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### Education and Training for Radiology

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#### The Experience in Germany

##### Author

**Prof. Dr. Berthold B. Wein**

*Associate Professor of the*

*Department of Radiology*

*Medical Centre of the*

*Technical University of*

*Aachen and Private Practice*

*Radiologist,*

*Gemeinschaftspraxis Im*

*Kaupzinerkarree, Aachen*

*To become a radiologist in Germany, several important educational steps must be taken during and after completion of the study of medicine. Knowledge acquisition ranges from basic information during medical study, to practical education in a hospital and finally, to continuing education and special courses after board certification to become a radiological specialist.*

#### Foundation Studies in Medicine

Already during the foundation studies in medicine, several general lessons make students familiar with the physics and methodologies of radiology, coupled with exercises to show the most important exams and their signs for selected diseases. In former times, these lessons were guided by an experienced radiologist and images were adapted to the lessons' topics. Some German universities have now launched a new course of study, where quite early (i.e. in the 3rd semester of the study) students are taught radiology during courses in anatomy and clinical disciplines beside the intrinsic information of that discipline.

In addition, there are courses to make students aware of radiation protection methods. During the last year of study, four months can be spent in a radiology department of a teaching hospital where live practice may be experienced by the student shortly before passing the medical state examination. In some clinical environments, first experiences are also made with interpreting radiological images. Having passed the medical state exam, basic knowledge has been acquired about radiology and its methodologies.

#### Residency: Achieving Board Certification

To achieve board certification as a radiologist, interested physicians must enter a five-year assistantship, mainly performed in a hospital environment but to a limited extent also in a private teaching practice. A one-year assistantship in a clinical discipline is also accepted as a training period. During this time, certain obligations must be fulfilled by the resident, including self-performed exams monitored by an experienced radiologist. With an attestation of his period of education and exams performed, he can apply for board certification which obligates him to pass a 30-minute exam conducted by the Board. This certification permits performance of exams under his own responsibility. Federal Medical Associations are liable for those curricula and exams, which differ for every federal state in Germany and may have different rules for the certification process. However, recent homogenisation efforts are being undertaken to end up with nearly equal education regulations for all federal states all over Germany.

#### Continuing Medical Education

The next step is to apply for a hospital working place or for work in the medical supply system in the compulsory health insurance (CHI) system, which increases familiarity with more complex exams or facilitates specialisation in specific subdomains such as neuroradiology or paediatric radiology, for an additional period of two to three years.

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At the end of that period there will be another board certification that testifies knowledge in the respective subdomain. If the decision is to enter the CHI services, quality assurance measures exist to ask members in the CHI medical supply system to prove continuing medical education (CME) by courses and visits to specialised centres. The CME is assessed by national medical associations via credit points of which 50 per year must be collected. There are some detailed differences between distinct courses, but in general, one point equals one hour of certified and monitored education in a medical topic. Approval is given by the medical associations and they oversee the courses. Normally those courses are paid by participants and no reimbursement is given.

#### **Quality Control in Mammography**

Mammography is one specific field where radiologists must show continuing quality and education. In curative mammography, every two years the radiologist must sit an exam where cases from a mammographic database have to be solved. The exam is conducted by the CHI, supported by the Cooperative Initiative for Mammographic Screening, Germany. Also overseen by the CHI is the quality of mammographies and reports, surveyed by dedicated medical colleagues, assessing images and reports on a random basis from year to year for each association member. Both exams stimulate radiologists to keep a high level of quality. In screening mammography even higher efforts for quality are laid out, including thorough examinations of reading radiologists on a yearly basis, as well as extended observation and supervision of the decisions of those reading radiologists. If the level of quality is lower than a fixed margin, additional courses and teaching materials are implemented.

#### **Conclusion**

Becoming a radiologist in Germany is, for more than 6,000 radiologists, a certified and continuously supervised task. Thorough educational courses allow a continuing medical education and guarantee a high level of skills and knowledge.



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