

Junior Scientific Masterclass: Additional Science Training for Medical Students

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Introduction

Educating an academic specialist in a scientific setting requires a comprehensive training program. In the Netherlands, the full training of an academic specialist takes on average 12-16 years. An academic specialist by preference should be both a highly qualified physician and scientist (earned a doctorate). In addition, an academic specialist is expected to be flexible, and should have local and international clinical and research experience and contacts. In order to solidly train and exploit the creative capacities of trainees, it is important to start scientific education at an early stage, preferably before graduation. Therefore, the University Medical Center Groningen (UMCG) established the Junior Scientific Masterclass (JSM) Bachelor 'Honors' and MD/PhD programs.

The Bachelor 'Honors' program offers medical students an additional, scientific training program that aims to involve students in clinical research from the start of their studies. The program trains students in the basic scientific skills. Successful completion of the program entitles graduates to the 'Honors degree in Science'.

The MD/PhD program offers medical students a prestigious program combining the final two years of the MSc program with a PhD track. This PhD track enables MSc students to obtain their PhD in less time than a regular PhD track (two additional years instead of the regular four years). Completion of an MD/PhD track is a good start to a successful career as physician-scientist.

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Undergraduate medical training in The Netherlands

In the Netherlands, eight medical schools provide undergraduate medical training. The educational objectives of all these medical curricula conform to the criteria described in the 'Blueprint 2001: training of doctors in the Netherlands' (Metz et al., 2001). Individual medical schools, however, have the freedom to design their own educational program.

The UMCG was among the pioneers of developing and introducing the bachelor-master system in Europe. Since 2004, our medical curriculum consists of a 3-year-bachelor (BSc) and the 3-year-master program (MSc) of 60 European Credits (EC) per year (a total of 360 EC for the whole medical curriculum). Each year around 400 students start their undergraduate medical training in Groningen. Once they have successfully completed their BSc and MSc program, their academic requirements for an MD are complete. However, to be recognized as an MD, they need to register in the BIG-register, a central official register for healthcare professionals in the Netherlands.

Each medical school spends between 40-70 EC on scientific education, of which 20-40 EC (14-27 weeks) is spent on an individual student research project somewhere during year 4-6 (Van Eyk et al, 2010). In our own medical school students spent approximately 60 EC on scientific education spread over year 1-6. In year 6, all students have to complete an individual clinical or basic science project of 30 EC. Students have to submit a research project plan, which is evaluated by a committee before the start of the project, and have to write a final report.

Forty to 70 EC of scientific education is reasonable for the standard medical curriculum. However, for a certain group of students, this was not satisfactory. They needed more challenges, as well as opportunities to participate in research. Therefore, the University Medical Center Groningen (UMCG) established the Junior Scientific Masterclass.

Junior Scientific Masterclass

In 1999 the Junior Scientific Masterclass (JSM) was established by the University Medical Center Groningen, University of Groningen. This program offers medical students a challenging program that aims to involve students in clinical research from the start of their studies. The JSM program has two phases: the Bachelor 'Honors' and the MD/PhD program.

Bachelor 'Honors' program

The Bachelor 'Honors' program, launched in 2006, is an additional, scientific training program that builds on and runs parallel to the regular BSc degree program. The program trains students at an early stage in the basic scientific skills. Successful completion of this special 'Honors' program (a minimum of 30 EC in addition to the 180 EC of the regular BSc degree program) entitles graduates to the 'Honors degree in Science'.

Since the start of the program dozens of students participated in the 'Honors' program each year which is, by principle, open to all medical students. Only a few courses/activities require a selection procedure. This selection is based on motivation, research experience and capacities.

The 'Honors' program includes a comprehensive set of science lectures, courses/activities and research training. The courses/activities are aimed at acquiring laboratory technical skills, knowledge of clinical epidemiology, statistics and critical reading, interpreting and writing scientific articles. In addition, a wide range of specialized courses is offered ('science electives' and 'tailor made courses'). The size of the all activities of the program together is 55-60 EC. This multitude of courses gives students the opportunity to choose courses or activities in their field of interest.

The courses/activities of year 1 aim to introduce students to the importance of science for medical practice. A wide variety of lectures next to a course in efficient literature search are offered in order to introduce students to the ongoing scientific research within the UMCG. First year students are also

stimulated to perform a short individual research project (3 EC) in a discipline of their choice.

The courses/activities of year 2 are a continuation of the introduction and students learn basic research skills and methods. Students are stimulated to find their own discipline of interest and to perform an individual research project (6 EC).

In the final year of the program, year 3, students can acquire more advanced research skills, like scientific writing, medical statistics, clinical epidemiology and project management. In order to acquire the 'Honors degree in Science' a student must perform at least one individual research project of 6 EC.

Individual research projects

An individual research project (6 EC) is an essential part of the 'Honors' program. These research projects are performed by second and third year students, mostly part-time over a period of three to six months. The aim of such a project is for both the student and the researcher/supervisor to find out whether the student is able to conduct a research project (as agreed), has sufficient skills, and is enthusiastic and motivated.

Individual research projects are often the first step towards a MD/PhD project and start with writing a research application and are completed by a scientific report, an assessment and evaluation. When a research project is approved, the student will receive a temporary appointment as a student assistant, funded by the UMCG. The research group receives a small funding to (partially) cover the research costs, while supervision of the student is recognized as an educational effort. The popularity of individual research projects is still growing. Last year alone more than 60 applications were approved (Figure 1).

'Honors degree in Science'

In order to qualify for the 'Honors degree in Science', students must earn at least 30 EC within the Bachelor 'Honors' program. At least 10 EC each must be earned in courses/activities from both the year 2 and year 3 programs. Performing at least one individual research project (6 EC) is obligatory. The BSc program in combination with the 'Honors' program has a study load of at least 210 EC.

Individual research projects (2001 - 2010)

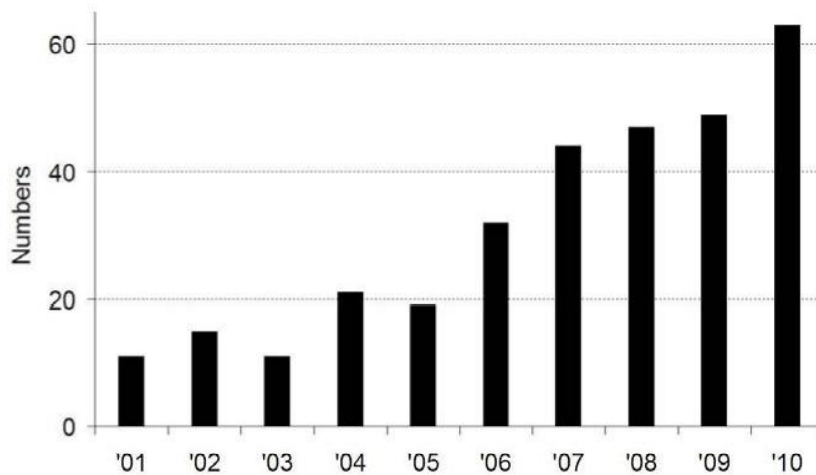


Figure 1: Awarded individual research projects 2001 until 2010.

MD/PhD program

The MD/PhD program is a prestigious program funded by the UMCG combining the final two years of the MSc program with a PhD track. This PhD track enables MSc students to obtain their PhD in less time than a regular PhD track (two additional years instead of the regular four years). Completion of an MD/PhD track is one of the keys to a successful career as a physician-scientist.

An MD/PhD project should be considered as a personal grant. Therefore, the selection procedure for the MD/PhD program is strict. Students have to write an extensive application. In addition, the student must add a manuscript/paper submitted to/published in an international, peer-reviewed journal, registered in PubMed or ISI, of which he/she is first author and which can be used for the thesis.

An independent selection committee of six experienced clinical scientist judges the applications. As part of the application procedure, candidates present their research project to the committee during an interview and they have to defend their application. Writing a scientific paper usually is a big hurdle for students and, is therefore, a good selection criterion.

The MD/PhD program provides students with a faster route to become academic specialists. Candidates in the MD/PhD program are young, which has a number of advantages. They have not settled yet, are energetic and flexible, especially with regard to spending a (research) period abroad. This is especially important given the increasing amount of female medical students who – at some time during their medical career – have to start a family as well. It is gratifying and amazing that so many students master the admission requirements for the MD/PhD program. In recent years, the number of awarded MD/PhD projects varied between fifteen and twenty a year. It is expected that in 2010 the number of granted application will exceed thirty (Figure 2).

Successful MD/PhD students

The MD/PhD program is very popular among medical students in Groningen. Since 2001 more than 160 applications were granted. At first, a considerable amount of scientists and staff members had doubts that MD/PhD projects could lead to a thesis of proper quality, since completing a PhD track combining two years of research (funded by the UMCG) and two years of clerkships seemed an impossible task.

MD/PhD projects (2001 - 2010)

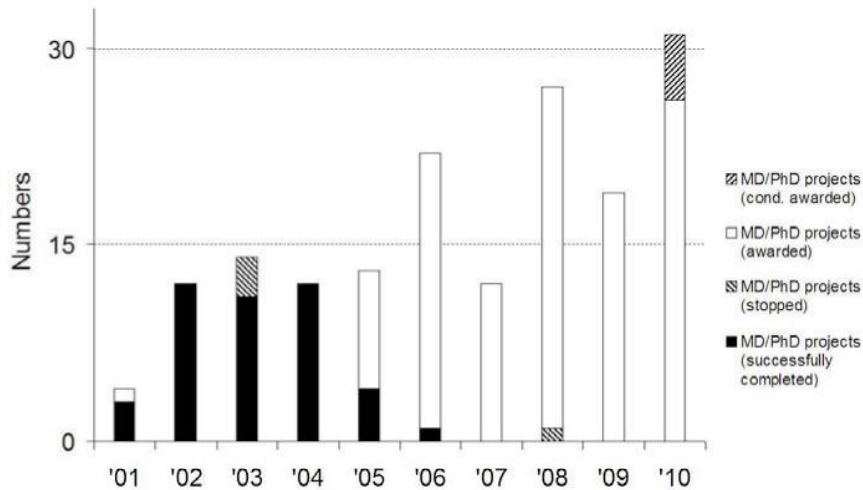


Figure 2: Awarded MD/PhD projects 2001 until 2010. Since 2001 161 projects were awarded, 5 were conditionally awarded, 43 student successfully completed their project, of which 31 students in 2+2-years, and 4 MD/PhD students prematurely ended their project.

However, history has proven that this is definitely possible. Until now, 43 MD/PhD students successfully completed their MD/PhD project of which 31 within the period of two plus two years and the level of their theses was good. An analysis of the first thirty dissertations (n=30) showed that there is no significant difference related to the amount of articles published before the thesis defense between MD/PhD students and a control group of PhD students. Additionally, there was also no significant difference between the average impact factors of the published articles. Until now, only 4 MD/PhD students decided to prematurely end their program.

Mandema-stipendia - training of academic specialist

After completing their undergraduate medical and PhD-training, MD/PhD students usually further their medical education in a specific field of medicine. This specialized training can take up to 6 years. In most cases, however, all research activities of the trainee stops during this training period. Such a disruption is disastrous for building an academic career. To fill the gap between the end of their MD and PhD training, as well as the start of their career as academic specialist, the UMCG established the 'Mandema-stipendia'

The 'Mandema-stipendia' (€ 60.000,- to € 100.000,-) offers young physician-scientists (MD/PhD) the opportunity to combine their specialist training with research in order to establish their own line of research. A maximum of three scholarships are awarded annually.

The requirements to acquire a Mandema-stipendium are substantial. The candidate should be young, should have a PhD, research experience of at least six months abroad, as well as clinical experience outside the region, served a minimum of one year full-time of their specialist training and is able to obtain research funding. In the last three years three applications were granted.

It will take several years before it is evident that programs like the JSM and Mandema-stipendia are successful. The first results however are very encouraging.

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Keywords

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