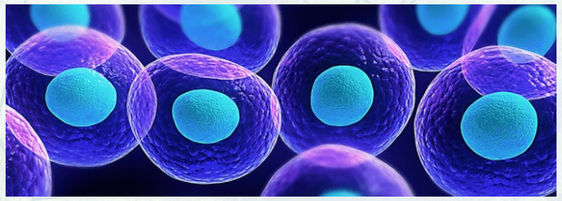
After this, we could create the questions and let them be checked by experts from the three universities. As you can expect, organizing an event like this requires adequate planning but also sponsors, promotion, and many meetings to discuss our progress. Every member of the board was assigned one "core" task such as promotion or finance, for which he/she was ultimately responsible. However, we all helped each other as one team, and everyone made questions. I have learned a great many things up until now, particularly organising skills. I am very proud of what we have achieved and I hope to welcome you all the 6th!

Improving Bone Regeneration by Mesenchymal Stem Cells

By Laura Graus

This year, I started HPPS, and I will finish my first project at the end of the year. I did my project at the Centre for Regenerative Medicine at the UMC. The group of Maxillofacial Bone Regeneration was willing to offer me a project within their research group. Since September, I have been helping a PhD student with one of her projects, which has become my HPPS project.

This project is focused on a growth factor that might increase bone regeneration by mesenchymal stem cells. Mesenchymal stem cells (MSCs) are a type of multipotent stem cells that can differentiate in either osteoblasts (a type of bone cells), chondrocytes (a type of cartilage cells), or adipocytes (a type of fat cells). The MSCs will differentiate into different cell types depending on the surrounding environment. By use of a construct containing calcium phosphate granules held together by hydrogen glue and a growth factor encouraging differentiation of MSCs into osteoblasts, an environment can be created in which bone regeneration might increase. In our experiment, a small critical defect was created in the pelvis of goats. The construct with or without growth factor was placed in the defect. After several weeks, histochemical analysis of the bone defect was performed in order to determine whether the investigated growth factor led to significantly increased bone regeneration. I have worked on the histochemical analysis of these bone defects, and hope to have some results to present soon.



Although bone regeneration of large bone defects in humans is still impossible, I hope that, with the research of the Centre of Regenerative Medicine in Utrecht, we might get a little closer to clinical application.

AWARENESS CALENDAR

June-September 2018

June

On the 14th of June, it is World Blood Donor day. The WHO organizes this awareness event to draw attention to the importance of voluntary blood donations. Every year, over 100 million blood donations are collected worldwide.

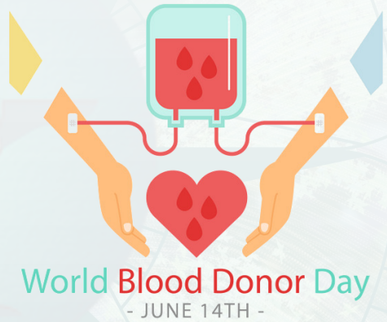
Blood donations are used for various different situations. During or after humanitarian catastrophes, such as war or earthquakes, the demand of blood donations increases. The blood is needed to treat the injured people. Moreover, blood donations are needed to treat patients with disorders such as cancer, anaemia and blood disorders, during surgery, or after blood loss caused by childbirth.

The different components of blood (red and white blood cells, plasma, and platelets) can be separated and used to treat different patients with different disorders. Red blood cell transfusions are used to treat blood loss after childbirth, accident, during surgery, and to treat various kinds of anaemia, such as those caused by cancer or sickle cell disease. White blood cell transfusions are rarely given, but can be used to help people with a compromised immune system fight a life-threatening infection.

The many different proteins found in plasma are useful to treat a variety of diseases. Albumin, the most common protein in plasma, is used to treat hypoalbuminemia caused by surgery, liver failure, kidney disorders, and pancreatitis.

Other components in plasma are clotting factors used to treat blood clotting disorders (such as haemophilia), and immunoglobins (IgGs) to treat immune deficiencies, autoimmune, and idiopathic (of unknown origin) diseases. Infusions of IgG are used for example in patients with Kawasaki disease or Guillain-Barré syndrome, and in graft versus host disease.

Would you like to help save lives and improve the life of people with various illnesses? Check out the closest blood bank near you and sign up!



More information about the campaign can be found on:
www.who.int/

Additional information on the blood components and disorders blood donations are used for can be found on:
www.blood.co.uk; www.everydayhealth.com/; www.emedicine.medscape.com/

Opening of Princess Máxima Center for pediatric oncology

The Princess Máxima Center is specialized in pediatric oncology, and has recently been opened at the Uithof. Its aim is to maintain a national pediatric oncology center in the Netherlands, where children and adolescents with cancer and cancer precursors receive fast, ongoing treatment with minimal side effects. The best people, care, knowledge, and research are offered, and the children with cancer are treated using the best possible methods. The experts focus on the children, their development, and their families, and the brightest researchers are working nearby to improve care and treatment.

vóór kinderen tégen kanker

Prinses MÁXIMA

centrum voor kinderoncologie

The national pediatric oncology is established by three organisations: the Dutch Childhood Cancer Parent Organization (VOKK), Dutch Childhood Oncology Group (DCOG), and the ODAS Foundation. The VOKK is the national association of families with a child who has or has had cancer. The DCOG is the national association of diagnostic and attending specialists for pediatric oncology and bone marrow transplantation in the Netherlands. The ODAS Foundation supports scientists, doctors, and organizations participating in scientific projects involving cancer and visual disorders in children and young people.

In conclusion, there is one mission that the Princess Máxima Centre is trying to fulfill by combining care, research, education, and training:
“Cure every child diagnosed with cancer, and provide them optimum quality of life.”

Internship Abstracts

Association of NOACs on atrial fibrillation care quality

(Department of Pharmacoepidemiology and Clinical Pharmacology)

Hi, my name is Yrea, and I am doing my research project at the department of Pharmacoepidemiology and Clinical Pharmacology. Research projects in this department never involve lab work, so my day is typically spent behind a computer. I am researching the association of the introduction of NOACs on the quality of anticoagulation care in atrial fibrillation, and to do this I use SPSS and a dataset derived from the CPRD. Since I can do my entire project on my computer, I am quite free in what I do whenever and wherever. At the beginning of the project, I did a lot of literature research. Then, I started with the dataset and SPSS, and now I have most of my results and I am writing my article. Also, twice a week, short sessions are organised where other people present their research. On Tuesdays, PhD students, professors and doctors present their research, and on Thursdays, similar sessions are organised especially for students. These sessions are always very interesting. I really like my research project, and I strongly recommend doing your research project at this department if you like epidemiology, or do not want to do lab work.

Preventing food allergy with dietary components

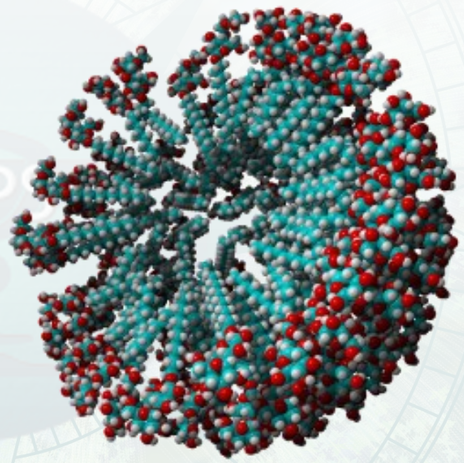
Department of Pharmacology

My name is Ruben de Vries, and at the moment, I am doing my CPS internship in the neuro-immunopharmacology group in the pharmacology department at the Utrecht Institute of Pharmaceutical Sciences (UIPS) in DDW. My research project is supervised by Kirsten Szklany, a PhD student in our research group headed by prof. Aletta Kraneveld. The research project I am involved in looks at the possible use of dietary components for the prevention of food allergy and its associated behavioral effects. The work I’m doing for this project mainly involves immunofluorescent staining and qPCR analysis of mice intestinal tissue, but at the start of the internship, I was also involved in the mice behavioral experiments and section. A typical week in the pharmacology department involves a lot of lab work, literature research, protocol preparations, pharmacology department update meetings, and sometimes animal experiments. In conclusion, it’s a nice mix of everything, and I really like working in the pharmacology department and being involved in this nice project!

Hydrogels as delivery systems for siRNA

Department of Pharmaceutics

Hi, I am Kyra Fortuin, and I am currently doing my CPS research project at the department of Pharmaceutics in the UIPS. My supervisor, Lies Fliervoet, is a PhD student in the Tina Vermonden research group. The project that I am involved in is a VIDI project investigating the use of hydrogels that release drug loaded micelles for tumor therapy. I am working on the delivery of silencing RNA (siRNA) encapsulated into polyplexes and how hydrogels can facilitate the delivery of this siRNA. My lab work is very diverse, as I am doing experiments which include multiple aspects of pharmaceutical sciences. This includes (polymer) synthesis, quantification of hydrogel release samples, characterization of nanoparticles, and also cell culture and transfection. A normal week in the pharmaceutics department involves weekly research colloquiums, small meetings in which you can present your findings and problems in the labs, a lot of literature research, and lab work in both the cell culture labs (Biosafety 1 and 2) and the synthesis labs. Overall, this internship is a project with a lot of different things to do, making it a really cool bachelor internship. I really enjoy working in the pharmaceutics department and this interesting project!



News Flash

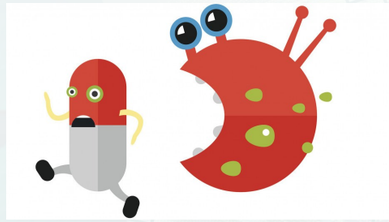
Vulnerability of drug-resistant cancer cells potentiates new treatment option

Most drugs currently used for the treatment of melanomas target the oncoprotein BRAF, or both BRAF and the MEK kinases the oncoprotein activates. Both approaches generally result in clinical benefits; however, almost all patients treated with MAPK pathway inhibitors experience relapse with treatment-resistant tumors. This is caused by mutations leading to hyper-activation of the MAPK signalling pathway in presence of BRAF and/or MEK inhibitors.

One feature of these drug-resistant melanomas is an increase in the production of reactive oxygen species (ROS). Using flow cytometry, Wang et al. measured the basal levels of ROS produced by single and dual drug-resistant cultured melanoma cells. They found a two-fold increase in ROS levels in single drug-resistant cells, and even higher levels in dual drug-resistant cells. Wang et al. suggested that this feature might point to a possible acquired weakness of treatment-resistant melanomas. They hypothesized that a further increase in ROS might lead to cell damage. After incubating parental (non-resistant), single, and dual drug-resistant melanoma cell cultures with the ROS inducing compound paraquat, they showed inhibition in proliferation of the drug-resistant cultures, but not the parental cells, with higher ROS basal levels leading to an increased sensitivity to paraquat, and higher DNA damage and apoptosis. This sensitivity could be reversed using an ROS scavenger. This led to the conclusion that the ROS inducer could be used in the treatment of MAPK inhibitor-resistant melanoma.

The team then tested whether the clinically approved histone deacetylase (HDAC) inhibitor vorinostat, which is known to induce ROS production, had similar effects on MAPK inhibitor-resistant melanoma cell cultures. Indeed, vorinostat was able to inhibit proliferation and induce DNA damage and apoptosis in resistant cell lines, but not the parental cell line. The effects of vorinostat could be reversed using an ROS scavenger, similar to the effects observed with paraquat. However, it has been shown that an increase in ROS activates the MAPK signalling pathway. Wang et al. showed that vorinostat was able to activate MAPK signalling in resistant melanoma cell lines. Combined treatment of vorinostat and a MAPK inhibitor did not result in a decrease in proliferation, due to residual MAPK signaling. This effect can be explained by the MAPK inhibitors leading to a decrease in ROS; therefore, counteracting the increase in ROS initiated by HDAC inhibitors such as vorinostat.

These findings led to the conclusion that MAPK inhibitors and HDAC inhibitors need to be administered sequentially, rather than in combination. To test this notion in vivo, immunodeficient nude mice were injected with melanoma cells. After the tumors reached a certain volume, the mice were given either a control, a MAPK inhibitor, or vorinostat. The tumors continued to grow in control and vorinostat groups, and initially regressed in the MAPK inhibitor group followed by tumor growth. This was due to the acquisition of MAPK inhibitor resistance. Another group of mice was then treated with a MAPK inhibitor until the acquisition of treatment resistance, and was divided into different treatment groups. Withdrawal of the drug led to slow progression of tumor growth. Similar results were observed for mice treated with a combination of the MAPK and the HDAC inhibitors. Strikingly, switching from the MAPK inhibitor to administering the HDAC inhibitor vorinostat alone lead to reduced tumor volume.



In an ongoing clinical study, the effect of vorinostat administration to advanced melanoma patients, who developed a resistance to BRAF and MEK inhibitors, is being investigated. So far, 6 patients have been treated with vorinostat after a one-week withdrawal period of the BRAF and MEK inhibitors. Vorinostat treatment was able to suppress SLC7A11 expression, which leads to ROS induction, and to eliminate MAPK inhibitor resistant cells.

These findings show that the development of drug-resistances in cancer cells may also provide them with a new weakness that can be exploited. Understanding how cancer cells acquire these resistances can help identifying their potential weaknesses. In the case of BRAF mutant melanoma developing MAPK inhibitor resistance, the weakness was identified as an increase in ROS, which could be exploited by the use of an ROS inducer such as HDAC inhibitor vorinostat. Vorinostat was shown to have benefitting effects in MAPK inhibitor-resistant melanomas, both in vitro and in vivo. The administration of vorinostat following MAPK inhibitor treatment and withdrawal is currently being investigated, and it has shown some promising initial results. Upon completion of the clinical trials, the potential clinical use of this setup will become evident and might provide an efficient new treatment option for melanoma.

Reference: Original publication: *Wang L. et al. An Acquired Vulnerability of Drug-Resistant Melanoma with Therapeutic Potential. Cell. 2018;1–13.*

Interview with Dirk Rijkers, coordinator of HPPS

Dirk Rijkers started his educational career at the TU Eindhoven, where he studied Chemical Engineering from 1985 to 1990. Soon afterwards, he realized that his main interest was the chemical properties of molecules, so he specialized in this subject during his electives. A major in Bioorganic Chemistry followed, in which he focused more on organic synthesis, biotechnology, and enzymology. Furthermore, he took a gap year to look around in the field and visit pharmaceutical companies. "I wanted to learn more than just what you learn from the books", Dirk explains.

What internships did you do during your studies?

Dirk enrolled a practical traineeship at DSM Research (Geleen) for 6 months, focusing on enzymatic resolution. In short, his research was on the purification of racemic mixtures into a single enantiomer, using enzymology and conversion of only a single enantiomer in bacteria.

The subject of his major thesis was the synthesis of DNA molecules. His goal was to synthesize specific DNA molecules to study the rearrangement of those molecules, to better understand the biophysical phenomenon. He focused on both the chemical synthesis and the analysis of the molecules, using NMR, among other spectroscopic methods.

What was your PhD project about? And your post-doc afterwards?

Dirk started his PhD in October 1990 at the Radboud University Nijmegen and worked on his project for 4 years. His main research question came from Maastricht University, who also funded his project. He developed a small substrate that is specifically hydrolysed by thrombin, after which it obtains a yellow colour that can be measured as the potency of a blood sample to coagulate.

> "I don't have a 9:00-17:00 mentality. When I like something, I will give it 100%, and if that costs me extra time, so be it. "

After this, he started as a post-doc in Maastricht, where he further worked on a spin-off from his PhD subject for 3 years at the Faculty of Medicine. He wanted to optimize the substrate, working with real patient samples suited for a clinical chemistry laboratory.

However, Dirk found out that working with patients involves a lot more that taking blood samples. "I had never learned to deal with this very close contact with extremely ill patients." Therefore, he stopped his work in Maastricht and continued his post-doc in Utrecht at the Medicinal Chemistry department, where he worked with small peptide hormones in close collaboration with Solvay Pharmaceuticals.

What do you currently do, as a researcher at the Utrecht University?

Still, Dirk specializes in the synthesis of small peptides with antibiotic properties, especially in stabilizing (rigidification) peptides applicable for drug use. In 2000, he became an assistant professor in Utrecht in the department Chemical Biology and Drug Discovery. At the beginning, his job included 70% research and 30% teaching, which is now switched around. Also, Dirk has a lot of other responsibilities, including the Board of Examiners, Coordination of the HPPS and he is currently supervising his 11th PhD student. And this is what stands out when talking to Dirk: his endless enthusiasm and drive for a large variety of 'after 5 pm' activities. Dirk emphasizes: "I don't have a 9:00-17:00 mentality. When I like something, I will give it 100% and if that costs me extra time, so be it. I am curious, I want to cross new borders and I want to extend my knowledge and achieve results with new students."

Now about the HPPS. What was your motivation to become the HPPS coordinator?

Dirk started as the HPPS coordinator in January 2017. "My major motivation was that I really like teaching students on honours level. Sometimes, students come up with extremely out of the box ideas and projects." It is also a very busy responsibility. Especially now, Dirk is very busy sending all the emails for recruitment of new HPPS students, going around classes, reading all the applications… "It is purely out of own interest. I also learn a lot from you, don't underestimate that! This keeps me alert on things that are happening in society. I believe it's important for teachers to always keep improving your qualities as a teacher and I think being the coordinator of HPPS helps me in that, too."

What is your vision on the HPPS community, being the coordinator?

"My mission was to involve Pharmacy students more in the honours program. A few years ago, we had only 5 Pharmacy students in HPPS, which is not a good representation of the Pharmacy cohort at all. Last year, we had around 20, which was almost a 1:1 ratio with CPS!" Dirk's main concern is to make sure that all students know that they can do something extra if they want to. He got applications saying: "I like Pharmacy, but I have so much spare time now, so I want to do something extra". This is what Dirk wants HPPS to provide for those students. Also, Dirk wants to focus on the encouragement of students to come up with their own, out of the box, ideas. "I want to encourage students to start with their own ideas, to evaluate and investigate, to see what comes out of it. Sometimes the outcome is completely different from the initial idea, but the process in between the idea and the final product is also how you will later work as a researcher."

What kind of projects did you come across that you liked?

Dirk still remembers a lot of very good theses from students that were very interested in a specific topic and they got the change to explore this topic in much more detail. Also, big events such as the Pharmacy Olympiad started as an HPPS project. Another big project is the Book Project, which was a pharmacy educational book, of which now the English translation and a second edition are being worked on. In addition to this, students are highly involved in their own teaching since three projects are running in which new teaching materials, even a complete new lab course will be designed and made.

What would you say to the new HPPS students with regard to setting up new projects?

"First of all: welcome!" Dirk continues with saying that he wants to encourage everyone to go to the update meetings. During these meetings, a lot of ideas come up, to get some inspiration from, but also recruiting projects will present, that you can join. Also, keep track of what is happening in the Dutch society or the rest of the world with respect to medicine. The high prices we pay for example: why does that happen in the Netherlands, but not in Belgium or Germany? Dirk adds: "Since we are an international group of students, work together with different nationalities and look at what is going on in your home country for example."

Dirk has been the coordinator of HPPS for a year now already and is proud to see what the HPPS community is doing. "I like to see the effort that you put in and the end results you obtain." And not only is he proud of the work we do, he will admit he can even still learn from us as well: "Still, for me it is quite interesting to learn from you. In general, I try to be your teacher and a good teacher, but on the other hand, you also provide me with new knowledge. I think it's important that both of us see the value that is brought by the HPPS community."

And let that be the main message of this interview: may we all be as enthusiastic as Dirk and all experience the value of the HPPS community!

> "I also learn a lot from you, don't underestimate that!"