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’.

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.

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.

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.

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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 then 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.