

# Radiopharmacy

## — overcoming the training barriers

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One-to-one teaching is not always possible in a radiopharmacy where a limited number of practitioners is spread across the globe

Specialist areas of pharmacy often have few practitioners and infrequent training opportunities. This article looks at how an online, virtual-learning community provides a solution to such training issues within the field of radiopharmacy

**O**nline learning is a good solution for a specialist field in which there are relatively few practitioners and infrequent (and often geographically remote) training opportunities. The combination of imaginative learning materials, active support from a tutor and participation within a learning group as well as the wider community, can make self-learning for work a reality. This was the vision of the virtual radiopharmacy consortium (VirRAD) when it started work in February 2002, and the resulting resource provides a virtual-learning community, the platform and principles of which can be applied to any specialist educational field.

### Identifying the challenge

The radiopharmacy community is a rather disparate and widespread group made up of people from many different backgrounds, such as pharmacy, chemistry, nuclear medicine technology, physics, medicine and other professions. As in any specialty, the levels of knowledge varies from those new to the field, such as undergraduates first coming into pharmacy or chemistry, through to people with established careers.

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The diversity of the specialty means that there is a wide range of learning needs. For example, the ability to perform a specific task well requires skill competencies and knowledge on appropriate safety measures. However, an understanding of the theoretical basis for the work is also important in order to perform the task effectively. Increasingly, there is also a need to understand the legal framework within which the work is conducted to ensure compliance with any regulations.

In Europe, we already have a variety of different radiopharmacy programmes. Within the European Association of Nuclear Medicine we set up the European specialisation certificate in radiopharmacy a few years ago and now have a number of courses covering this syllabus in Germany, Switzerland, France and Slovenia. Our colleagues in the US also have a number of courses, particularly certificate courses run by Purdue University and a recently developed online teaching resource at the University of Arkansas in New Mexico.

The problem with the courses that already exist is that they do not adequately meet present training needs. Many places still do not have access to these courses, and many regions have no provision at all. Those people who are able to attend the courses have to pay high fees, travel to wherever the course is being held and pay their accommodation while they are there. During this time they are absent from their work, so they are not available to carry out their normal duties and, therefore, employers are often somewhat reluctant to let them go. Another

important issue is the intensity of the courses. When you take people away from their workplace and gather them together for two weeks, there is an inclination to try and deliver as much material as possible in a short time. From the students' point of view, it is difficult to absorb that information when sitting in front of a lecturer for seven hours a day. There are also language difficulties because we teach the courses mostly in English and many of the students have other native languages.

Another downfall of the present situation is that the provision does not really match the requirements. We referred above to the requirement for learning skill competencies — the courses that we have, although they teach the theoretical basis, do not adequately teach the skill competencies. We need a more efficient way of delivering this material.

Radiopharmacy presents a particular challenge to those wishing to deliver teaching programmes since it is a specialised field with relatively few radiopharmaceutical scientists in any one location. Because these numbers are limited, it is difficult to organise regular, local or even regional training courses on an economically viable basis. The numbers of potential teachers are even smaller and those individuals find themselves increasingly asked to deliver lectures to small numbers of students. There are also recruitment issues as radiopharmacy is a developing and expanding field. There is a need for, in particular, positron emission tomography radiochemists and radiopharmacists, so we should be training more people to work in

these specialties. It is also important to remember that learning does not stop when the student leaves the classroom. Much learning takes place through interaction with colleagues and problem-solving within the workplace. In radiopharmacy there is limited peer contact and, if you have a problem, there is not usually someone just down the corridor who can help. Since there is limited local expertise, radiopharmacists need to find assistance from outside.

### — Addressing the problems

There were several aims in developing VirRAD. We hoped that it would provide a system of peer-to-peer communication for its users, so that if anyone had a problem and needed help, there would be somebody to turn to. There would also be learner-to-expert communication, so that students could have easy access to teachers, and also person-to-community communications, so that people would feel a part of a global team. We wanted VirRAD to provide a system enabling access to broad multimedia learning material, including simulations and virtual reality. This would provide useful support for people running external teaching programmes so they would not necessarily need to pay for many experts to gather in one place to provide the teaching, and would also provide support for the self-learning needed for continuing professional development. Our intentions were for VirRAD to form an electronic depository and resource for relevant technical information which would support not only learning but the routine day-to-day activities that people in radiopharmacy undertake.

The delivery of VirRAD through the internet should provide a universal resource, not just for those working in radiopharmacy specifically, but also people working in other areas of nuclear medicine and related fields. Our first aim was to make radiopharmacy training more accessible so that people could learn at any time and in any place, ensuring that wherever people live around the world they have access to the same level of learning. In order to make it more effective than the teaching we have at the moment we hoped to make it less intensive and more pro-active. Students would become more involved in the learning process, thereby making it more fun and useful. We also recognised that it is important that the learning remains a shared experience. One of the big advantages of classroom teaching over distance learning is the fact that it brings everybody together and people can share in the learning process. The challenge is making sure that when the student is sitting on their own in front of a computer, they do not feel alone, but still feel part of a learning community.

An international consortium was established to run the VirRAD project. This



Figure 1: Screenshot of the VirRAD homepage



Figure 2: Screenshot from the training section of the website

included people with a radiopharmacy background from the UK, Belgium, Portugal, US and Canada, and also those with expertise in education (from University of Lancaster), web and multimedia design (FH Joanneum, Graz, Austria) and virtual reality (CTI, Patras, Greece). To support the venture, we obtained a grant of €3m from the European Commission at the beginning of 2002. This grant was to run for three years and concluded in March this year. The system which can now be seen on the world wide web is the result of several iterations which were published and evaluated by a panel of twelve individuals who had experience in a broad range of radiopharmacy and nuclear medicine activities. Space does not allow a detailed description of all the features that have been incorporated, or of the process in which they were developed, but anyone interested can view these by accessing the site ([www.virrad.com](http://www.virrad.com)) and registering to join the VirRAD community.

The VirRAD platform is divided into three independent but linked modules:

- The virtual learning community
- A multimedia learning resource containing the course ware
- The virtual radiopharmacy laboratory

Screenshots from the website are shown in Figure 1 and 2. After an initial registration process, each user is given their own personal home page where they can provide some information about themselves including a photograph. This allows other users to find out something about the other members of the community and also helps to personalise the communications that take place.

### — Communication

Once logged in, the user can access the community module which provides access to a collection of communication tools. The aim was to try and reproduce the different types of communication that take place in a real classroom, so there are possibilities for communication between students, between students and teachers,

and between individuals and the community as a whole. The forums are the core of the system where users can pose questions or raise ideas on any issue whether it be scientific, professional or social. Other features in the community module include pages highlighting recent items, forthcoming events such as courses and conferences, links to other useful web pages and a glossary of specialised terms sometimes used in radiopharmacy. There is also a database of radiopharmaceutical adverse events and an electronic library where people can upload or download useful documents. All of these features allow any registered user of the system to contribute to the information available. If someone wants to advertise a course, post an item of news or suggest a new specialised glossary term, then there is a facility for doing so.

### — Learning

The VirRAD multimedia course ware was developed according to “mindful learning” guidelines, which include incorporating a variety of media including video, text, diagrams and animations into the resources. We hope that by using a variety of different types of multimedia to provide the learning material, it will ensure sufficient novelty within the learning situation to engage the

students’ interest and give learners the opportunity to use the course in a flexible manner. This should allow them to develop “learning to learn” skills and promote autonomous learning. Links are provided to a set of videos which show the practical procedures undertaken in the radiopharmacy. The menu allows students to follow a logical sequence of conventional, linked HTML pages while the “learn more” links allow them to select topics that take their interest. As well as the course ware itself, we have developed a user-friendly system that will allow teachers (with some editorial approval) to put additional course ware onto the VirRAD platform.

### — Virtual radiopharmacy

The final module of VirRAD is the virtual radiopharmacy laboratory (3D-Lab) where people can try and get some hands-on experience to get an idea of what goes on in a radiopharmacy. This allows the student to put into “virtual” practice the theory they learn from the videos and other resources provided. In the 3D-Lab, students undertake all the tasks that are performed in a real radiopharmacy such as eluting generators, preparing kits, dispensing doses, performing quality control, etc. Students can either enter the laboratory alone or can do so together

with a teacher and up to five other students in order to follow demonstrations of the procedures.

### — Future

Although the period of funding by the European Commission has now come to an end, VirRAD continues to function thanks to the support of the original project consortium. It is not clear how long this situation can continue without a sustained source of funding to ensure that the site can be maintained and further developed. However, for the time being, VirRAD remains a useful and well-used resource for the global radiopharmacy community. Users are continuing to join and post messages in the forums on a regular basis. The course ware modules are being used for teaching in several universities. The virtual reality laboratory provides an ideal environment where students can learn the skills and competencies required in a radiopharmacy without the need for specialised facilities and exposure to potentially hazardous ionising radiation. If you are interested in finding out more about the platform then VirRAD encourages you to access the site and join the 900 members that make up the worldwide virtual radiopharmacy community.