**Summer school2023**

**Towards Immunotherapy for Medulloblastoma**

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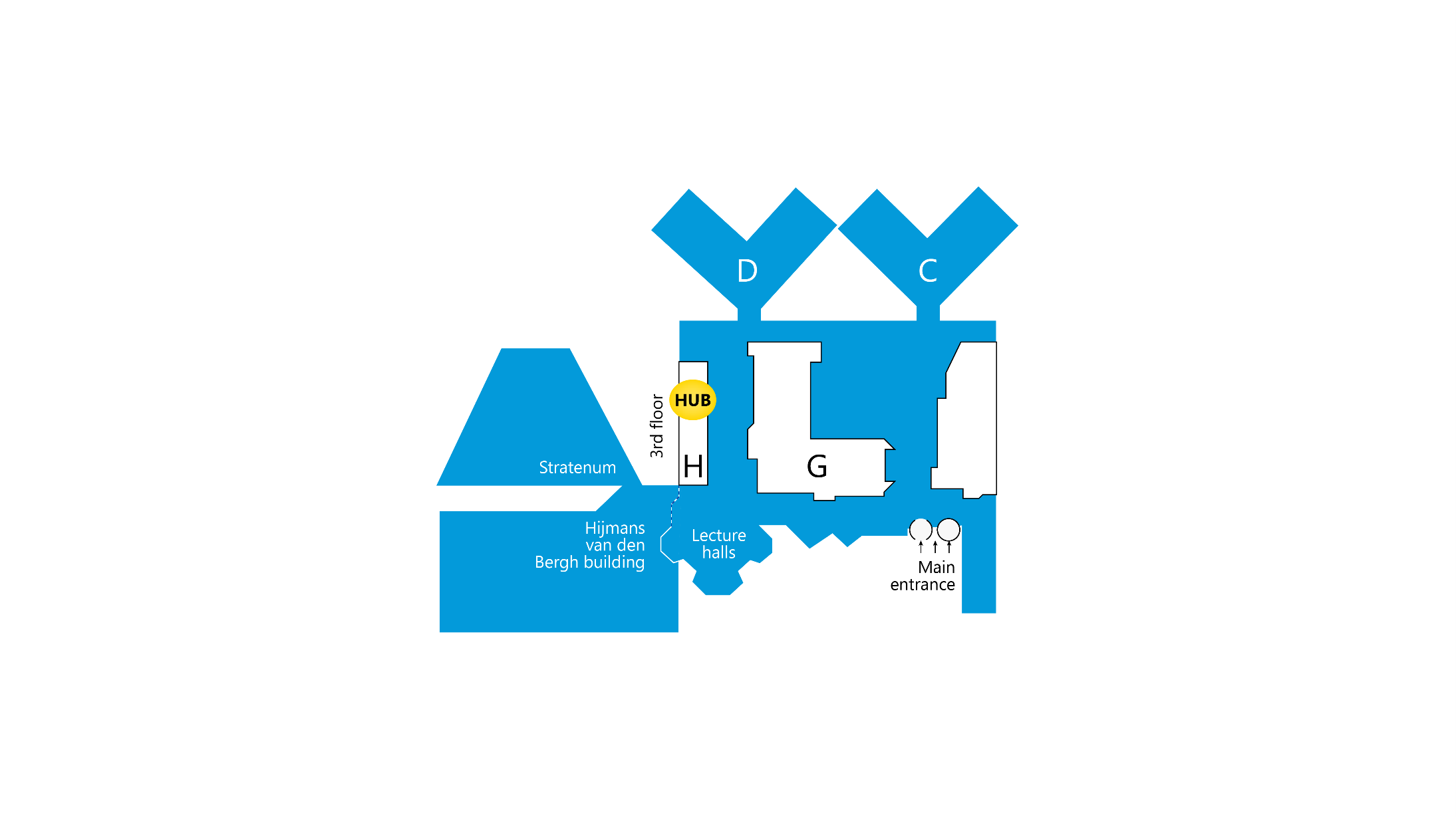
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**Preface**

Welcome to the Bachelor Research Hub Summer school, taking place in the newly equipped laboratory positioned in the heart of the University Medical Centre Utrecht. During the 2-week period you will be performing an authentic and real-world actual research under supervision of professionally trained teacher-researchers. You will experience a “crash-course” in the scientific world: from thinking about the topic, investigating the current literature, and writing a short project proposal, to conducting the experimental part of the research, and finally presenting and discussing your data. Sharing your findings and knowledge is always an important part of the research, therefore it is useful to get acquainted with it and practice it at the very start of your scientific careers.

The topic of the Summer school will revolve around medulloblastoma – one of the most common brain tumours in children. Currently, there are three therapeutical options for medulloblastoma: surgery, radiation and chemotherapy. Although survival rates vary from 70-85%, the quality of life of the patients is severely affected. Thus, there is a need for improved or new therapies. In recent years, immunotherapies have proven to be successful strategies in the treatment of cancer. During the course, you will investigate options for using immunotherapy as a future treatment for this disease by incorporating your own ideas and choosing your own research paths.

We wish to welcome you to our laboratory where, with a support of many supervisors, you can get a glimpse of the real scientific world. Happy researching!



*Location: Bachelor Research Hub (H03.201), UMC Utrecht (Heidelberglaan 100, 3584 CX Utrecht)*

With kind regards,

Niels Bovenschen, Toine ten Broeke, Sandra Crnko, Emma Pijnappel, Michael Schakelaar, Matthijs Monnikhof, Jan Meeldijk and Heggert Rebel

**Literature**

The following articles and videos will give you an insight into the topic and techniques you will be using during the Summer school.

1. **Medulloblastoma**

Paul A. Northcott, Giles W. Robinson, Christian P. Kratz, Donald J. Mabbott, Scott L. Pomeroy,

Steven C. Clifford, Stefan Rutkowski, David W. Ellison, David Malkin, Michael D. Taylor, Amar

Gajjar & Stefan M. Pfister

*Nature Reviews Disease Primers volume 5, Article number: 11 (2019)*

<https://www.nature.com/articles/s41572-019-0063-6>

1. **The blockade of immune checkpoints in cancer immunotherapy**

Drew M. Pardoll

*Nature Reviews Cancer volume 12, pages 252–264 (2012)*

<https://www.nature.com/articles/nrc3239>

1. **Immunotherapy in medulloblastoma: Current State of Research, Challenges, and Future Perspectives**

Marije J. Voskamp, Shuang Li, Kim R. van Daalen, Sandra Crnko, Toine Ten Broeke, Niels Bovenschen

*Cancers 13(21):5387 (2021)*

<https://pubmed.ncbi.nlm.nih.gov/34771550/>

1. **Bachelor Research Hub**

<https://www.youtube.com/watch?v=PmBeLLvpXHw>

<https://www.bachelorresearchhub.com/>

1. **Western blot tutorial**

<https://www.youtube.com/watch?v=CEEekahiqMo>

1. **Cell culture tutorial**

<https://www.thermofisher.com/nl/en/home/references/gibco-cell-culture-basics/introduction-to-cell-culture.html>

1. **Flow cytometry tutorial**

<https://www.youtube.com/watch?v=sfWWxFBltpQ>

# **Schedule**

**Week July 3th-July 7th:**

**Monday:**

1. Gathering at the main entrance 08:55-09:00h Everyone

of UMC Utrecht

1. Introduction to the Summer school 09:00-09:15h N. Bovenschen
2. Introduction of the topic 09:15-10:00h N. Bovenschen
3. Hypothesis formulation, planning and 10:15-17:00h Students

preparations

**Tuesday:**

1. Lab journal 09:00-09:30h T. ten Broeke/Crnko
2. Discussion of the hypothesis and 09:30-10:00h Everyone

planned lab work

1. Lab work\* 10:15-17:00h Students

**Wednesday:**

1. Lab work 09:00-17:00h Students

**Thursday:**

1. Lab work 09:00-17:00h Students

**Friday:**

1. Recap results (short ppt) 09:00-09:45h Everyone

+ Planning for the next week

1. Lab work 10:00-17:00h Students

*\*Lab work includes: molecular biology, cell culture, Western blot, Flow cytometry, etc*

**Week July 10th-14th:**

**Monday:**

1. Lab work\* 09:00-17:00h Students

**Tuesday:**

1. Lab work 09:00-17:00h Students

**Wednesday:**

1. Lab work 09:00-17:00h Students

**Thursday:**

1. Lab work 09:00-17:00h Students

**Friday:**

1. Presentation preparation 09:00-15:00h Students
2. Final presentation (30min+discussion) 15:15-16:00h Students
3. Closing remarks 16:00-17:00h N. Bovenschen

*\*Lab work includes: molecular biology, cell culture, Western blot, Flow cytometry, etc (see list of techniques on the last page of syllabus)*

# **Knowledge of techniques per teacher**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Emma | Sandra | Toine | Jan | Heggert | Matthijs | Michael |
| Cell culture | +++ | +++ | +++ | +++ | +++ | +++ | +++ |
| Western Blot | ++ | ++ | +++ | +++ | +++ | ++ | +++ |
| RNA isolation, cDNA synthesis and qPCR | ++ | +++ | + | +++ | ++ | + | +++ |
| Flowcytometry | +/- | +/- | +++ | ++ | ++ | +++ | +++ |
| Cloning | - | - | ++ | +++ | ++ | - | - |
| IF | +/- | +/- | +++ | + | +++ | - | +/- |
| IHC | +++ | ++ | + | + | +++ | - | - |
| Transfection | ++ | ++ | ++ | +++ | + | + | + |
| PBMC + NK cell isolation | - | +/- | +++ | + | +++ | +++ | +++ |
| XCELLligence | - | + | ++ | ? | ++ | - | - |
| Confocal microscopy | + | ++ | +++ | +++ | +++ | + | + |

- = Has no knowledge of this technique

+/- = Has almost no knowledge of this technique

+ = Has a little knowledge of this technique

++ = Has a lot of knowledge of this technique, but can’t answer all questions concerning the technique

+++ = Has all the knowledge of this technique and can answer difficult questions concerning the technique

# **Techniques and facilities available in or via the Hub**

* Flowcytometry
  + - Cytoflex (HUB)
    - BDCantoII (Flow facility)
* Immunohistochemistry
* qPCR
* Western Blot
* SEM (in collaboration with Cell Microscopy Center, Tineke Veenendaal)
* Confocal imaging
* Immunofluorescence
* Cell culture
* Transfection
* Cloning
* CRISPR-Cas
* Killing assays
* PBMC and Primary NK cell isolation from healthy donor blood
* Making of fusion proteins
* Electroporation
* XCELLigence

Chemicals can be found according to the SOPs. If not present, consult the HUB team for more information.