

# Michael Baumann: the dynamo of Dresden

→ Marc Beishon

Michael Baumann went into radiation oncology because it has all the biological interest of medical oncology with added technical excitement. He claims the new targeted therapies will only come into their own when combined with radiotherapy, and last year he cofounded OncoRay, a state-of-the-art research facility, to help find out how this can best be done.

Last October, dignitaries flocked to Dresden to witness the reconsecration of the Frauenkirche, the great church reduced to rubble in World War Two, and rebuilt remarkably quickly after the reunification of East and West Germany. Meanwhile, another project was taking shape that is far from a reconstruction of the past – a new medical school at the city’s University of Technology, the youngest and possibly the most progressive school in the country.

After reunification, federal funds poured into the old East Germany for many such projects – and attracted professionals such as radiation oncologist Michael Baumann, who in 1995 seized the opportunity to help carve out a new interdisciplinary cancer centre at the Carl Gustav Carus medical faculty and university hospital. Fast-forward 10 years, and he’s now a director of the centre, professor of radiation oncology and has recently taken on the presidency of ESTRO, the European Society for Therapeutic Radiology and Oncology.

Both Baumann and the work he’s set up in Dresden – including for example a new research facility called OncoRay – are becoming important markers in the European cancer community, and especially in radiation oncology – a specialty that despite its long history of effectiveness has suffered from lack of recognition and investment. While Baumann hammers home time and again the absolute imperative for all specialties to work far more closely together, there’s no doubt that he’s a champion of the radiation oncologists’ cause through long-standing involvement in ESTRO’s education and training committee, and a forensic knowledge of the key role of radiotherapy in cutting-edge cancer research.

“I believe radiotherapy is the optimal environment to bring in new molecular targeted substances, which are far from being curative themselves,” he says. “We can prove that radiotherapy is extremely effective in eliminating cancer cells. If we fail, a recurrence could be down to just a few surviving cells – that’s all. The combination of a weak biological agent and a



At the opening of the OncoRay Centre, Dresden, June 2005. Baumann is a founding father of this state-of-the-art radiation research facility, which does pioneering work on molecular and biological imaging and targeting

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very strong local modality in radiotherapy is very promising.”

Radiotherapy, he adds, is also the most cost effective of all treatments, borne out for example in a recent ESTRO study called QUARTS (Quantification of Radiation Therapy Infrastructure and Staffing needs – see also *Cancer World* 9, October 2005). “That should convince anyone to invest – but they’re not doing it,” says Baumann, who points to a wide diversity in radiotherapy provision and practice across Europe.

The cost of the machinery, competing demands on health service budgets, and the trend to make short-term purchasing decisions are clear factors that contribute to this ‘blind spot’ about radiotherapy, comments Baumann. But it also suffers from a poor image among the public and politicians – especially in countries such as Germany, where there is a strong anti-nuclear power lobby that muddies the waters when it comes to discriminating between ‘good’ and ‘bad’ radiation.

All this can also feed back into the education system and deter young doctors and other scientists from pursuing a career in radiation oncology and related topics such as radiobiology and radiation physics. In Baumann’s case, as in many others who get turned on to a particular specialty, it was by chance that he found himself inspired by a good teacher of radiobiology at an early stage at medical school in Hamburg.

“I wanted to do medicine because it combines biology and social science, and it has a strong component of interaction with people – although I could also have been an historian, and I’m still very interested in history.” At medical school, Baumann opted early on to combine science and research in his training and to become a ‘doctor’ (in Germany, those who train only as physicians are plain ‘mister’).

“What really stimulated me about radiobiol-

ogy was not the radiation protection side but its application to cancer research. At Hamburg, the radiation biology lab was already working on tumour models directly related to cancer – whole tumours, not single cells – and bringing these complex tumour models into a clinical setting. They were doing fractionated radiotherapy [breaking up the total dose into many shorter sessions], for example, and it was very easy to explain to students why it had a direct impact on clinical practice.” The scene was also set for work on perfusion, hypoxia and imaging, although molecular targeting was not yet on the table.

Apart from the facts about radiotherapy – that for example 50% of patients cured of cancer have a radiotherapy component (a figure that is rising) – Baumann found it more diverse than medical oncology as a specialism. “You have the same biological principles relevant to medical oncology, but also all the technical issues such as imaging, and the possibility of not only administering drugs intravenously and over different times, but also to shape your agent by local or spatial means. It’s a fascinating way of treating cancer – you have to know as much about your patients as a medical oncologist, but those extra technological aspects are turning out to have a real resonance today.”

In Germany, as in several other countries, radiation oncologists also administer chemotherapy in conjunction with radiotherapy, but the term ‘clinical oncologist’ is not used – which does add to the problem of knowing who does what around Europe, comments Baumann.

As a specialty, radiation oncology is not very visible in many medical schools, he feels. “It’s not taught at some schools – students may just be shown a linac [linear accelerator], which is hardly very interesting.” Needless to say, at Dresden there’s an interdisciplinary oncology course in the medical school that lasts eight weeks.

Baumann's interest in research at Hamburg saw him leave for a two-year laboratory spell at Harvard Medical School almost immediately after graduating and before he started work as a radiation oncology resident at the Hamburg-Eppendorf University Hospital. It's a path well trodden by many high flyers featured in *Cancer World* – as Baumann reiterates, it's very hard to build even a small research interest while working long hours in the clinic if you don't have the grounding in setting up lab projects, writing papers and obtaining grants.

It's also a great opportunity to make career-long contacts – it's no surprise that Baumann cites as his key mentors not only his Hamburg thesis supervisors but also radiation oncology luminary Herman Suit, who is now officially retired from Harvard and Massachusetts General but who continues to impress with a 'can do' attitude and ability to get projects moving.

Commenting on the strengths of the US, he notes that some European centres are actually ahead of America in the use of certain clinical techniques, such as Heidelberg with ion therapy. Regarding possible controversies in the use of radiotherapy, for example the different application in rectal cancer in various countries, he considers that historical treatment regimens and strengths are often key factors. Germany, for example, has a track record in highly skilled head and neck surgery, which means less radiotherapy is used for these tumours than in the US and elsewhere.

In many cases, he adds, there just aren't enough data to make hard and fast judgements on the increasingly complicated treatment options, and he points to the increasing availability of European cancer statistics as a good first step in highlighting the wide variations in outcomes among countries, which will hopefully fuel more large-scale trials.



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What Baumann is certain about is the need for all specialties to have the best grounding and up-to-date knowledge in their fields. This became apparent in his specialty during his residency at the University Hospital in Hamburg, in the early 1990s, when a serious problem came to light regarding late damage to a large number of patients who had received radiotherapy at that hospital during the 1980s. Baumann says the problems, which mainly affected patients treated for prostate and rectal cancer, were largely the result of a lack of clinical radiobiology understanding, and the whole episode had a profound effect on him.

“It brought home to me that radiation oncology is a very specialised field and you need a very sound education to be a good clinician,

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particularly if you are applying new treatments. I also learnt that to make changes in clinical practice you must do them in formal study settings, and most importantly you need good follow-up of patients who are treated with anything other than completely standard therapy.”

As Baumann adds, late damage is unique to radiotherapy – or at least we don’t know yet of very-long-term effects of chemotherapy. Since the Hamburg incident, all radiation oncology treatment has to be followed up in Germany – possibly the only country with such a requirement, he reckons.

Meanwhile he completed his residency at Hamburg while also running an experimental radiotherapy lab, where among the hot topics was modified fractionation, later to appear in clinical practice. It was there that he laid the groundwork for his present clinical specialties: treatment of head and neck, lung and sarcoma. Then – it being usual to move on in German career progression – Baumann chose to move to Dresden, although the problems at Hamburg gave added impetus.

“I did have several options, including mov-

ing abroad. But it was clear there was going to be a boost to science and medicine in the old East Germany and there were plans to really put Dresden on the map with support for academic research.” Dresden is also a nice city, he adds, and his wife Bettina, a nuclear medicine specialist, had already moved there in advance.

It’s certainly the case that Dresden’s medical faculty has picked up a reputation for being rather less stuffy than the more traditional institutions in Germany, with younger senior staff (Baumann arrived aged just 33), and a progressive attitude. “Dresden’s medical faculty has been ranked as the most dynamic in Germany,” he says (and the medical faculty’s dean has been quoted as saying, “Our main principle is to make unconventional things happen.”).

There are two paths that the medical school is pioneering in general. One is a change to problem-based learning for students, an approach developed in partnership with Harvard Medical School. The idea is to give students far more work to do on their own initiative rather than passively attending lots of traditional lectures. As Baumann explains, they are set problems such as ‘theoretical’ patients presenting with certain symptoms, and have to spend time researching and discussing the implications in small tutor groups.

“Now I don’t have enough lecture slots to teach a systematic approach to radiotherapy – I can only give a couple of examples. At first we were worried that students would be less good at their exams – which are common to all German students – but they have been much better than average.”

The upshot is that students are more tuned in to both clinical bedside issues and research. Indeed, Baumann says that, increasingly, real patient data will be introduced to a model that is actually more radical at present than Harvard’s. “But you still need some systematic lectures,

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and we'll be putting more in as the curriculum develops," he adds. Academic staff are also trained in the new approach – “It's not usual for us to receive teacher training,” he says.

The other trend is to fast track the right students into research, especially clinical research, and to help young doctors avoid the conflict between training and research that is as acute in Germany as in other countries, according to Baumann. The idea is to give doctors the kind of break that he enjoyed at Harvard – time out in the lab at an early stage, either at Dresden or abroad, and either for long spells or for, say, one week in every four.

There is also a strong emphasis on building up opportunities for translational research through close-knit interdisciplinary working, which Baumann says is critical to the success of the clinical side of the cancer centre.

For Baumann's work, early success in bringing in grants for experimental radiotherapy and radiation biology have led, 10 years later, to Dresden being one of the world leaders in pre-clinical testing of new radiotherapy approaches. “That's true for normal tissue research, run by a colleague, and tumour research, run by my group,” he says. The approaches include modified fractionation, identifying mechanisms of resistance to radiotherapy, testing molecular targeted substances in combination with radiotherapy, and developing imaging modalities. “Hopefully in a couple of years we'll be able to stratify patients for particular treatments,” he says.

One of the recent highlights for Baumann has been the establishment last year of the OncoRay centre – a snappy title that helped raise the visibility of its work from the start, he feels (its full title translates as Centre for Innovation Competence for Radiation Research in Oncology). This is one of six such federally funded science centres. It has several research

programmes in train on the core topics of molecular and biological imaging and targeting, with state-of-the-art equipment in place, enabling the combined use of CT and PET (positron emission tomography), and four-dimensional techniques – moving radiotherapy through space and time. OncoRay is seeded with funding of some 12 million euros for five years, after which its results may enable it to become self-funding.

Baumann adds that other oncology research specialities are also strong in Dresden – he mentions a medical oncology colleague who has recently obtained a grant for stem cell work in conjunction with a branch of the Max Planck Institute in the city.

Much has gone according to plan in Baumann's research aims. The hard work to gain visibility in the early years has definitely paid off with large-scale funding today. However, there was one huge setback – a flood in 2002, when the river Elbe burst its banks and the basement labs in the hospital grounds were inundated. “It took about a year to set it up again,” he says. “There was a lot of sympathy from funding agencies – but that only goes so far.”

Baumann is also very happy with the way the cancer centre and clinical work has developed. He's currently director of the university cancer centre, a position that rotates among the oncology specialties so that no one feels their department is less valuable. A system of interdisciplinary tumour boards is in place, meeting at least three times a week to plan treatment. “Our feeling is that we should provide a service before treatment and even before diagnostic procedures – we have joint guidelines on how to proceed, so it doesn't matter who sees a patient first.”

Such multidisciplinary working has, however, come fairly late to Germany, he adds, but all academic centres are going in this direction in



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the country. However, the psychological barriers and competition between specialties are tough to break down. As he says, a prostate cancer patient should have equal access to both a urology surgeon and a radiation oncologist to make a decision about a choice of effective treatments. “It should be a European right to talk to both – but it’s not European fact. Competition is only good if you talk about it and put forward the arguments. Quality for a department is often defined by quantity – say the number of surgical procedures performed – and that’s not always medically driven.”

A big obstacle is also the resources needed

to run a multidisciplinary centre “We don’t get any extra funds at Dresden to provide the service – it needs time and personnel – but our patient surveys show how popular it is. Budget-holders must provide money for such services.”

As he says, there is only one chance to get things right in curative settings, and so many things that can go wrong, including on the palliative side. He adds that, with studies showing that current best practice would lead to an overall survival gain of at least 10% even in developed countries, he is keen to take the messages to the wider platforms of ESTRO and FECS (Federation of European Cancer Societies).

As president of ESTRO, there are pressing investment and image concerns about radiotherapy to address. The recent enlargement of the European Union, in particular, has exposed a wide variability in radiotherapy provision – not surprising, when you consider the costs of linacs, radiation protection buildings and imaging facilities, and competing demands for other machinery such as MRI scanners. “Most health-care budgets are too short term – a linac needs to be costed over 10 years or so,” says Baumann.

The lobby for radiotherapy is much weaker than the drugs lobby, he adds, and equipment makers have relatively little clout compared with their pharma counterparts. Outdated equipment is a real problem, given the advances in imaging, planning software and dosimetry kit.

Personnel is another issue – apart from a shortage of radiation oncologists in some countries, Baumann points out that radiotherapy is always inter-disciplinary in itself, “We can’t afford the shortage in radiation physicists either.” He warns too of a trend towards having too many small centres – which is the case in Germany. One linac and a very low number of radiation oncologists simply can’t provide good specialist care for curative treatment, he says.

But he picks out the image and importance

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of radiotherapy as probably the key issue, and says there is a lot of excitement when he discusses in lectures the very promising pathways for combined radio- and molecular-targeted chemotherapy.

His priorities for his two-year ESTRO presidency are to expand the society to properly cover all European countries, and to build up the education and training work further (ESTRO has made good progress in establishing Europe-wide training records to aid professional mobility, for example).

He sees no contradiction between promoting radiation oncology as a strong specialty and improved interdisciplinary organ-based subspecialisation envisaged by FECS. If anything, discipline-based specialism will only increase as branches of oncology become more complex, and there's no way that ESTRO is going to stop arguing the case for, say, more linacs per head of population. What's needed at a higher level, he feels, are clear aims before any discussion of structure takes place, given the premise that there can only be a set of strong specialties in oncology.

"The question of whether we need a federation or a single society is not too interesting for me – we should first define aims, which I feel should include providing a good lobbying instrument for patients, good conferences and fostering oncology research at all levels." The aims he has in mind are really a scaling-up of the kind of inclusive, interdisciplinary cancer centre work he's involved in at Dresden. Good PR and 'branding', and concerted efforts to make the general population more aware of treatment alternatives, should also be cultivated at European level, he says.

That said, "I feel though that a federation could work well, and we should look at why FECS doesn't appear at the moment to be the unambiguous voice of oncology."

To some extent the debate will be shaped by both medical and technological progress, and radiation oncologists have no shortage of exciting tools either in action now or on the horizon. All important, as Baumann restates, is molecular targeting, either protecting normal tissues or for sensitisation of tumours, by integrating radiotherapy with molecular targets. Biological imaging using PET and MRI "will offer a host of information on how tumours are reacting" and is clearly a major step up from conventional anatomical imaging.

IMRT (intensity modulated radiation therapy) is also now in play, while more equipment such as proton and ion machines might be worthwhile, although some commentators are sceptical about possible gains. "The investment is huge – but that can't be an argument not to do it. For specialised indications – such as for children – reducing the volume of irradiated tissues say at the base of the skull is clearly advantageous."

Baumann doesn't have 100 million euros for an ion machine in the OncoRay unit at present, but few would bet against the Dresden team's ability to come up with the grants. In any case, he's keeping an eye on other possible routes, such as laser technology, which is developing apace (and for which the last Nobel prize in physics was awarded).

At home, Baumann likes to get away from work – classical music including opera is among his interests, as are reading history, biographies and mystery novels. He has no plans to move from Dresden but doesn't rule anything out.

At work, he says his team works on close personal terms – but he considers himself to be a demanding boss. "I see nothing wrong with that. If you don't move you are dead." The whole set up brings to mind the name, if not the current performance, of another feature of the city – its football team, Dynamo Dresden.

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