

# ARBO

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**ORGANIZATION**

*ERIBA  
DEPARTMENT OF GENETICS*

**DATE**

*##-##-##*



# ARBO

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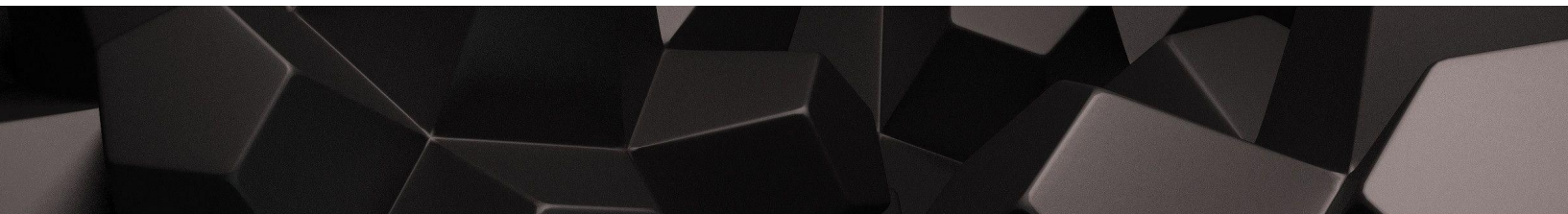
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# INTRODUCTION

## THE COMPANY

This internship was provided and guided by the immuno-genetics research group in the department of Genetics at the University Medical Center Groningen (UMCG). The hierarchy can be seen as a structure divided in multiple sections (A-F), each with its own director (figure 1). Above these directors is a main director. All sections are divided into departments, and each department has a head. For the Department of Genetics this is prof. Richard Sinke. Under his coordination, several associated and full professors lead different research groups.<sup>[1]</sup>

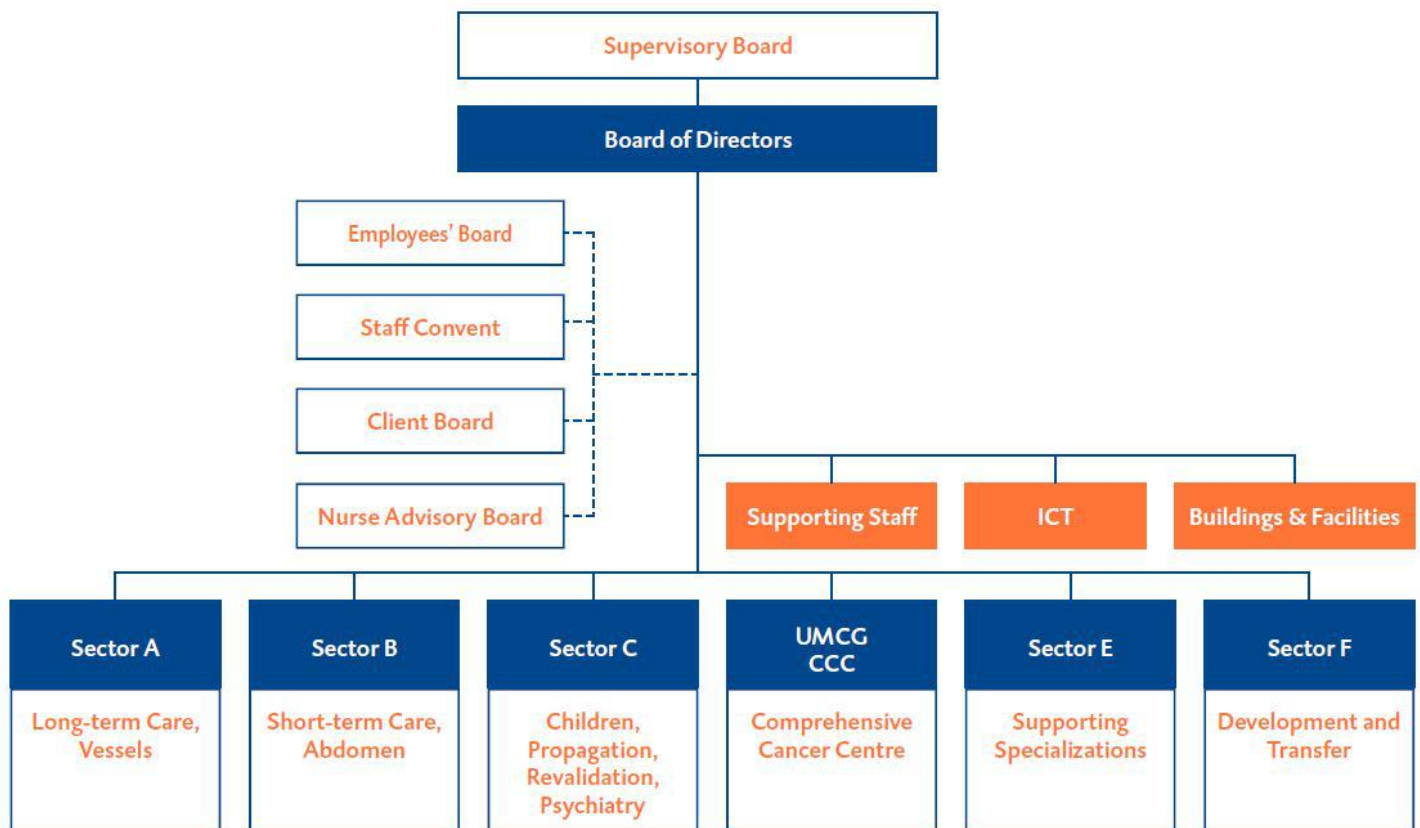
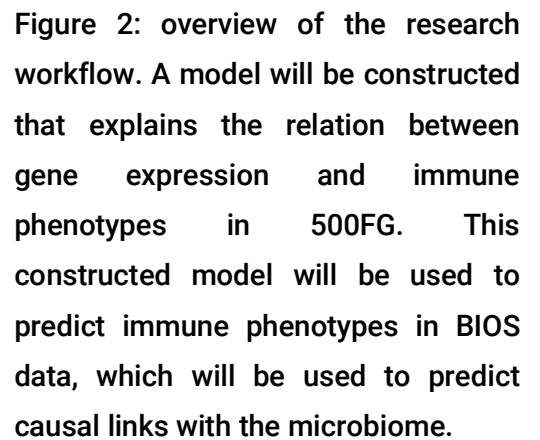


Figure 1: Organogram of the UMCG organizational structure

The body of a human is a complex interconnected ecosystem, and the gut is where the body acts as a first line of defense. Where it interacts with the “outside world”, functioning as a front-line of the immune system, which is constantly exposed to new microbes and molecules.<sup>[2]</sup> The whole assortment of microbes that are present in and on the human body is known as the microbiota.<sup>[3]</sup> The microbiome refers to the whole set of genes within these microbes. The role of the microbiome composition/function is considered as an acting organ in the body’s operation. It has an impact on aging, digestion, the immune system, mood, and cognitive function.<sup>[4]</sup> The immune system a defensive system from the host entailing many biological structures and processes within an organism to protects against diseases. The function of the immune system relies on the ability to detect and distinguish a wide arrange of agents known as pathogens, viruses, and parasites from self and non-self.<sup>[5]</sup> The aim of this research is to find causality links between the microbiome composition/function and immune system, does the microbiome influence the immune system (cell counts, cytokines, globulin levels), or/and does the immune system influence the microbiome. By using gene expression data, transcriptomic data from the 500 Functional Genomic cohort<sup>[6]</sup> a model is constructed that explains immune traits/functions between gene expression data and 500FG with elastic net regularization<sup>[7]</sup>, and cross-validation. The constructed model will be used to predict immune function/traits in BIOS data which contains genetic data from a large number of individuals which lacks immunogenic information. After the immune phenotypes are predicted, a causal link between microbial composition/function and immune phenotypes can be predicted with one-sample Mendelian Randomization, here microbial metagenomic data will be used and the predicted immune phenotypes, see figure 2.



# WORKING CONDITIONS

## THE “ARBEIDSOMSTANDIGHEDENWET”

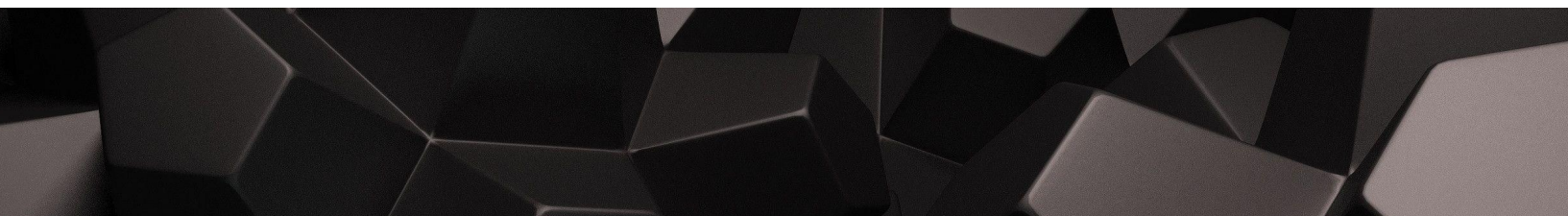
The “Arbeidsomstandighedenwet”, further known as the “Arbowet” stands for nothing more or less than for the abbreviation of the word employment conditions. The working conditions are: "the conditions under which the employees perform their work: in the area of safety, health and whether, as an employer, take sufficient account of the well-being of the employees in the workplace".<sup>[8]</sup>

The “Arbowet” is a framework law containing general provisions. These have been further elaborated in the Working Conditions Decree and the Occupational Health and Safety Regulations that contain concrete regulations. In an occupational health and safety catalog, employers and employees define how they can meet the target requirements of the Working Conditions Act per company or branch. A few other laws that are important: the Working Hours Act, the Gatekeeper Improvement Act, the Work and Income according to Labor Capacity Act (WIA), the Work and Care Act, the Equal Treatment Act and the equal treatment on the grounds of age at work.<sup>[8]</sup>

## POLICY OF ARBO

The practical implementation of the ARBO regulation at the UMCG is a collaboration of the UMCs in the Netherlands. This health and safety catalog is compiled by the Dutch Federation of UMCs (NFU) and employee organizations. This catalog contains many aspects employees have to deal with, and the goal of this implementation is to reduce health risk, and the caption of a healthy and work friendly environment. The combined effort the Dutch Federation of UMCs addresses the following risk factors<sup>[9]</sup>:

- Cytostatics (tumor suppressing drugs)
- Physical stress (lifting heavy objects etc)
- Repetative strain injury (RSI)
- Inhalational anesthetics
- Dangerous substances (gasses, glues, disinfectants etc)
- Skin reactions (allergies due to soap etc.)
- RI&E (risk inventorization and evaluation)
- Aggression and violence (verbal and non verbal violence)
- MRI (for people working with MRI scanners)
- Infection prevention
- Unwanted behavior (discrimination or bullying)



- Pregnancy
- Stress

## SAFETY

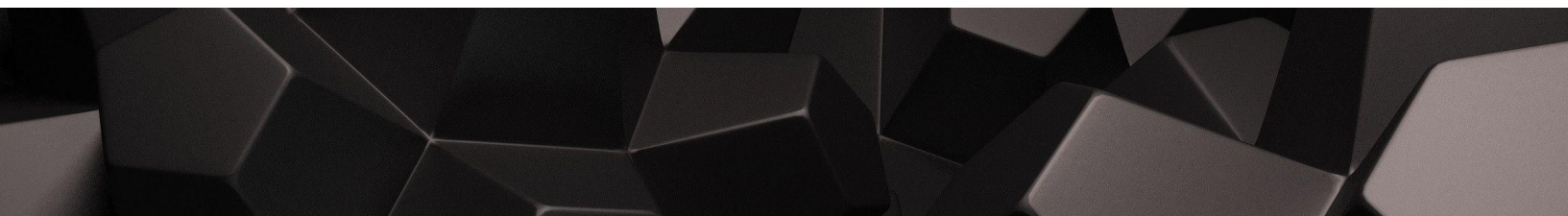
Safety at work is not only about working with safe and approved means (such as the use of machines, tools, equipment and installations), but safe behavior is just as important. Clear information, clear work instructions, the correct use of resources and regular maintenance and inspection - often required - increase safety. Employers and employees are jointly responsible for this. Most subjects related to safety described by the ARBO are related to manual labor environments, and not the environment that is set at the office desk, which do not pose any hazardous potentials as working with for example with pneumatic drills, construction sites, or lab work (for the sake of clarity, see figure 3, which shows the difference between a pneumatic drill and a laptop, since these objects are both items used in professions so there can be some confusion about the potential risks in using them, and distinguishing them). Since I am working as a Bioinformatician my environment summarizes a desk, laptop, writing material, and that is it.

But there is an important part in safety that is not incorporated in the ARBO, and that is cyber safety, which is a difficult subject to give boundaries in terms of preventing or protecting against. The UMC's in the Netherlands have the responsibility to handle private data, like patient generated data. This type of data has to be stored and processed in the right way, at the right moment and by the right person, the researcher. Cohort based studies like LifeLinesDeep, BIOS, 500FG, and 200FG are examples of very deep detailed patient based data cohorts, with which I am working on with my project. These type of data is very expensive to generate, and must hold to the law of privacy, which when is violated, will give rise to a very high fee, but also damages the image of the company.

Genotype, or phenotype, can potentially lead back to specific individuals, and in the wrong hands this can be very hazardous. The UMC's maintain a strong communication and plan in keeping this data safe and from the "streets". It is not allowed to have patient data on a non-company computer product, and real patient identifiers are never used, instead some random generated sequence is used that can link back to the patient, but this sequence normally only makes sense to the research team. And if an employee has a portable product with patient data, the UMC requires the laptop to be encrypted.

## WORKING ENVIRONMENT

The ARBO policy on the working environment, describes in the "ARBObesluit" details what the working environment should look like. It defines standards like the space that must be available per employee or object, furthermore there are statements about factors that could help lower the risk for RSI, like that desks and chairs must be adjustable. The UMC handles this by having a contract with the manufacturer who passes by over an pre-stated sequence to check chairs and desk to maintain quality. Another important part of the working environment is the





atmosphere among colleagues, there should be no bullying, discrimination, any form of sexual intimidation. These are things that could result in a stressed environment and could break down the quality of the research and the well being of a person. From personal experience there is no form whatsoever that has a negative impact on the atmosphere among colleagues. As mentioned, stress is a really important factor, and with being a researcher this is a silent killer because the level, pace, and pressure that is put on and expected from an employee can be considered heavy. It is important to take regular breaks, discuss problems, talk about problems, and do proper activities during spare time instead of working, for example exercise.

## **CALAMITIES**

The most likely calamity to take place within the UMC is a fire. The government has lined out very strict rules in how the design and to fire proof buildings. There several several actions that can be undertaken to ensure a fire does not break out and that all persons can get out safely. There are fire extinguishers available at multiple locations, and there are lots of smoke detectors which are checked regularly. Exit routes are defined by signs. There are always multiple exit routes from a building. The doorways between buildings are fireproof blast doors which can close automatically in order to prevent the fire from spreading by making sure that there is little air transport. Every department has responders that are trained to deal with these kind of situations and aid in the process of helping people getting safely out of the building. There are also regular fire drills in which these protocols are tested and evaluated. For minor injuries at the workplace, at several points are first aid kits should they be needed, this way responders can help out someone who needs help quickly.





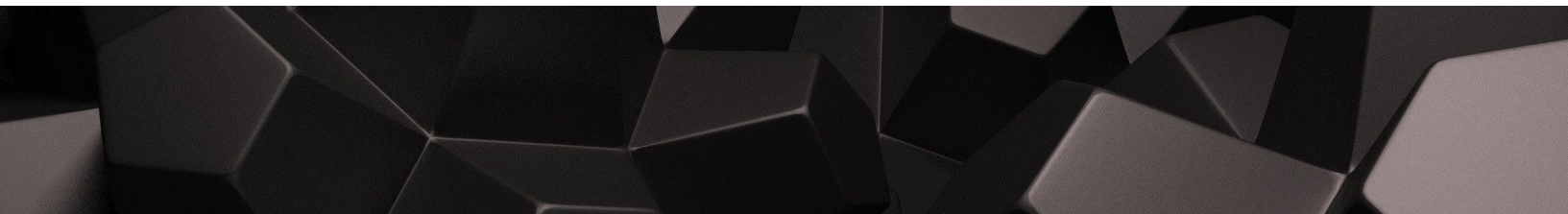
# **RISK ASSESSMENT**

**RSI AND SITTING DOWN**

**STRESS**

**EYESTRAIN**

**CARPAL TUNNEL SYNDROME**



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