第５編

第１回
がん生涯教育センター国際シンポジウム
「New Era of Cancer Education」
（がん教育について考える）
内　容

1. 概　要

1-1　名　称

第 1 回がん生涯教育センター国際シンポジウム　「New Era of Cancer Education（がん教育について考える）」

http://www.juntendo.ac.jp/graduate/laboratory/labo/cancer/lecture/l_07.html

1-2　日時、場所、対象

開催日時：　2 月 20 日(水)　14：30～17：30
開催場所：　順天堂大学　本郷キャンパス　10 号館 1 階 105 カンファレンスルーム
参加対象：　がん医療に興味ある医師・看護師・薬剤師・医学物理学士・学生等

1-3　内　容

14:30	Opening Remarks 木南英紀　順天堂大学大学院医学研究科長
14:35	Guest Speaker: Janis Apted, M.L.S. "Mentoring:A Key to Success in Medicine and Research"
15:10	Guest Speaker: David P. Ryan, M.D. "The Education of Medical Oncologists at Massachusetts General Hospital"
15:45	Guest Speaker: Ritsuko Komaki, M.D. "How to Educate Radiation Oncologists"
16:20	Guest Speaker: Faiz M Khan, Ph.D. "Medical Physicist:Roles, Responsibility, and Education"
16:55	Panel Discussion
17:25	Closing Remarks 樋野興夫　順天堂大学医学部病理・腫瘍学講座教授 "Formative Force of the New Era"

❶ Guest Speaker の紹介

Janis Apted
(M.L.S. Executive Director, Faculty Development, University of Texas, M.D. Anderson Cancer Center)
Ritsuko Komaki
(Professor, Radiation Oncology, University of Texas, M.D. Anderson Cancer Center)
David Ryan
(Clinical Director, Tucker Gosnell Center for Gastrointestinal Cancers, Massachusetts General Hospital Cancer Center)
Faiz M. Khan
(Professor Emeritus, Department of Radiation Oncology, University of Minnesota, Medical School)

1-4　主催、後援

主催：順天堂大学　がん生涯教育センター

後援：順天堂大学、新潟大学、東京理科大学、明治薬科大学、立教大学

1-5　参加者の概要

参加者：71 名

事前申込者：25 名　（欠席 2 名）

当日参加者：46 名

1-6　アンケート回答数

アンケート回収：42 名分

2. Opening Remarks
（木南英紀　順天堂大学大学院医学研究科長）

Good afternoon, ladies and gentlemen.

It is a great pleasure to welcome all of you to the first symposium of the Center for Lifetime Cancer Education.

First, I would like to thank the four speakers who have traveled a far distance and taken their valuable time from their busy schedules to attend this symposium. Your interest and effort have helped us to make this symposium possible.

To the participants gathered here, I would like to present a brief background on the purpose of this symposium with a few slides.

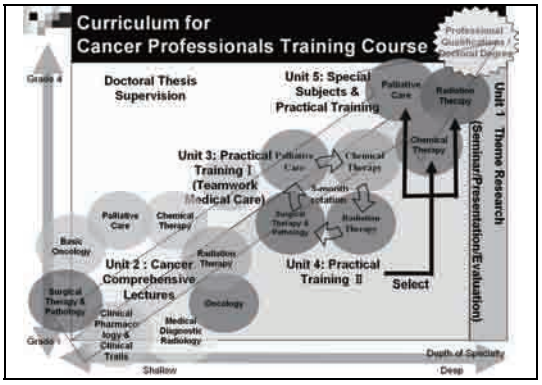
Last year, MEXT, the Ministry of Education, Sports, Science and Technology of Japan, announced support of the “Human Resource Development Plan for Cancer 2007,” with the objectives shown here.

Although mortality rate from cancer is the highest among all diseases in our country, there is a national shortage of specialists who can deliver holistic and multidisciplinary cancer treatment. Developing these qualities and abilities in cancer professionals is urgently needed.

The plan supports outstanding programs that train and educate a variety of skillful cancer professionals such as doctors, pharmacists, nurses, and other medical engineers.

The plan aims to promote the vitalization of academic education and the training of sophisticated cancer experts.

After keen competition, our program, The Foundation of the Center for Lifetime Cancer Education, was selected as the next project. This program is going to enable us to educate cancer specialists from a consortium of five universities, including Juntendo University, Niigata University, Tokyo University of Science, Meiji Pharmaceutical University, and Rikkyo University, in collaborating with five representative cancer hospitals in Japan.



This is the curriculum for the training course of our program.

Let me talk about the details later. I would like to ask you to come back to these slides after the lectures and we will discuss more then.

There are the goals and objectives for establishment of our Center for Lifetime Cancer Education.

The first is to develop a practicaleducation /research center for training core members of a high-quality “Cancer Medical Team.”

The second is to re-educate medical experts to keep up with rapidly advancing cancer medical care.

The third is to strengthen local medical centers that can offer superior medical treatment.

The last is to provide greater opportunities for interaction with patients, local residents and citizens.

We held a symposium in October last year to discuss the last four objectives and over 250 people gathered here, at the Ariyama Halls of our university.

So we look forward to hearing the four speakers' experiences, theories and new developments in cancer education and hope that in total it will prove informative, interesting and useful.

OK, now we would like to start the Symposium.

Thank you very much.

3. Mentoring:A Key to Success in Medicine and Research
（Guest Speaker: Janis Apted, M.L.S.）

Ms. Saito, Associate Professor (speaker introduction)：
We are very glad to invite a professional person on faculty development and training advising like you. We seldom have the chance to learn how to teach the younger generation as well as the chance to learn communication skills between colleagues and leadership, so it's a very good opportunity to learn how to do this especially from someone at the M.D. Anderson Cancer Center in the United States.
So please go ahead.

I wanted to tell you a little bit about M.D. Anderson at first to give you a background, an idea, of the size of our institution and what we do. This is a major research and clinical care institution in the United States. We go back and forth with Memorial Sloan-Kettering in New York City with being number one in the country in terms of research and clinical care in cancer.

We have a staff of 17,000, which includes 1,300 full-time faculty. And we have about 40% of our faculty doing basic research science and 60% doing clinical care. Many of our clinicians are also active researchers; in fact, they are required to be researchers.

M.D. Anderson sees about 79,000 patients a year, including 27,000 new patients. We have 11,000 patients per year participating in clinical trials; 521 hospital beds; 927,000 outpatient visits in 2006; total research funding is about $410 million; our budget is about $2.5 billion; and we have over 65 nationalities working at M.D. Anderson and that kind of diversity amongst the patients, too. I think that kind of diversity is probably typical of most big academic health centers in the United States.

M.D. Anderson has invested a lot of money into faculty development. We feel it's a commitment. We hire in very, very top talent – the best clinicians, the best scientists, as does Massachusetts General Hospital, as do the top institutions in the United States. They are an investment. We don't want them to fail at their work. We don't pick mediocre scientists and we don't pick mediocre clinicians. We pick the best. But we also know that because they are a good scientist or a good clinician, does not mean that they will be a successful academic. There are a lot more skills involved in being academicians than purely the science or purely the clinical work.

Faculty development offers about 60 to 70 programs a year, and we cover a variety of topics. I will show you in a minute the kinds of programs we offer. We now have a full-time staff of 11, which includes two faculty.

Right now we offer a full-time "Faculty Leadership Academy" that is by invitation only. So, faculty who show a talent for leadership or who are going into being chairs of departments or section heads are invited into a full year-long program on

leadership skills. This is not a mini-Masters in Business Administration type of program. We did two of those and they failed. What we really needed was a program that had looked at interpersonal skills and helped our faculty and leaders develop interpersonal skills so they could run these complex teams. So, this year-long program focuses very much on who you think you are as a leader and what it is that you think you need to be developing interpersonally.

It's been such a successful program and it's in its sixth year now; but we have a small two-day program called the "Heart of Leadership Program", which is for junior faculty. Early-career faculty coming into M.D. Anderson go into this two-day program which looks at collaboration, competition, teamwork and interpersonal skills.

We also have a graduates program for everybody who has been through the Faculty Leadership Academy. There are advanced topics in leadership and we do those two to three times a year.

And we have a "Junior Faculty Development Program," which we have just started that is for all new early-career faculty and it is mandatory.

We have a full teaching skills program; although we are not a medical school, we do a lot of teaching. We have collaboration with the University of Texas Medical School across the street, also with Baylor College of Medicine. So, a lot of teaching goes on in M.D. Anderson of clinical fellows, interns, and residents.

We have a full faculty health program, which addresses things like work-life balance, stress, how to identify clinicians or researchers who are getting to the point of being impaired (drug addiction or alcohol abuse or whatever). And I've been listening to some of you about your hours. We would be very concerned about people who work as hard as you do. And I'm going to say some more about that, because really tired clinicians make mistakes. And if you burn them out in the first 10 or 15 years, you're not going to have that investment available for 20 or 25 years. So, I'll say more about that later.

We have an organizing skills program. Believe it or not we have someone on staff that will go into your office and help you to organize your files, your PDA, your computer desktop, and do time management with you and your assistant. The reason we have kept that person on board is our studies have indicated that faculty productivity has gone way up because of her help. And a lot of faculty get paralyzed just from overwork and can't dig themselves out of those piles of work and all the email that keeps flooding in.

And we have a new Faculty Mentoring Initiative, which is why I am here to talk to you.

All right, how did we get so interested in mentoring?

For one thing, there was some disappoint on the part of the senior faculty with the progress of more junior faculty. We had invested a lot of money in programs called, for instance, the "Trust Fellows," which is a select elite group of junior faculty who were recruited in to be the best scientist in the world and we were hoping they would be award winners, like Howard Hughes Medical Institute award winners. Much to our dismay, they didn't turn out to be award winners. And in looking at what had happened, and at looking at some of our other faculty, we realized they weren't getting the personal attention they needed to succeed.

We looked at mentoring across the United States. Mentoring is becoming a huge initiative in academic health centers because they, like M.D.

Anderson, are investing a lot of money into these people and we cannot afford to have them have mediocre careers.

The National Science Foundation has recently required that mentoring for post-docs be documented in order to receive funding. So, that's really motivated a lot of centers to look at mentoring. And the Howard Hughes Medical Institute requires researches to prove successful mentoring, not just good intentions, to qualify for funding.

Now why is mentoring important?

For one thing, medicine and research science are enormously complex enterprises. This is not like 30 or 40 years ago. I've been working for 35 years. When I started in medicine, you could afford to have a few years where you were kind of finding your feet. Or a few years where you didn't quite get the grants you needed. The money was there and you were subsidized. It isn't that way anymore. We can't afford to have young people come in and not get a quick start to their careers. And much of what they need to learn is the implicit knowledge that more senior people have. And I don't mean just senior, high-level faculty. Because senior, high-level faculty can be out-of-touch with the most junior faculty. Sometimes it takes just faculty members 2 or 3 years ahead who can say, "Don't make this mistake," "Go to this physician for help," "Go to this scientist for help," or "Talk to Janis Apted in Faculty Development," or "Go see the ombudsman program" who can help them avoid making those critical mistakes that can derail careers.

The route to success is not easy. There are a lot of unwritten rules. The attitude on the part of some of our senior faculty is "I got here the hard way. You can get here the hard way." And that just doesn't work.

We also know, and this is a quote from one of the senior researchers who is a brilliant mentor, that new faculty need a "massive amount of help to be successful." He treats every new faculty member as though they are a student. He walks them through the basics of how to think like a scientist, and how to take that science and translate it into clinical applications. So, he has saved the careers of a number of people who have been since switched from their departments into his department because he knows how to mentor and groom scientist and good scientific thinkers.

What is needed for success now is far beyond technical. It includes interpersonal skills, later on administrative skills, obviously research and leadership skills.

Competition for funds is fierce. We have senior faculty now who are not getting their grants renewed. We have a lab whose whole existence is threatened because their big grant wasn't renewed and they are just starting to show success, so we are providing bridge funding. It's a very difficult time in the States in terms of money for science and research. A lot of it has gone to the Iraq War and has been siphoned out of research.

Turn over costs of a scientist can be anywhere from $500,000 to $2 million. This is a huge investment. Academic faculty who are not fully engaged in their work are not as productive as we would like them to be and many of our faculty on the junior levels have told us they feel isolated and they feel, even though they are top students coming out of top institutions, they are afraid. They are afraid of not being as smart as the next guy.

And there are growing generational differences. I don't know if you have this in Japan or not. But the younger people coming into M.D. Anderson are

concerned about work/life balance. I just had a class of 52 early-career faculty assistant professors and all 52 said their major challenge, their major concern was work/life balance and having time for families. This is very different. You know, it used to be, especially for people our age, that you got into work and you worked, worked, worked. They don't want to do that anymore. They don't want to work 100 or 120 hours a week. They don't want your lives. They want other lives that are fuller. They've had many more opportunities. Dr. Ryan has his son here. This boy is traveling. They are getting out in the world; they're seeing things; they're doing things. They don't want to work 120 hours a week. And I'll bet you don't either if you are really honest!

Multidisciplinary team work requires a heck of a lot of emotional intelligence. We are doing a lot of multidisciplinary teamwork. You need honest, candid feedback on how to be effective in a team.

Our patients come from all over the world. They represent a dizzying array of ethnic and cultural groups and that makes delivering care very challenging.

I have to say that academic medicine is becoming less attractive to clinicians and scientists. A good colleague of mine who is running the Faculty Affairs department at Indiana School of Medicine recently told me that he asked his clinical fellows, a big class of clinical fellows, "How many of you are going into academic medicine?" Not one. Not one was going into academic medicine. They can make a lot more money in private practice. So what can academic medicine do to attract the best and to keep them?

Now, you can quickly look at these slides. I've given you some indication as to who is doing mentoring at other institutions.

This is a big deal. A lot of institutions are looking at mentoring, Vanderbilt University School of Medicine, for instance. In your offer letter, you get the names of three mentors who will be your team of mentors. And they will take you from wherever you are in your career today, to your next level of success.

So, if you come in with a 'KO1 award,' they are with you until you get an 'RO1 award.' And they are very clear about their standards. They meet with the person probably three times a year for an hour or two at a time. They look very closely at what's going on with the career; they ask what's happening with the family life; they ask if the individual is investing in their own personal interests; they look at the publications; they look at how they are planning their time. They do the whole thing.

Let me say a little more about this work/life balance stuff. We have found, and the literature supports, that young faculty (any faculty) who invest in their own personal lives, have much more resilience to get through an entire career than somebody who does nothing but work.

You are in an institution, an organization that is very political. You don't know the political cycles it is going to go through, right? In the United States, you don't know from one day to the next whether your chair(person) is going to be the same person. You can come in one day and they've changed leaders on you. If you don't know how to ride those waves out, and you're investing everything in your work, you just don't have the inner strength to ride out these waves. So we are very, very, very interested in seeing that our faculty have rich personal lives, in addition to having these all-star research and clinical careers.

OK, those slides will give you the chance to see who is doing what. But I bring this up because here's an interesting case, University of California, San Francisco Clinical and Translational Science Institute just got a $123 million grant to restructure their clinical translational research program. A chunk of that money is going to support a new Mentor Development Program, a Junior Faculty Mentoring Program, and a Faculty Mentoring Academy.

Why? Because mentoring is seen as one of the key factors contributing to success in academic medicine. So, this is serious business.

All right, what is mentoring?

I don't know if in Japan you have a tradition of mentoring. We did in the United States up until, I would say, about the mid-80s or so. It kind of fell by the wayside because the clinical load got so heavy and the research load got so intense that many faculty felt that they could no longer spend the time cultivating the younger faculty. I've done many, many focus groups and surveys, and I will give you some direct quotes:

"I know a winner when I see one, and I don't have time for the others."

or…

"There are those who are born to be stars and the rest we just put up with."

Now, that is an all too common thought on the part of very, very busy senior people. So what I will talk to you about later is that it doesn't have to be the most senior people helping the junior people. In fact, even our senior faculty have asked for mentoring. So it doesn't stop. Once you go from being assistant professor to associate professor you don't just stop needing mentoring. We've matched up new chairs with more experienced chairs for mentoring, new division heads with very experienced division heads for mentoring, senior faculty with other senior faculty who have changed their careers, who are tired of being clinicians or researchers and want to branch off into something else. So, there are lots of different forms of mentoring.

I like this quote from Daniel Tosteson, who was the dean of the Harvard Medical School 25 years ago, he said:

"We must acknowledge that most important, indeed the only thing we have to offer our students is ourselves. Everything else they can read in a book."

Those junior people are looking at you as the models of success, and the behavior that they manifest for you is what they see you doing. So, we've had some problems, like every other academic institution in the country, with very abusive surgeons, for instance. We had an issue with a surgeon who threw a used syringe at a nurse in the O.R. We've had abusive faculty who have really gotten mad at people in the halls, publicly, or played favorites, or stolen people's research and put their names on the research. This is not atypical of very competitive institutions, but we do not want that behavior at M.D. Anderson. We try to nip it in the bud when we see it happening. And we try to pay a lot of attention to interpersonal skills, and we're very candid. "We don't want that kind of behavior here. Don't you show that behavior here." So, it's very clear.

OK, what do mentors do?

Certainly, they listen. And mentoring doesn't mean you have to spend hours and hours with a person. It could be five minutes or ten minutes. It could be a quiet moment of mentoring where you give somebody candid feedback, for instance, "That was a really good presentation you gave. I think you could have been a little bit clearer in your conclusion. I think you might look at this-and-this article to see if you can strengthen that conclusion. And if you want to talk about it with me some more, please come to my office." It doesn't have to be a difficult, complex kind of situation.

They support and facilitate; they provide networking and connect people to networks; they teach by example; they serve as a model for adhering to the highest values in every area of life; and they encourage and motivate.

They promote independence. And one of the things we see in a lot of junior faculty is a kind of passivity in their careers, which is worrying.

They promote balance, we hope. There are some faculty we would never put in a mentoring position because they are toxic, frankly, and we don't want them mentoring anybody. But, fortunately, we don't have too many of those.

They rejoice in the success of their mentees and give them a lot of pats on the back. And they convey joy. They really love their work. At least, that is what we hope.

What they don't do is they don't protect people from experience. Everybody is going to make mistakes and we all have had our fair share of failures. And we can all certainly learn from our failures.

They don't threaten.

And they don't take credit for work that was the mentees work. And this is a huge problem in competitive science where mentors are scarfing up, gulping up the work of their junior people and claiming credit. This is a problem.

And, they don't take over.

They don't force.
They don't use undue influence.
And they don't condemn or lose critical oversight.

Now, this is an article I would really like to recommend that you read. Dr. Eva Singletary works for M.D. Anderson and she wrote a fantastic article; there's a reference in here, so you can see it. It's in the "Annals of Surgical Oncology." And when she was coming into be president of the American Surgical Oncology Association, she wrote an article on mentoring. And she says if you look at a surgeon, for instance, what is it that we do with surgical trainees? Well, at M.D. Anderson, we hire in a lot of our surgeons as clinical fellows because we want to train them ourselves. It is very important to the surgeons that they train our own fellows in how they want surgery done. So, you must have absolutely excellent clinical skills to get onto M.D. Anderson's faculty as a surgeon. That's the bottom-line. You have to be excellent technically.

They have to be able to deal with ambiguity and be adaptable in dealing with unexpected findings. And they have to be able to deal with the anxiety that comes with opening people up everyday.

They are not mere technicians. They have to be sensitive to the needs of patients and their families. They must be available to discuss options, risks and benefits.

Dealing with cancer is very complex and terminally ill patients and their families can have special needs. And the level of interpersonal

skills that are brought to these relationships can make the difference between an adequate surgeon and a great one. I have to say, Eva Singletary is a great surgeon. Her interpersonal skills are fantastic.

Surgeons in an academic environment must be able to run clinical trials, conduct retrospective studies, analyze data, write and publish papers, and prepare and submit grant applications.

That's a huge load. And without somebody telling you how to do it and how to avoid some of the dead-ends, it can be very hard to establish yourself.

Now some of these skills can be learned from books, but many of them cannot. And many of them come from attendings or senior physicians that they are watching.

In a study that I did on clinicians to find out how they broke bad news, most of them had learned from being in with an attending who delivered bad news, sometimes not very well.

Another skill the surgeon will need, according to Dr. Singletary, is time management. This is a very, very challenging thing for all of our faculty – is to manage their time.

E-mail has probably tripled in the last five years. Just handling e-mail is horrendous.

They need to avoid time-wasters like getting on the Christmas Party Committee or writing book chapters. We tell them, "Forget book chapters. Don't get lured in to writing book chapters. It won't do your career any good at this point. Focus on articles." So, the mentee must work hard on the right things.

Political savvy in these institutions is absolutely a survival skill. It's very easy to make a mistake that goes unforgiven. So, we want our faculty to avoid making political mistakes. We call it, "shooting herself or himself in the foot" by doing something wrong.

Perfectionism is a huge problem amongst faculty. Fear of making mistakes and not being good enough paralyze faculty. It has hindered a lot of faculty in terms of getting research done and articles written. They are constantly editing themselves and not finishing things.

It takes a team of mentors, not just one.

So, what we tell our junior faculty is that there is not going to be one person who is going to walk down the hall and say, "Ah, let me be your mentor." It's not going to happen that way.

These are special relationships. We do recommend and do encourage our faculty to look for the junior faculty who are afraid to ask questions. I think I mentioned a little earlier, one of the things we find very troubling amongst junior faculty is a sort of passivity, as though someone is going to come along and tell them everything.

They have to be able to manage their own careers as well. So, mentees have a responsibility to find mentors and work with them.

I'm going to let you read these on your own because we decided to skip these because we have too many slides.

We train our young faculty on how to find mentors, how to identify mentors, how to approach mentors, what kind of help they need. Many junior faculty don't know what they don't know. And that's again why we also train mentors. We train our senior faculty and our mid-level faculty to be mentors.

Increasingly, as I mentioned, bright clinical and

postdoctoral fellows are not choosing academic medicine. We need to make it more attractive to them. And one of the things we can do is support them from the day they get in to the day they leave and retire.

And just some final thoughts… You can look at these other slides on your own.

Focus Group Summary… We found out that mentoring was spotty, at best. We've done a survey of our faculty, and about 48% said they had mentors, the rest do not.

So, we looked at mentoring models. We are not going to pair all of our faculty with a senior faculty member. We hired in 153 faculty last year. If we did that, we would use up all our senior faculty in no time. So, we are training our junior faculty to go out and find mentors and we're working with all department chairs to put in some kind of model of mentoring. They can either pair them within their departments or they can set up peer and group mentoring, which, in the literature, indicates is more successful than one-on-one mentoring. Paired mentoring, where you say, "All right, you are the mentee and you are the mentor and now you will meet once a week," is like an arranged marriage. It usually doesn't work… It often doesn't work in the United States.

We also have academic advisors in departments, some of those serve as mentors.

We're looking at establishing a mentoring day twice a year, which the provost is going to host, which will bring together 15 - 20 senior faculty mentoring whoever signs up amongst the junior faculty to get mentoring. In order to make this attractive, we will bring in really top speakers in science and clinical work, so it attracts the senior faculty to be involved as well. The provost is looking at doing that.

All right, we also have a manual for mentoring. So, we have a manual for mentees and a manual for mentors. We have group training, we have department support, and we have a lot of other things that are going on to support this culture.

We are looking at our promotion and tenure committee review process, so people get credit for mentoring. And we are looking at how we can foster mentoring across the institution.

You know, the advantage for mentors is that they build this enormous network of young people who bring in new ideas and new connections. Plus, we have reverse-mentoring. My younger staff keep me up-to-date, (well, kind of) on technology because I am totally uninterested in being on top of all the computer science stuff. So, that's how I get reverse-mentoring, through the junior faculty or junior people who come in to work for me. They train me or keep me up-to-date on things that I have no time to do.

I think for the mentor, this is something that can really enrich your career, because you are giving back to your field. You're grooming young people who are going to be enthusiastic and successful. That brings credit to you and to your institution.

And for the mentee, it means they have the possibility of thriving in their careers and not dying out or crashing from overwork.

So, thank you. I hope you all take up mentoring.

Ms. Saito, Associate Professor:
Thank you very much for your fantastic lecture. Could you allow us to ask some questions?
I have some questions.

What is the difference between training or teaching, and mentoring, as far as meaning?

Ms. Apted:
There is very little difference, except I think of mentoring as being a more informal relationship. Training, obviously, has to happen and you have to be there if you are a young person. You have to be there for the training. The mentoring you can seek out on your own. And it can be, for instance, I would go to David and say, “You are really good at getting grants and you’ve got a lot of money supporting your research. I’m not getting my grants funded. My specific aims are obviously not well defined. Would you mind sitting down with me and looking at one of my grants?” That would be a mentoring relationship.

I connected a department chair with another department chair; he wanted to learn how to manage faculty. So, it wasn’t a training situation, it was more like, “Tell me how you do this. How do you manage?” He had been promoted to chair and he was managing his friends. All of the sudden he is chair of a department and his colleagues are peers and friends he had had for 10 years. How do you establish credibility as a chair or as a leader and manage high-performing faculty in a way that gives them space, but that lets them realize that ‘the buck stops here,’ with me? So, I think it’s more of an informal kind of relationship, rather than a formal training.

Ms. Saito:
So, you’re very free to select your mentor? Is there any matchmaker-type of person?

Ms. Apted:
If we get a request from a junior faculty to find a mentor, or mentors (Because we tell our junior faculty that they are going to need more than one; they will probably need a team of mentors.), we have a list of mentors on the research side and clinical side. We will approach them, set up a time for them to meet, or we will go out and talk to various faculty to see if they will take on a person and help them.

Ms. Saito: Thank you very much.

4. The Education of Medical Oncologists at Massachusetts General Hospital (Guest Speaker: David P. Ryan, M.D.)

Professor Takahashi (speaker introduction)：
Dr. David Ryan, I have just briefly introduced you to the audience and also explained the content of your talk. Could you start your lecture? Thank you.

Thank you very much for having me. It's been a delightful time so far in Japan. And this has been a wonderful opportunity for me and my son who came with me.

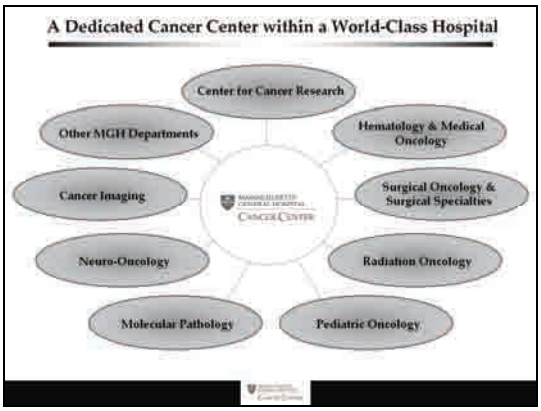
So, I'm going to talk to you today about the education of medical oncologists. I am a clinician, meaning that I take care of patients. And I take care of a lot of patients, though only those with gastrointestinal cancers. I am the Clinical Director of the Gastrointestinal Cancer Center. And in talking with some of the leadership here before, I thought it might be instructive just to give you an idea of what my background is. After medical school I went into internal medicine. I did three years of internal medicine. And then I decided to sub-specialize in medical oncology and I went and did a three-year medical oncology fellowship at the Combined Massachusetts General Dana -Farber Cancer Institute Fellowship Program and then I stayed on and sub-specialized in gastrointestinal cancers. And so, over the years, I've developed a clinical research facility in terms of running Phase 1 and Phase 2 clinical trials, so, new drug development within gastrointestinal cancer and in solid tumors. And then I also see a lot of patients with gastrointestinal cancers. I don't see any other patients except gastrointestinal cancer patients.

In the United States, it's very different in terms of the make-up. And so, what I'm going to describe for you today are the nuts and bolts of how we do that. And to understand that, you have to understand how the basic cancer center is arrayed within the United States. It doesn't make any sense to just describe the fellowship program without first describing how the cancer center is made up. I'm going to describe the MGH (Massachusetts General Hospital) Cancer Center for you, but essentially the basics are evident in almost every academic cancer center in the United States.

At the Mass General, it is divided up in to clinical activities and research activities. The clinical activities we see about 7,500 new patients a year; 100,000 outpatient visits a year; 4,000 discharges; and we have 200 clinical faculty, both full and part-time, within the cancer center. To give you an idea of how many of us our medical oncologists only, when I was first hired in 1998, I was the 16th team staff hired in medical oncology. Mass General came to cancer a little bit later than most of the other hospitals in the country. We were a great surgical hospital, but, somewhat weak in terms of medical oncology. We just hired our 65th medical oncologist. So, in the last ten years we have grown tremendously just within the specialty of medical oncology.

On the research side, we have 92 faculty members and about $50 million annually in cancer-related research grants and that is separate from what the Mass General gets in other research related grants.

Our clinical facilities are located on the main campus, the Mass General, in two main buildings. We have an outpatient building and then the inpatient building. And then our research focuses on two buildings as well: one is right across the street from the clinical facilities, and one is over in what we call the old “Charlestown Navy Yard.” Charlestown was a navy yard. The Navy consolidated their navy yards many years ago, and is still consolidating the navy yards. But, there was great research space and the Mass General came in and bought up some of that space and made it into research labs.



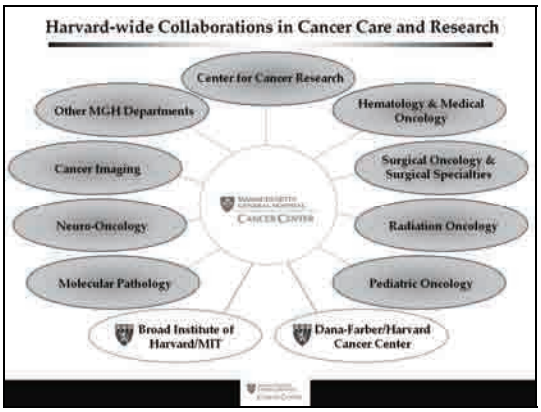
So, a cancer center looks like this. You can substitute almost every other cancer center, particularly hospital-based cancer centers, with this particular model. It is both a virtual cancer center and a real, physical presence. It is a virtual in the sense that multiple different departments interact with the cancer center.

So you have your center for cancer research, which is your basic science lab. You have your hematology and medical oncology clinical divisions. You have your surgical oncology and surgical sub-specialty clinical divisions. You have your radiation oncologists – clinical and lab-based divisions. You have your pediatric oncologists. You have your molecular pathologists, and your clinical pathologists interacting with the cancer center. They may not be on the same site clinically as the cancer center, but they are part of the cancer center in terms of its virtual make-up. You have your neuro-oncologists, which can either be made up of a specialist in terms of neurology or a specialist in terms of medical oncology. Both ways happen in the United States currently. You have your cancer imaging specialists, most of who come out of radiology departments, but not all. And now there are new molecular-targeted imaging methods that are mostly on a research basis, but about to come in the next ten years and be a huge boon to us. And then you have all of your other MGH departments. Those include your departments in medicine, like gastroenterology, respiratory medicine and on down the line. You have all of your other surgical departments and you have all of your other disciplines interacting if they have something to do with the cancer patient.

We have, for instance (and I’ll give you a “for instance” here), we have a psychiatrist, who lives in the Department of Psychiatry (actually we have several), but who focuses on cancer-related psychiatry. So, they live in the Division of Psychiatry, but then have a clinic over in the cancer center one or two days a week depending on their schedule. And their focus and their research focus is on cancer-related psychiatry, in other words, depression in a patient with pancreatic cancer.

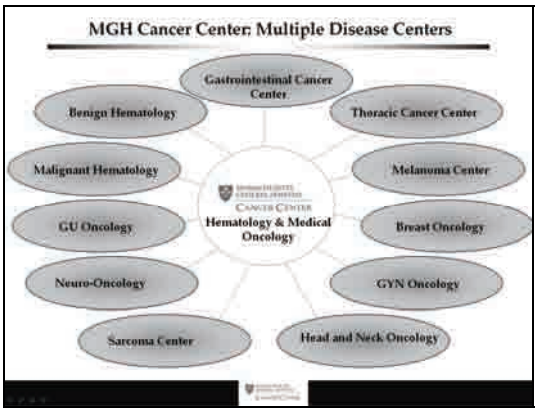
One of the interesting things that we just found out by having a cancer-related psychiatrist, was that we were referring all of our patients for depression, lo’ and behold, a significant percentage of them actually had delirium. The medical oncologists were not picking up on the delirium as

the major focus of their depression. They just thought the patient was depressed. Not so, the cancer medicines, the nausea medicines, the chemo-therapy that we were administering were actually causing the delirium in some of these patients.



Then we have a Harvard-wide collaboration. Whenever you have a big cancer center like us, there are often now more and more in major cities across the country and around the world, you're seeing several different cancer centers collaborating. In our particular cancer center, we collaborate with the Dana-Farber Cancer Institute and the Brigham and Women's Hospital. We are called 'Partner's Health Care.' And we collaborate through the Dana-Farber/Harvard Cancer Center. So, the Harvard Medical School is also a virtual part of the cancer center, and MIT, the Broad Institute at the Massachusetts Institute of Technology, is also a part or our virtual cancer center.

Our fellowship program in medical oncology and hematology is actually a shared program with the Dana-Farber Cancer Institute / Brigham and Women's Health Center and Massachusetts General Hospital. If you know Boston at all, there are two major sections to the city, there's the Longwood area and then there's the downtown area. We're in the downtown area along Cambridge Street and what's called Government Center. And the Dana-Farber and the Brigham and Women's are over in the Longwood area. Boston is a lot smaller than Tokyo, but you can imagine that a fellowship program, if you're thinking of this kind of thing in Tokyo, might involve several different hospitals just like ours does.



So, how does it work out in medical oncology? How is medical oncology associated with each of these areas?

Well, we've decided to go in the direction, as has almost every single cancer center in the United States, of disease centers. We live in disease centers, so, you can substitute hematology and medical oncology and you can put in there surgery as well. You can put pediatrics in there. All the major specialty programs actually interact with the cancer center through disease centers.

And so, I run the Gastrointestinal Cancer Center, but there is a leader for each of the other centers around: the Thoracic Cancer Center, Tom Lynch has come to Japan many times to talk about 'epidermal growth factor signaling'; the Melanoma Center, Ken Tanabe runs our Melanoma Center as well as being the surgical lead in our Gastrointestinal Cancer Center. He is a liver surgeon, but also a melanoma surgeon. So, he has two separate roles within the Cancer Center as well as being the Deputy Director. Breast Oncology, GYN, Head and Neck, Sarcoma,

Neuro-oncology, Genitourinary Oncology, and Malignant Hematology.

We expect each of our fellows when they come and train, so when they finish internal medicine training, and then they do medical oncology training, and then we expect them to specialize along one of these disease center models. We expect them to be a medical oncologist specialist in a specific disease type along these lines. And if you realize, our professional organizations now are having conferences along disease center models. I just went to ASCO GI, the American School of Clinical Oncology, Gastrointestinal cancers. There were people from Asia, people from Europe, people from the US, people from South America all getting together to talk about the latest just in GI cancers. There is an ASCO GU; there's the World Lung Congress that, I think, just happened out here in Japan last year. So, all of these areas of medical oncology, in terms of the education and in terms of presenting data, are happening at the disease center model as well.

So, who is in our disease center right now? This just gives you an idea. We have seven gastrointestinal cancer oncologists seeing all of our patients with GI cancer. When I first started, I was the second. So, in ten years we've gone from two to seven.

Each of us has different responsibilities. Some of us are more clinical than others. Others are more research oriented than the others.

The other thing that has changed dramatically, in the United States what has happened over the last 10 – 20 years is that it used to be that the fellows did the bulk of the work, that in an academic center the clinician would come in, wave 'hi' to the patient, and then leave the room. There was very little patient – academic professor interaction. That has completely changed. Nowadays, for reasons both having to do with liability and also because in the United States the patients get to demand who they want to see, patients demand to see the experts. So, when they come, they want to see me. They don't want to see the fellow. And they insist on it. And if they don't see me, they'll go to another cancer center down the street where they can see the actual expert and talk to them and say, "What do I do for my stomach cancer? Do I do radiation? Do I do chemotherapy? What chemotherapy do I do?" They don't want the fellow answering those questions, they want me. And the Cancer Center has made it a priority (as have most other cancer centers) that the actual senior staff has to sit down and take care of the patient individually. The fellow is much more like what the senior staff used to be 20 years ago.

But to do this is a tremendous amount of work and the largest change we've seen in academic centers is the introduction of the Nurse Practitioner. All the phone calls, the nausea, the vomiting, the diarrhea, all of the chemotherapy side effects that I administer, when people stop responding to chemotherapy and they start dying from their illness. There are a lot of side effects that we have to deal with. How do we have time to be an academic and also take care of the patient on a full-time basis? We do it with the help of nurse practitioners. There's a team approach. We've basically come to the conclusion that for every full-time clinician, we need one nurse practitioner. And we're actually probably going to have to go into a fuller ratio: for every full-time clinician, we might actually need two nurse practitioners, if we want to be a true academic center where people have time to do research as well.

And then there's an intense competition amongst us to get clinical fellows. We want clinical fellows. And you can imagine if we go back to all those disease centers, at the Mass General / Dana-Farber we have 14 clinical fellows coming in

each year. Of those 14 clinical fellows, once they finish their first year and go into their research years of the second and third year, they get to pick which disease center they want to be in. For every disease center we have on the Mass General side of town, there's a disease center on the Longwood side of town at the Dana-Farber / Brigham and Women's. Of all the fellows about 1/3 become clinicians, 2/3 become laboratory-focused clinical oncologists. So those clinicians, we're desperate for more people to take care of cancer patients. It's the Baby Boomer Bubble now and everybody has hit 60. The post-World War II population boom that we saw, they've all reached 65 this year. And they are all hitting their cancer years now. And while the incidence of cancer is going down slowly, the prevalence is just going through the roof. The other thing that we found is that nowadays, people with metastatic colon cancer, or even metastatic lung cancer or metastatic breast cancer, the average survival rate for metastatic breast cancer used to be one year. Now it's three to four years. You don't need to see that many new patients in order to keep your clinic incredibly full.

So, what is the medicine hierarchy? How have we overlaid the fellowship onto the hierarchy?

Well, essentially for fellows, during the first year, the fellow acts like a nurse practitioner. And that doesn't sound good because a lot of people go into medicine because they didn't want to become a nurse. In actual fact, our nurse practitioners act independently, and some of them are much better than our fellows. I wish that all of our fellows could be as good clinicians as our nurse practitioners by the end of their first year. But that's almost an impossibility, because our best nurse practitioners do this year in/year out and get to be almost better oncologists, in some instances, than some of the medical oncologists, particularly those who are staying in the lab.

Then, of course, you have your resident and medical student.

So, to administer our fellowship program we actually have two full-time people. We have a medical oncologist who is assigned as the Fellowship Director. This is Jennifer Temel at our place. It is her job to make sure that every fellow is well cared for and that every fellow is accounted for at every step of the way. We also need a full-time administrator, and Karen Shaama does this.

So, when you are thinking about putting together a medical fellowship you need at least two people – at least one medical oncologist whose full-time job, besides seeing patients, is to take care of the fellowship program. And you need an administrator whose full-time job is to make sure that the fellow's schedule and all of their other concerns are taken care of.

So, who can apply to the fellowship?

Well, the first is, you have to complete a M.D. degree at an accredited university. Then you have to complete internal medicine training and you have to be Board-eligible or Board-certified in internal medicine. In fact, almost all of our fellows take their internal medicine boards during their first year of fellowship because they finish their third year and are allowed to sit for their internal medicine boards after they finish their third year of internal medicine. And so they wind up taking the boards, they are taking a day off during their fellowship, usually in the fall, to sit for their internal medicine boards and become Board-certified.

" Short-tracking" is occasionally allowed. Short-tracking is for those people, typically M.D. PhDs who have spent years in training and know they are going to go straight back into the lab. They are allowed to do two years of internal

medicine training and then apply to oncology fellowship. They can then apply that first year of clinical fellowship to their last year of internal medicine training and do what we call, “short-tracking”.

But we are very critical about those people who do short-tracking because we feel that third year of internal medicine training is so important in solidify the basis of internal medicine and becoming a good clinician.

So, there are three years of training. They can choose to do medical oncology alone or they can choose to put hematology in addition to medical oncology. Very few fellows do just medical hematology, almost none. So if they decide to do medical oncology alone, they do one full year of clinical training and then they do two years of research training. If they decide to do hematology in addition to medical oncology, they tack on an additional six months of medical hematology at the end of that first year, mostly to learn benign hematology. They rotate through benign hematology, pathology; they rotate through clinical pathology; they rotate through the hematology consult service; they become what we call, “good clotters”. In fact, they learn the whole clotting system in that six months as well.

And then during their second and third year, they are expected to sub-specialize in a particular type of cancer, within a disease center. So, they actually have to choose.

If you can make an argument, one of the arguments against our particular system now is that when people graduate, they are outstanding at one particular area, but they may not know breast cancer. For instance, I’ve been out of training now for almost 10 years, and I have to sit for my Boards again. We have to sit for our Boards every ten years. I actually have to go back to the class room and learn breast cancer all over again. I haven’t taken care of breast cancer in 10 years. I haven’t taken care of lung cancer in 10 years. All I take care of is GI cancer. If there’s one weakness, I think that’s our weakness.

On the other hand, I think patients want to see somebody who takes care of that particular illness, all the time. And I thoroughly enjoy being an expert in one particular area. I know if I had to know all cancer, there is no way I could know everything I need to know about breast and lung and melanoma, in addition to everything else.

So, what are our objectives during the first year of fellowship?

Well, the first year, one, you have to learn the fundamentals of new patient assessment and workup. It is actually pretty hard. One of the things that is very hard to figure out is how do you work somebody up? And what’s interesting is when an internal medicine resident comes to do a fellowship with us, the first thing they are terrified of is that cancer patient who shows up in the clinic. They are used to an inpatient-type of setting. If somebody with a liver mass comes in, the fellow looks at us and wants to know “What do I do?” Because the patient is looking at them, and saying, “Doc, I have cancer. Am I going to live?” And they have to workup the patients and figure out what is the best way to give them the best possible chance and the best case scenario. And the fellow is terrified. They’ve never been in that situation before. How do you work somebody up to get them their best chance at being cured, or if not cured, get them their best chance at living for as long as they possibly can?

The second objective is to learn the pathophysiology of each of those different diseases. The reason for this is if at a later point, we find the cure for GI cancer, and you can take a pill and all of

the GI cancers go away, well, I will need a job. I can then go and learn to be a breast cancer doctor because the fundamentals of each disease can apply to each of the different solid tumors.

And then finally, you have to learn the fundamentals of chemotherapy. When I first started we had one drug for colon cancer. We had 5-FU. Now we have seven. It's very likely that in another 10 years we could have 15. Same thing has happened in lung cancer, same thing in breast cancer. As a respiratory medicine doctor, how are you aware of what's going on in terms of the fundamentals of chemotherapy? What is being taught about the fundamentals of chemotherapy, about Tyrosine Kinase inhibition, about these new targeted therapies, about antiangiogenic drugs? They're not at any of your meetings. Your meetings are about COPD, interstitial lung disease. Or if you are a gastro-neurologist, your meetings are about inflammatory bowel disease or colonic polyps or how to do procedures, how to do endoscopic ultrasound. When do you learn about targeted inhibition of epidermal growth factor or Raf Kinase? You don't.

So, during the first year, you spend six months on our side of town and six months on the other side of town over at the Dana-Farber. So, on January 1st, everybody switches, and if they're on our side they go to the Dana-Farber, this is during the first year, and if they were on the Dana-Farber, they come over to our side.

So if you are a fellow, and if you had picked up a lot of patients, all the sudden you're on the other side of town. That's one of the other reasons why the staff has to be so fully invested in the patient. The fellow, often times after six months, just leaves.

You rotate through all the different disease centers to learn the pathophysiology of each disease center. And you rotate through the inpatient consultation services. But that's less and less of a feature of each oncology fellowship and the reason is that more and more oncology happens in the outpatient setting. In fact, patients are admitted for usually only one of two reasons: either it's a complication of their chemotherapy or it's a complication of their cancer. So it's mostly end-of-life type care that people are admitted for. And so the bulk of medical oncology occurs on the outpatient side. Inpatient oncology and inpatient hematology is really about complications of therapy and bone marrow transplantation, which is the last rotation they go through. They go through a separate leukemia/BMT rotation as well.

So, what happens in the first-year typical day in the morning…

They show up in the morning, and they see patients in their ambulatory clinic that they've picked up either on the inpatient oncology consultation or the new patient multi-disciplinary clinics. Typically we allow fellows to see patients at a much more leisurely pace then the average staff, meaning that they can see patients once every 1/2 hour, which is a long time. Most of us, if we've been doing this for a long time, the bulk of the time we spend with the patient is really educational and I know what I'm going to do before I walk in the door. I'm a colon cancer expert. If someone has colon cancer there isn't a situation I haven't seen before… or almost. Never say 'never' in medicine. But, I know what I'm going to do and what I'm going to say before I walk in the door. I look at the films. I've seen what's going on. It's not that hard. What is hard about the patient interaction for me is getting down and figuring out where the patient is at mentally and helping them through their illness.

For the fellow, they don't know what they are going to do before walking through the door, and so we expect that they are going to take at least a half-hour with each of their patients. And then we

come in, do the same thing all over again, with them in the room, just so that we can go through everything with them one time again and see how they did it and how it matches up with how we would interact with that particular patient.

And then in the afternoon, they see patients in the multi-disciplinary clinics. In the multi-disciplinary clinics, patients come in to see, for instance, if you had colon cancer, you would call up our office and you would be assigned a surgeon, a medical oncologist and a radiation oncologist, and you would be assigned a fellow. And the fellow would go in and meet the patient first, and then all three of us would come in together. So, Ken Tanabe, who does liver surgery, and I, and Ted Hahn, who does radiation oncology, we would all go in after the fellow had presented us. We would all go in and meet the patient together sit down and spend about an hour talking to the patient about what their treatment plan ought to be.

And so, those patients that they pick up at the multi-disciplinary clinic, they then follow for the rest of their six months.

They other thing they can do if they are not in the multi-disciplinary setting is that they can be in inpatient oncology or inpatient hematology consultative services picking up new patients.

Once they've finished their first year, the second and third year is very different. Our objectives for them are to successfully complete their Boards in medical oncology and possibly hematology if they decide to do that. They have to decide on their area of subspecialty and become and expert in that particular area. And then they have to pursue their research agenda.

So, how does their sub-specialization occur?

Well, they decide that they want to work with me, let's say, in the Gastrointestinal Cancer Center, or with Tom Lynch in the Thoracic Cancer Center. And then they would see patients within that specific disease center. They would keep their continuity clinic and then they would see new patients. So, at most, they would be in the clinic 1 or 1 1/2 days a week. The rest of their time is devoted to research.

We ask that they write review articles, not because it's going to help their careers so much, but because one of the ways you become an expert is going back to the source documentation, going back to, in my case, the old GI tumor study group studies on colon cancer, the studies or going back to the source data of the ESPAC study in pancreatic cancer or going back to the S1 data in gastro cancer. You have to go back to that data, read the studies, see the flaws, and one of the best ways to do that is to write review articles.

Their research agenda can be in one of four areas essentially. They can be a clinical researcher, a clinical trialist; they can be an outcomes researcher who sub-specializes in outcomes or epidemiology; they can be a translational researcher. Translational can either have some overlap with a clinical trialist or it can have overlap with the forth area, which is basic science, going right back into the lab.

So, what does a clinical researcher's agenda tend to look like in their second or third year?

They pursue training in statistics and clinical trial design, for example, we have something called, 'Clinical Effectiveness Course'. I actually got a Masters in Clinical Medicine. We have an MIT/Harvard course where for two years you go to lectures and get expertise in statistics and in clinical trial design, in IRB, in human subject safety, regulations that we have in the United States.

You are expected to write, administer, and report phase I and II studies, eventually, hopefully, you will

be able to do phase III studies, but those are done at the co-operative group level by senior investigators. In the beginning, you cut your teeth on phase I and II studies. For instance, the first study I ever wrote was for people with pancreatic cancer. I wrote a phase I study of gemcitabine and Docetaxel for people with pancreatic cancer.

You write observational series, retrospective series, review articles, and opinion pieces. You learn how to write. You are what you write in academic medicine, and you have to learn how to write. And, I was an English Major in college, but unfortunately, for many students who come to us they were Science Majors. They never had to write term papers. That's essentially what being a clinical trialist is doing – it's communicating your results.

What about an outcomes researcher?

Well, we actually send these people to get Masters in Public Health at the Harvard/MPH school. They pursue studies of outcomes research, which is basically data mining these large data bases. For instance, the Nurses Health Study was done in Boston. Charlie Fuchs is an expert in the Nurse's Health Study. He has written multiple papers. We actually have a gastroenterologist who does outcomes research within our GI Cancer Center. The gastroenterologist, Amy Chan, just came up with a great paper looking at Cox-2 Expression in polyps in women who had taken aspirin and women who hadn't.

And then you have your Translational Researchers who go to a lab to learn a specific focus, to learn a specific pathway, and then they apply their knowledge with new trial development.

And then, finally, you have your lab people who go directly to the lab, and their goal is to become RO1, our big research grant-funded investigators in the lab. They see very few patients. Almost nobody anymore is what we called, a "triple threat". It used to be thought, ten years ago, that you could be a triple threat. You can't. You can't be in the lab 100 hours a week and be a good doc. When I get cancer, I don't want some guy in a lab taking care of me. I want somebody who is taking care of patients all day long to take care of me. I want a clinician. And so, the old triple threat really doesn't exist anymore. The only triple threat I know of is the Translational Researcher, in the sense of somebody who is part-time in the lab. But, they will tell you straight out that they can really never get an RO1, that they are really not a triple threat in the strict idea of it, where they are running a fully-funded NCI-funded lab.

So, let me give you two examples in the last two minutes.

One is Aram Hezel, recent graduate of our fellowship. He did his residency at the BID Medical Center and he came to us to do his fellowship. And then after his first year, he decided to do a basic science model and worked in Ron Depinho's lab.

Well, he thought he wasn't going to make it, and he wanted to be a translational person. So, he came to us and applied for a job as an instructor in doing translational science. Turns out his work is so good, he started seeing patients 1 1/2 days a week, but, he actually asked to cut back.

He's working on the notch pathway in pancreatic cancer or pancreatic carcinogenesis. And so he has actually gone back the basic science route. He has asked to see less patients because he actually thinks he's going to make it now. So, one of the things you have to be, as we heard in the first talk, is flexible. You have to allow these young docs to figure out their way on their own. But in terms of mentorship, you have to be flexible about which of these different areas you are going to be.

So we've allowed him to cut-back his clinical time to go for an RO1 funding.

These are some of the recent articles that he has done. He wrote a reviews article with me and he looked at Lkb1 deletion in cystic neoplasms of the pancreas. So, he actually has several different projects in the lab that look like they're going to make it.

Lecia Sequist, another homerun. Lecia came to us, did her fellowship. In her second and third year she decided to pursue the translational model. She worked with Tom Lynch and Daniel Haber. I don't know if you know, but, Daniel Haber is our Cancer Center director and the expert in the EGF pathway. She has one of the critical papers in terms of novelty chaos.

So, she wrote, with Tom Lynch, "Molecular predictors of response to epidermal growth factor receptor antagonists in non-small-cell lung cancer." She sees patients 1 to 2 days a week and basically writes some correlative science studies that have to do with the EGFR pathway for patients with lung cancer.

So, in conclusion, if you're going to have an excellent medical oncology and hematology fellowship, there are three things that I think you really need to focus on.

One is you need to specialize in hematology and oncology after internal medicine training. Just like you would be come a cardiologist or a pulmonologist or a nephrologists, you have to become a medical oncologist.

The second area is if you are going to truly become an academic, you need to sub-specialize in one of the disease centers. You can't see every cancer, it's just too complicated. You have to see GI cancer or thoracic cancer.

And then finally, you have to pursue specialized research agenda: you have to be a clinical trialist, you have to be an outcomes researcher, you have to be translational, or you have to be basic science. I'd see the first three overlap. The last one is an area onto its own. And it's very hard to be a clinician and a basic science person. You can, however, be a clinician and a clinical trialist, an outcomes person or a translational person.

And I'll stop there and take any questions.

Professor Takahashi:
Thank you very much for a very excellent lecture. Now we are open to questions from the floor. … Can I ask one question? Actually, I want to ask two questions, but time is limited, so let me ask one question.

Actually, how many different types of cancer do the fellows need to see? Because there are so many different types of cancer and I don't think it's possible to all types of cancers for the fellows.

Dr. Ryan:
That's a great question. They do rotate through all the disease centers, so we try to expose them to the principles in those disease centers. But one of the hard things is exposing them to as many cancers as we possibly can. Thankfully, in the solid tumor world, the principles in one particular area often apply to the principles in another area. But you're absolutely right. It is very difficult to expose them to everything. One of the jobs of Karen Shaama, who is our fellowship administrator, is to keep a list of all the different types of cancers that they've seen, and go to each of the clinical directors of that particular cancer center and, for example, she would come to me and she would say, "John Smith, one of our medical oncology fellows, has seen five people with pancreatic cancer, but

nobody with colon cancer.”　I would then, the next time that John Smith is in our Gastrointestinal Cancer Center, I would absolutely find him a patient to see with colon cancer.

Thankfully, for the common types of cancer, we have many, many to see.　For the rare types of cancers, often a fellow nowadays can go through training and never see a rare sarcoma, for instance.

Professor Takahashi:
Can you tell us what is the most important thing to establish in the educational system for the medical oncologist in Japan?

Dr. Ryan:
So, if I had to narrow it down to one thing, I would say that the government would not allow you to give chemotherapy unless you were Board-certified in medical oncology.　And that would change everything dramatically.

Professor Takahashi:　OK, let’s talk about this issue later.　Thank you very much.

5. How to Educate Radiation Oncologists (Guest Speaker: Ritsuko Komaki, M.D.)

Ms. Karasawa, Associate Professor (Speaker introduction):　放射線科の唐澤でございます。
私は「放射線腫瘍医」と放射線科の中でもがんを専門に扱っております。
今日の Komaki 先生と khan 先生のお二人は、放射線腫瘍学に関する先生でいらっしゃいます。お二人ともお願いしまして、順天堂の客員教授になっていただいております。
まず、komaki 先生をご紹介申し上げます。Komaki 先生は 1965 年に広島大学をご卒業になり、小学校のときにお友達が原爆で亡くなったりして放射線に非常に興味をお持ちになりまして、原爆の研究をしようということでまず研究所に入られております。そこで出会われた先生のおすすめでアメリカに渡り、アメリカで放射線腫瘍学を研究されております。
放射線腫瘍学では非常にご高名な先生で、日本が世界に誇る日本出身の女性ということで、アメリカの放射線科の女医の会の会長など非常に広く活躍されてらっしゃいます。
今回は実は国立がんセンターのシンポジウムでお出でになっていたのを非常に無理をお願いしましてちょっとだけこちらに来ていただいています。ご講演を終わられたらがんセンターの方に帰らなくてはなりませんので、終わったらぜひご質問ある方はお願いいたします。
では komaki 先生、お願いいたします。

It is a wonderful opportunity to meet someone from M.D. Anderson, Dr. Apted.　It's a real surprise to see her in Tokyo.　I agree with Dr. Ryan who described the multidisciplinary approach at the MGH, which is basically what we do at M.D. Anderson.　We are really specialized depending on the site.　And I know Dr. Thomas Lynch who is the Lung Cancer Medical Oncologist at the MGH very well through conferences.

I am going to speak today is that radiation oncology is one of specialties to treat cancer patients in the United States.　I went to the United States about 38 years ago and I did my rotation internship, so I had to go through all the different areas: pediatric, surgery, and hematology oncology. Finally, I decided to go into radiation oncology because of my background from where I grew up –

that was in Hiroshima and a friend of mine died of leukemia after exposure to radiation. So, I had determined to become a hematology oncology specialist or maybe a radiation oncologist when I grew up.

What we do as radiation therapy specialists in the United States may not really apply in Japan, but about half of patients who have a diagnosis of cancer, sooner or later, they will have some radiation treatment – that could be palliative, that could be post-op adjuvant, or maybe pre-op radiation treatment with concurrent chemotherapy. So, compared to Japan, I think we are using radiation therapy more often.

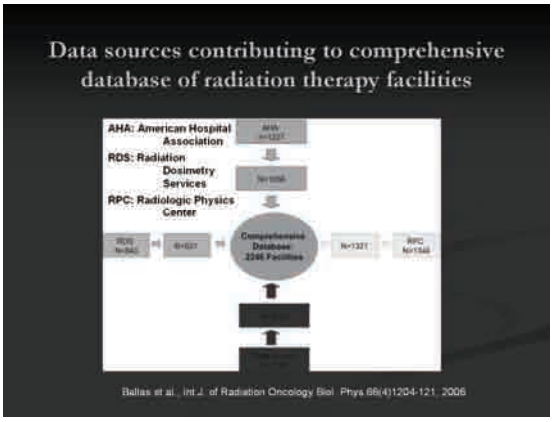
So, I would like to show a published data which was constructed from comprehensive database.

There were four different sources: each state hosts its own department, and one from the American Hospital Association, and one is a very strong group, the Radiologic Physics Center (I'm sure Dr. Khan used to get involved in this), and the

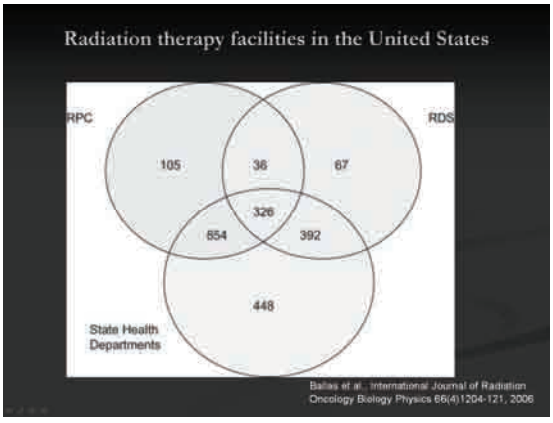
Dosimetry Services.

Therefore, this slide shows where the radiation oncology centers or radiation therapy facilities are in the United States.

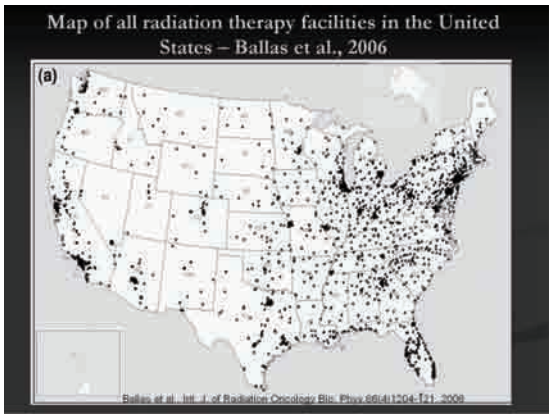
There are 2,246 radiation therapy facilities operating in the United States as of 2004 – 2005. Again, the number has changed already. Every year the number of radiation therapy facilities increases a little bit more.



This is a diagram of the American Hospital Association, the Radiation Dosimetry Services, the Radiologic Physics Center, and the state information.

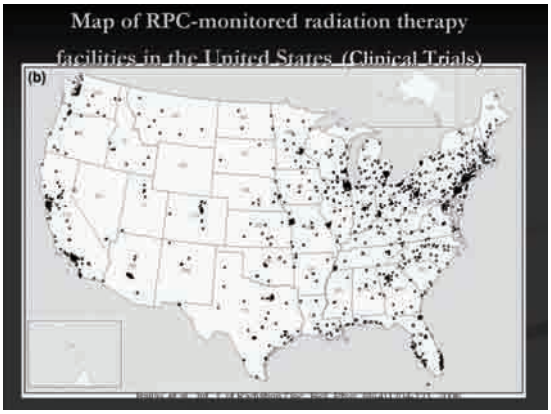


So, to put it together, they collected the numbers. Some of them, as you can see here, gave some information and there are 326 facilities overlapped from other places.



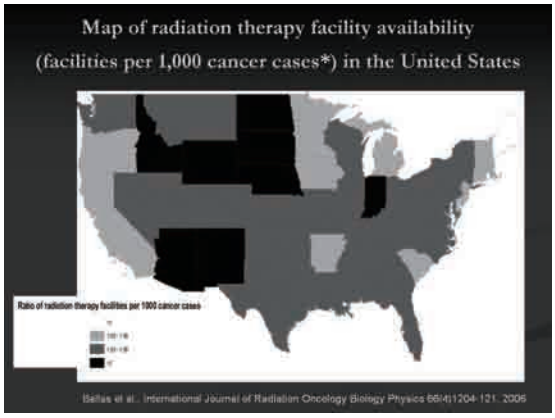
This shows how many radiation therapy facilities there are in the United States. As you can see here, there are a lot of radiation therapy facilities in the Boston/New England area. When I went to the United States, I started to do an internship and a radiation oncology residency program at a medical college in Wisconsin. And I lived there 14 years. It was very, very cold and I hated it. There was too much snow, like Boston. I moved to the Houston area about 20 years, but between that and Wisconsin, I worked at Colombia University in New York for about 3 1/2 years, between 1985 and 1988. I know this area well. The patients are very, very picky. They bring in so many questions. I used to treat breast cancer patients, and they usually showed up with a tape recorder and five pages of questions. They asked me if radiation was a type of carcinogenesis and how is it possible to use radiation treatment without causing cancer on the other breast. I had to be prepared to answer every question they had. They were ready to sue me over everything I said. So, I had to update my knowledge and that was tough, but also that was a kind of self-education. I had to keep up my knowledge.

Again, in California and Florida, there are many Radiation Oncology facilities.



And this is the Radiologic Physics Center-monitored radiation therapy facilities, which means that these are institutions where clinical trials are held.

This is Houston right here. There are far fewer areas compared to the previous mentioned sites. But they do have clinical trials at these facilities.



This shows the availability of radiation therapy facilities per 1,000 cancer cases. This is a little bit misleading because if there are not many patients with cancer and there are very few facilities, and they are shown in dark color. Actually in California and in the New England area, they still need more radiation oncologists according to this.

I would like to emphasize more radiation oncology training because I think this is very important for Japanese people.

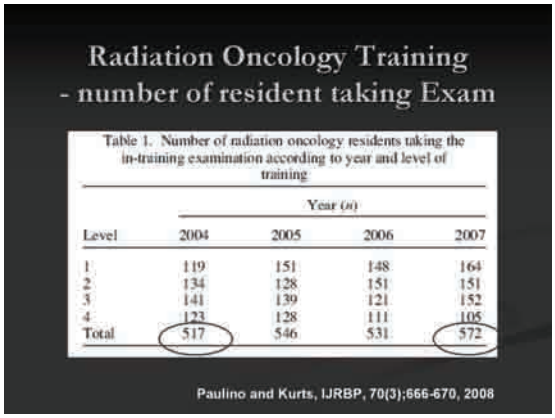
What I had to go through, well, to be honest, 38 years ago, was much easier compared to now. I don't think I could get into the Radiation Oncology training in UT M.D. Anderson Cancer Center now. When we interviewed applicants last year, there were almost 200 applicants for only four positions at the UTMDACC.

So, it is very, very tough to become a Radiation Oncology resident these days especially in certain Cancer Center with good academic back ground. They have to go through four years of college, and then four years of medical school, and a one-year internship (usually this is a rotating internship), and four years of radiation oncology residency program. And usually, at the end of the residency program, they take the written board exams.

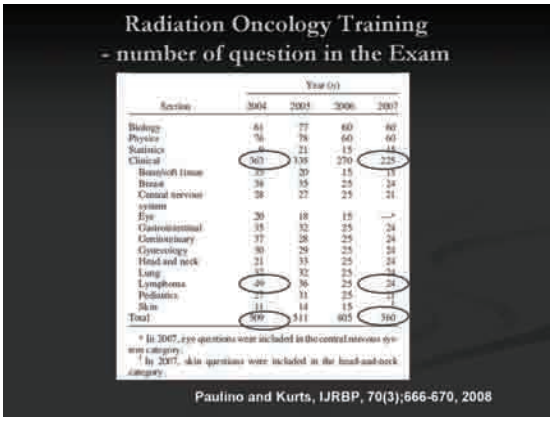
These days the rules have been changed. They now have to practice one year before they can take the oral board exam. I used to do an oral board examination about ten years. I had to go to Louisville, Kentucky to do the oral board examination. But in 2001, they decided that this is mandatory from now on; if you take a specialty board exam you have to repeat it ten years from now.

When I took the specialty board examination, which was in about 1979, it was permanent. So, when I was told in 2001, "You can volunteer to take this examination" I volunteered and I passed that year. That was a renewal. And then I got mail saying, "OK, you passed the examination in 2001, but you will have to repeat it in 2011." I asked to myself "Do I have pay $750? " My answer was "No way!! I have a permanent license and I'm not going to take another exam."

But, this is the direction we are moving to in USA which is a great way to keep up our own education. Gynecological oncologists and many, many specialists have to take the examination. They have to renew it.

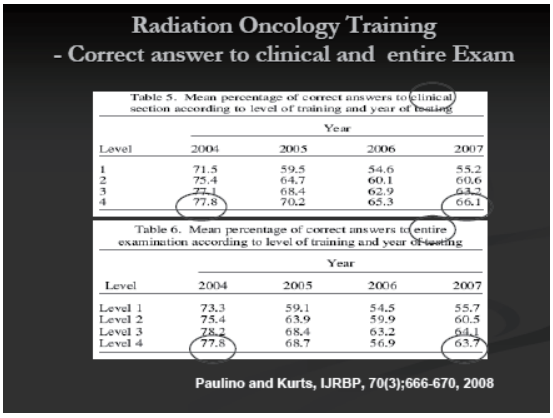


And this is the radiation oncology in-training examination. We have about 20 residents and three fellows. But the residents take the whole day off to take this in-house examination. The number of people taking this examination is increasing as you can see here. And this is the first-year, second-year, third-year, forth-year level.

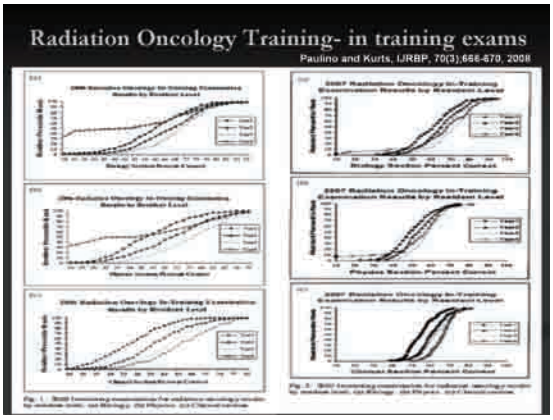


And this one shows what kind of examinations they are taking. You can see the difference in 2004 compared to 2007: there are fewer and fewer lymphoma questions. This is being overtaken by medical oncologists or hematologists and we don't see so many lymphoma questions anymore. The questions are decreasing. And also the total number of questions, though we do have some biology and physics, has decreased from 509 to 360.

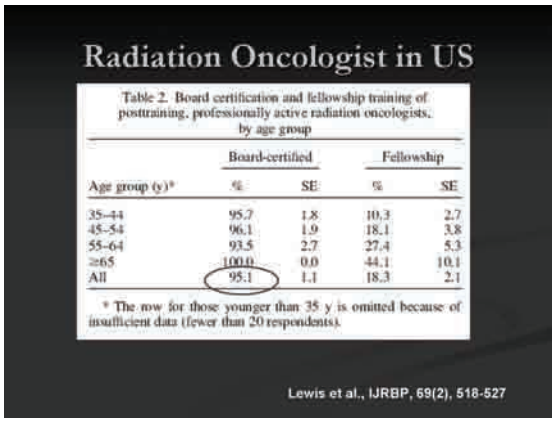
But because of the increase in Radiation Oncology residents, the questions have become kind of tough. This is the passing score. It used to be much higher. Now this is the score. I would like to show some examples of how they are preparing because of this tough examination.



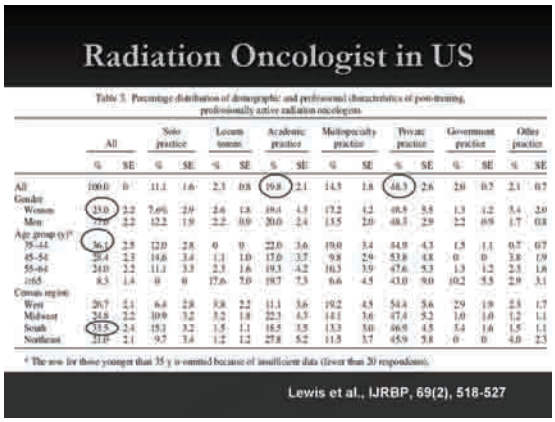
This shows the clinical part and the entire part of the examination. The score is much lower these days. So, what are they doing? Are they studying or what? They have to see a lot of patients too. So, it's not easy for them to study.



This shows the difference between 2006 and 2007. It's a little difficult to see, but what it shows is the different years – 1st year, 2nd year, 3rd year – and the levels are getting very close compared to a couple of years ago. What this is showing is that the examination through the American Board of Radiology is now on the website; they can see what kind of in-training examination they will have. And the answers and background are all displayed. So, they are learning how to take the examination. It doesn't matter what year of the residency program, they have started to get very close.



This screen shows the proportion of radiation oncologists by age.　And as you can see, for those 65 and older, 100 percent are working.　But amazingly, a lot of people are working almost full-time as radiation oncologists.



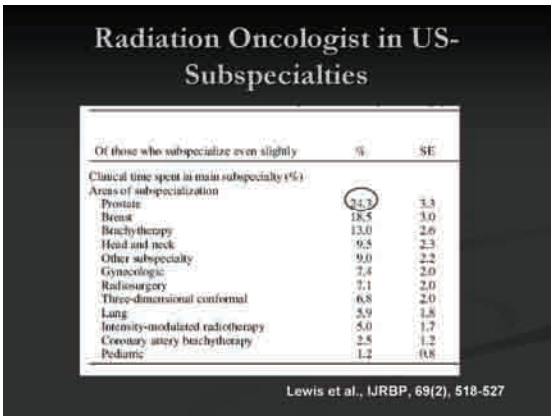
This shows the proportion of women.　About one-quarter of radiation oncologists are women. And about one-third is a fairly young group of people. But again, because the training is relatively long compared to neurosurgery or some specialty group, they are much older.　But again, these days, some of the people already have an internal medicine specialty and then they come to the radiation oncology residency program.　So, they are fairly old by the time they finish the residency program.

This also shows the geographical area that they practice, but I'll just skip this slide.

About 20% of radiation oncologists are from an academic institution.　These slide shows how often these people are working full-time.　About 72% are working full-time.　Actually, this is according to members of ASTRO who answered this survey.

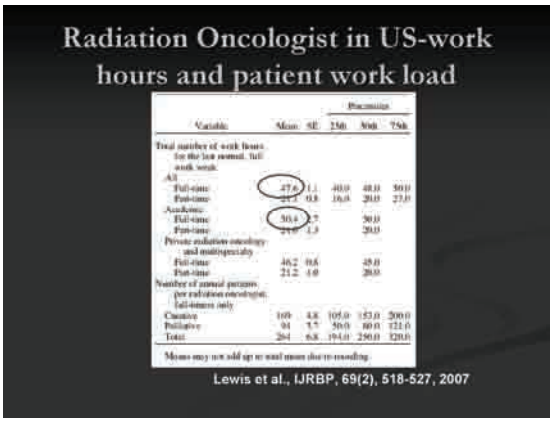
And about 80% of radiation oncologists overall are working full-time.

Here we see how many hours they work. Compared to surgeons, they may not work that long. But, the interesting thing is that there is no big difference between academic and private practice. About 50% of radiation oncologists are in private practice, but they do work very hard.　This may include attending educational meetings and so on. According to our previous residents who visited various private practices, they still work very hard.

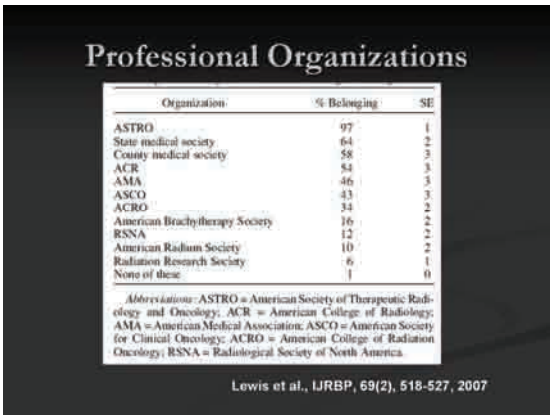


This shows what kind of cancer patients radiation oncologists are treating.

One-quarter of them treat prostate cancer, and the next is breast cancer, and then they do Brachytherapy.　Others including head & neck and lung cancer are a bit less.　And pediatric makes up a very small proportion here.

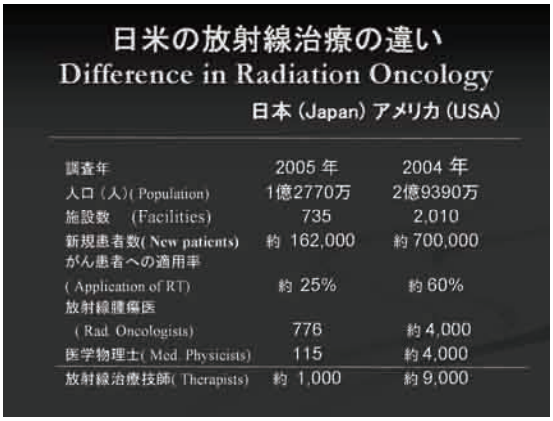


This again shows how many hours they work full-time, about 50 hours. And overall, including private practice and academic institution people, radiation oncologists work about 50 hours per week. But again, they have to do more writing, some research and also teaching.



This shows what kind of societies radiation oncologists belong to. They most frequently belong to ASTRO, the American Society of Therapeutic Radiology and Oncology. Next is a state medical society. And a lot of people belong to ACR, but this is decreasing because of the fees. The dues are so expensive – almost $700. And many of them, almost half, belong to ASCO.

Here we can see how often people move. People who have been practicing longer than 30 years don't move so often anymore. They might move up until retirement. But you can see here with the yellow line, these are people who have just graduated or finished training, they move a lot up to the first year or year and a half. About 70% of these radiation oncologists move. Because in private practice they may hire them on a temporary basis and then if they are not good enough, they may have to move onto somewhere else.



OK, this is the most important slide I would like to show today.

The differences between Japan and the US: the population is about half of the US, but there are over 2,000 radiation therapy facilities in the US and only 735 in Japan. As for new patients, they see about 700,000 compared to 162,000. And here 25% of all cancer patient care involves radiation treatment. So, radiation therapy is applied only 25% of the time – palliative, curative or adjuvant – whereas in the United States 60% of the cancer patients were treated with radiation treatment.

Here is the number of radiation oncologists. And in the United States, there are about 4,000, though it might be more now since this was for 2004. So this number is increasing. Compared to Japan, where there are 776 radiation oncologists. And there are a very small number of physicists - 115 compared to about 4,000 medical physicists involved in cancer patient care. They are not basic physicists; they contribute in IMRT and all of our plans. And here is the number of therapists. Again, we have a large number of people between this medical physicist and therapist. We have Dosimetry to do planning. That number is around

5,000, so we do get a lot of help.

For those of you who cannot read the Japanese, please guess which one is which. This one is Japan, and this one is the United States. And this one is Germany, and the U.K. So, I think that in Japan they can use more radiation treatment for patients with cancer.

This is the message from the United States.

Radiation therapy is one of the important parts of cancer care in the USA.

And there are an increasing number of elderly people in Japan, which has one of the highest longevity rates – women's life span is up to 87 and men is to 79. So, that means that by the time they get cancer they may be 85 years or older. How can this cancer be dealt with? Radiation treatment is becoming very important.

Japan has a very high level of technology. So, why can't we apply this high technology to treating patients? We really need to deeply consider this.

And again, as Dr. Ryan mentioned, in Japan we really have to create an Oncology Specialty in different modalities. When we see a new patient at M.D. Anderson, there are three modalities, sometimes four. The medical oncologist, radiation oncologist and surgical oncologist see the patient together. Sometimes the pulmonologists or diagnostic radiologist gets involved. But we present the patient and decide what is best for the patient, not for us. And even if a patient comes to see me, and I think that the patient really needs chemotherapy or can be operated on first, I will refer the patient to the surgeon or medical oncologist. So, it is very important to think in a multi-disciplinary approach.

This is the conclusion of my talk on the essentiality of having radiation treatment as a part of cancer care.

Radiation oncologists need to know physics and biology including, more often, molecular biology. I was so impressed by all the molecular-targeted treatment. Now we can combine this with radiation therapy, chemotherapy. We are trying to make cancer care a chronic disease care. So, they don't need to be totally cured. Patients can live with cancer as long as it is suppressed.

This is very important to educate medical students – they really have to know what a cancer specialist is. Also, in Japan, they really need more medical physicists and dosimetrist to help the radiation oncologist. We cannot do it by ourselves. When I went to M.D. Anderson about 20 years ago, I was the only attending treating around 50 lung cancer patients, with only one fellow. And I was almost dead by 7:00 in the evening. I was just checking all the films. And now I have seven attendings that treat just thoracic malignancies. I am really fortunate to be supported by other people. So now I can leave town like this. Otherwise, I could not be here.

I would like to recommend those of you here who are really interested in education, to read the book, "Preparing for the Future of Radiation Oncology." This was written by my husband, James Cox, M.D. and also by Tom Buchholtz, M.D... This provides a good opportunity to educate radiation oncologists or those in other specialties, on being a specialist in cancer care.

So, that is my last slide. I'll be happy to take any questions.

Ms. Karasawa: komaki 先生ありがとうございました。なんて言っていいんですか、ほんと、言いたいこと全部言っていただいて、先生は日本の現状よ

くおわかりなので、客員教授でほんとに良かったと思います。
ご質問ございましたら、komaki 先生はお帰りにならなければいけないので今お願いします。

Dr. Komaki:
What she was saying is that why they do not have enough Radiation Oncologists in Japan that I understand the Japanese situation.

Question 1:
アメリカはいろんなシステムが早く立ち上がってどんどん進んでいくっていうか、日本は必要性を感じて後づけでそういうのができていくと思うんですね。クリエイティビティというか・・・・How did you develop or create new specialists like dosimetrist or physicists or other advanced nurse practioners?　Do you have any, uh…

Dr. Komaki:
One thing I have to mention is that I think that MGH is a more conservative place.　M.D. Anderson is like the Wild West or more liberal and they can do a lot of things, although we follow our institutional rules.　But in Japan there is a pyramid system, and if the professor does not agree, it doesn't go anywhere.　I think it used to be like that maybe in the United States too.　But when I went to the United States, the difference between Japan and the United States was that the medical students or residents always asked questions.　That was forbidden in Japan.　When I was a medical student in Japan, I wasn't supposed to ask or discuss any questions with our professors.　Discussion or conversation was really limited.　Asking questions to our professors was thought to be very rude.　But, in the United States if you get any questions or ideas, it will be discussed openly.　I'm a tenured full professor, but many medical students ask me questions.　And I never say, "That's a stupid question," or anything like that.　We think that we can discuss it or pull out some articles or maybe we can do some research.　Most professors are very open-minded.
And then, everything is evidence-based.　Whenever there is evidence, we move.　And we move faster, as long as there's evidence.　Of course, in Japan, there is the group mentality, and high pride, and the thought that this is the way we have always done this.　I think that exists much less in the US, and so things move faster.

Again, Janis mentioned about mentoring.　We try to get some mentors and to move up faster.　For example, some women felt like they were being discriminated against and they looked for someone to talk to.　In all areas, we try to help each other in order to make things better.　I think that in Japan they need to be more open-minded about medicine and that everything has to be based on evidence.　Not just, "this is what I have done."　We can't do that anymore.

Q1 (cont'):
Thank you very much.　So, the key words are "open-minded" and "evidence-based medicine" and "mentoring"?

Dr. Komaki:
You have to be proactive.　You have to say, "What I would like to do is…"　Otherwise, no one will read your mind.　The one problem I face with a lot of visitors from Japan is that they don't say what they want to do.　The United States is a mixed group of people, so unless you speak up and describe what you would like to do, nobody can read your mind.　In Japan, it is very homogeneous. So, we don't need to say much.　Everybody can figure out what you're thinking.　But in the United States it doesn't work like that.　So, medical students, even when they were children, they had to express their desires, rather than being told by their parents.　I didn't need to say anything.　My parents decided everything.　It doesn't work like that (in the US).　So, if they try to improve something, they have to make up the goal and express their desire to do

something since they were young. Otherwise, nothing improves.

Question 2:
Thank you very much. I think if we think about the difference between Japan and the USA, the individual person in Japan is a nice person…

Dr. Komaki:
Yes. I agree 100%. That's why I love being back here.

Q2 (cont'): …
but the system is poor. In America, the individual person is not so good.

Dr. Komaki: Well, I don't know. I can't say that.

Q2 (cont'):
No, no. Sorry. But, the system is wonderful. I think this is the first difference. I think how we choose leadership is different from America. How we choose leadership in Japan may be different from America, so therefore, there is a big difference. So, we should think about how we choose leaders. I think this is an important question.

Dr. Komaki: Yes. I think that is very true.

Q2 (cont'):
I have an answer, but I can't discuss it now. Later, privately.

Dr. Komaki:
I think there is some misunderstanding of what people are thinking in the United States. When I went there, I couldn't understand what they were saying, although I could read and write English fairly well. Therefore, I misunderstood what they said to me. But, actually, there aren't so many bad people. They don't have much patience. So, if we don't understand what they are saying or have some miscommunication, you have to ask them to repeat their questions or comments. When I worked at the Columbia Medical Center living in Manhattan, NYC, it was tough after living in the Mid-West. And I learned very quickly that there were not so many nice people there. But, afterwards, I think the people are very open-minded and they love to discuss everything openly.

But, I don't know if they choose leaders is wisely. I'm not sure. Sometimes their judgment is not very good from Japanese standard point.

Ms. Karasawa: ちょっと時間が遅れて申し訳なかったんですが、これで komaki 先生はがんセンターの方にお戻りになりますので、最後に拍手をお願いいたします。

6. Medical Physicist:Roles, Responsibility, and Education

(Guest Speaker: Faiz M Khan, Ph.D.)

Ms. Karasawa, Associate Professor (Speaker introduction):
Let me introduce Dr. Khan in English. Dr. Khan is originally from Pakistan. His first major was physics, not the medical field. He went to the United States and changed his major to biophysics with specialization in medical physics. A medical physicist is an essential person in performing radiation therapy. But in Japan, we have very few medical physicists. He will talk about how to promote and educate medical physicists in Japan, so that we can establish a system. And we will start education in this area from April.

Would you please give us your lecture?

Thank you, Dr. Karasawa.

I fully understand Dr. Komaki's feelings about living in Wisconsin for 14 years. I have been living in Minnesota, which is colder than Wisconsin, for 45 years. So, we can empathize with each other quite well.

This is a quotation from a very famous radiation oncologist, a pioneer, Ralston Paterson. Those of you who are associated with radiation oncology will know that the 'Paterson-Parker System' of Brachytherapy implants, his rules are still being applied in the world, how to implant Brachytherapy interstitial/intracavitary. And he said in 1963 in his book, "In radiotherapy, the physicist who has given special study to this field is a full partner with the therapist, not only in the development of the science, but in the day-to to-day treatment of patients." This is a very radical statement dating back to 1963. It took many, many years before radiation oncologists realized that physicists were part of the team of radiation therapy.

This afternoon I will talk about what is the role of medical physicists in radiation oncology.

This is a basic radiation therapy team. This is well established; it's not just my opinion, but is well established in the world. There has to be this team of four essential individuals, besides the nurses and others who are also very essential: the radiation oncologist, of course, the medical physicist, the dosimetrist, and therapist. We call them 'therapists' now, though usually in the past they were called 'technologists.' Now if this team is not in tact, operating in radiation oncology, I think the treatment of patients can be very difficult, if not compromised.

This is a sample of the responsibilities that a medical physicist has. The first is the equipment evaluation and specification. The equipment for radiation oncology is very complex. It includes a linear accelerator with all kinds of imaging equipment on board. And there is nobody on the radiation oncology team other than the medical physicist who fully understands how this equipment works. Of course, physicians are very bright and they can go in and do all kinds of things, and

therapists or technologists can actually operate the linear accelerator, a dosimetrist can go in and plan a treatment. But actually it's only the medical physicist who knows what the computer is doing, who knows how much radiation is being put out by the linear accelerator, and other complex facets and features of the equipment.

Calibration of the equipment, of course, is the most important task the medical physicist has. In other words, you calibrate the accelerator, the radiation-producing machine, as to how many units of radiation are being put out per minute or per operation time. And remember, that in treating cancer patients, we have a very tight accuracy to maintain. There have been studies in radiation oncology, where it has been demonstrated that if the radiation dose delivered to the patient, to the tumor, is beyond +/- (plus/minus) five percent, either the patient will be injured or the cancer will reoccur. So, in other words, with this tight margin of +/- five percent accuracy in dose-delivered-to-the-patient, that actually is a very difficult task. And for that, the medical physicist really has to calibrate the machine very accurately. Probably within +/- one percent accuracy, because there are other errors that occur on the way, such as how the patient is positioned under the machine, where the feed is directed, and all kinds of other kinds of facets of the treatment that can introduce errors. These errors can combine together and exceed +/-5%. So, if the studies have shown that +/-5% is the only window that you have to operate in, then every step of the way you have to make sure that the radiation applied is accurately delivered. And that is part of the calibration of the accelerator. And nobody, actually, is qualified to calibrate the machine other than the medical physicist. If somebody does, in the United States, who is not a medical physicist and calibrates the machine, there will be tons of law suits. There have been in the past, but not anymore. So, that is the most important task.

Now, when the machine is purchased, a modern linear accelerator nowadays will cost between $2 – 3 million, this machine is very complex, so who has to test it first? Because the vendors, the companies, they have engineers, but they don't have medical physicists really on staff. Some of them may have one or two, but they cannot really test the machine in the factory and commission the machine in the factory and say, "OK, you take this machine and then start treating the patients." You can't do that.

So, after the machine has been installed by the company and the engineers, then it is the physicists job to obtain the beam data, make sure the beam data is correct, make sure that the beam profiles are correct, make sure that all the properties of the radiation that are going to be used is according to specs. So that actually takes, on average, about a month or two months to test the machine out before it can be released for patient treatment. That's a standard procedure and you can't get around it or patients will be injured.

Then there are other ancillary things that physicists are supposed to be doing, like radiation therapy facility design. The linear accelerator requires a lot of shielding so that the outside public is safe because radiation can leak out of walls, it can leak through the doors, it can leak and do all kinds of things. So, it has to be contained in a room. For those of you who are not in radiation oncology, a linear accelerator will typically take up to eight feet of concrete in wall thickness, as well as lead in the door and all kinds of features to contain the neutrons. It's very complex thing to design a facility. And actually only the medical physicist can design this kind of facility. That's one part of the job. Although vendors will give you standard designs, that doesn't hold good, because the design depends on how many patients you are treating, how much radiation you are putting out, and so on.

Then dealing with the regulatory agencies, treatment planning,… Quality assurance is another very important task that medical physicists have.

I could go on and on and talk about each one of those topics, but I don't I don't think time allows me to do that.

I think in the University of Minnesota (which I really take pride in, I've worked there for about 35 years) we have a slightly different system than many other radiation oncology departments, even in the US. We place a lot of importance and responsibility to the medical physicist. For example, each patient is assigned a physicist. In other words, in his chart, it not only notes that this is such-and-such doctor's patient (the doctor's name is there), but there is also the name of the physicist who is involved in the physics work-up, you know the core treatment planning and so on. The physicist's name is also listed there because if any problem occurs they will call the physicist to help. So this is unique, very unique in our department.

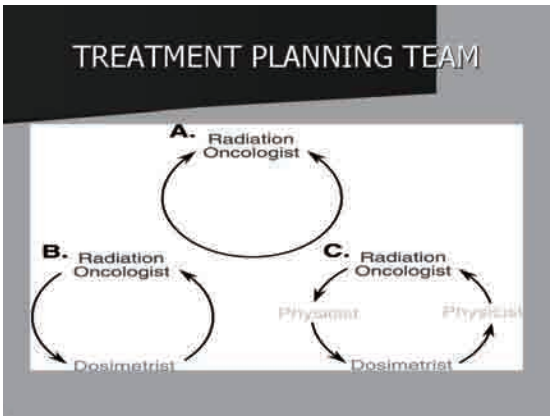
The physicist is present at the time of simulation of the patient. That's when the physicist has to learn what the patient's needs are as well as the physician. So you work together to work on the patient because there are several problems that can arise right at the time of simulation.

Then, sometimes the patient requires that you have to measure the dose in the patient in vivo. Who can do that? The medical physicist is the only one who can do that.

And the medical physicist actually participates in treatment planning, although physicists may be helped, nowadays in the US especially, by dosimetrists. But the physicist is the one who is in charge of treatment planning. He may or may not personally do the planning for each patient. Dosimetrists are like operators of the treatment planning system, which is computer-based software.

And, also, in our institution, the physicist participates in daily treatment-planning conferences. Every new patient that is going to be started or has started, has to be presented in a treatment conference where there are radiation oncologists (more than one, because one radiation oncologist in the treatment planning conference has no input from anyone else, so there has to be more than one radiation oncologist), there has to be a physicist there, there has to be a therapist there and so on. Everybody is in a team, the people that are there, so they can question the treatment. A lot of times people think that nobody can question a physician as to what that physician is doing. We have an exception in the team: the medical physicist can question and say, "Why are we treating this patient this way?" based on his scientific knowledge.

And then treatment is evaluated jointly by the physician and the physicist.



I have drawn this kind of chart, the patterns of physicist-participation in the US. We are very proud of radiation oncology in the US, but, there have been patterns-of-cares studies where some institutions are really not operating the way they should. It's getting better, but it didn't used to be as good in the past.

For example, ‘A’ shows that the radiation oncologist makes all the decisions. Well, that’s really bad. It’s not allowable anymore, OK. That’s the most extreme situation.

While in other situations, a radiation oncologist and a dosimetrist work together and nobody else is in the loop. Dosimetrists are good operators and can operate the treatment planning system, but dosimetrists do not understand what the computer is really doing, what the algorithm is behind those calculations, how accurate and how valid the treatment plan is. So, that is actually happening in a lot of institutions in the US, in spite of the fact that there has been a lot written against that type of practice.

‘C’ is the radiation oncologist works with the physicist, works with the dosimetrist, again, evaluates the plan with the physicist. ‘C’ is the ideal type of teamwork that has to happen in order to make sure that the treatment is safe and effective.

I will spend a few minutes on speaking about what the American College of Radiology has recommended in what they call the ‘Blue Book.’

This actually gives you guidance as to how many radiation oncologists you should have, how many medical physicists you should have in an institution, how many dosimetrists and so on.

Now, this was written in 1991. It has not really been updated yet, which is too bad. But, if you follow their guidelines, it’s very easy to update them. But, first you have to follow these guidelines. The guidelines say that there should be one Radiation Oncologist-in-Chief. There has to be some chief. We were talking about leaders, and there has to be one leader in radiation oncology who is in charge of making sure that everything is going accordingly.

Then you can have additional staff, additional radiation oncologists for each additional 250 patients treated annually. That’s the guideline.

And then there is also a guideline that a physician, a radiation oncologist in this case, should not be treating more than 25 – 30 patients at a given time. The reason is that if you have more patients than that, you will not be able to give the patients the full attention that they deserve. You are running around constantly doing this, this and this, but you are not paying attention to the complex disease that you are treating for those patients. So, that is another guideline.

Now, the guideline for medical physicists is that there should be one per 400 patients treated annually.

And then, if you are treating more than 300 patients, you should have a dosimetrist.

Now, for technologists/therapists who operate the machine, there should be two per megavolt of unit. That means it’s just like an airplane, you know. You have to have two pilots. It’s only the technologist and the linear accelerator, and they are the only ones treating the patient at that time; a physician may not be there. It may only be the technologist, the patient and the linear accelerator.

Now, there are a lot of steps they have to go through to set up a patient. And if the technologist makes a mistake – sets up a wrong distance, sets up a wrong field or something – that would be very unfortunate. Therefore, you have to have two: one sets up and the other one helps and checks what the other one is doing. There is a checklist for most complicated treatments. That’s why there is a requirement for two per machine.

Now, as I said, this book was written in 1991. Things have changed since 1991. ‘Blue Book’

guidelines must be updated in accordance with the sophistication of the equipment and clinical practice. If you have IMRT, if you have Image-guided Radiation Therapy, if you have Stereotactic Radiotherapy, if you have High Dose Rate Brachytherapy, if you are using proton therapy, and so on, these are very complex technologies of the current era, and therefore, these were not available at the time the Blue Book guidelines were written.

So, with these modalities of treatment coming in, you have to make sure you have got enough staffing, more than what the 'Blue Book' guidelines call for. You have got to use good judgment when you are doing your work. So, here, the institution has to pay attention to how much more staffing they will need because of these modalities they are getting into.

Also, if it is an academic institution, you have to give your staff time to teach and research, and that requires more staffing. But if you have one physicist per institution, he is running around all day taking care of patients, he has no time to do research. Well, that's not an academic institution. In my mind, being 'academic,' means you have to do teaching and research.

Now, medical physicist's qualifications. Very simple. You have to have a Ph.D. or Masters degree in physics or a physics-related field. There are physics-related fields like biomedical engineering or medical physics; there are degree programs for medical physics, any of those you have to have at least a Ph.D. or Masters.

Then, even after he has received a Ph.D. degree in physics or a physics-related field, this physicist is not ready to work in the clinic. He will not know anything about what is going on in the clinic. So, this person has to go through training. It's called 'clinical training' and hospital-based, that means this person works with patients under the supervision of a qualified medical physicist. So, that's the hospital-based clinical training. We call it the 'medical physicist residency program.' Just like the physician's medical residency program.

They have to have that program out of the way before they take a board certification exam. Medical physicists also get Board certified by the same board that certifies radiation oncologists. So they have to have residency training before they are accepted for board certification.

The American Board of Radiology, which certifies radiation oncologists, has been examining medical physicists including me and others, who are from the 'old days' when there were no residency programs. They would actually have a medical physicist spend a few years, three or four, under the supervision of somebody else who is board certified, and work as a student for several years and then he could take the examination. But, it was found that nobody really knew what kind of program they went through – there was no structure to it, no organization to it. There was just a letter of recommendation: "Oh, yes. This person has worked for me for four years and I think he is qualified to take the board examination." They found out on the board examination, which I have had the privilege of examining for 20 years, we found out that these students were very poor and didn't understand many things.

So, after a lot of meetings and all of that, the American Board of Radiology is going to require that "you must have 3 years of full time equivalent clinical experience…..under the supervision of a certified medical physicist." Now this is grandfathering, still… No, I'm sorry. That is the old system. You must have "two years of clinical residency plus one extra year of clinical experience under the supervision of…" This is the American Board of Radiology's current requirement.

But, the American Board of Radiology's requirements in 2012 are going to be, that the medical physicist candidates must be enrolled in or have graduated from a CAMPEP, which is an organization that accredits residency programs, a CAMPEP-accredited education program with an MS, Ph.D. or residency. So, that isn't very rigorous either.

It really becomes rigorous in 2014 when candidates must be enrolled in or have completed a CAMPEP-accredited residency program before they can sit the examination. So, in 2014, no physicist will be certified unless they come through an accredited residency program. That's a great development, as a matter of fact, and I am happy that they came up with this requirement. They couldn't do it right away because then a lot of physicists would not be able to take the exam and there would be a big shortage. But they're giving you about six more years to get your act together to get your residency program established. So, we are on the right track now.

Now, I have this comment on medical physicists in Japan.

I actually have had the privilege of coming here to Juntendo for a month in 2005. We worked on and commissioned a machine and all of that, but at the same time I found out that there was an acute shortage, in fact, I was really flabbergasted that there are not many medical physicists in Japan, although the equipment is very advanced and they're doing proton therapy. They're doing IMRT; they're doing all kinds of fancy stuff, but no physicists to show for it. It was all done by the physicians and technologists, which was really a shock to me.

However, after the shock wore off, I worked with Dr. Karasawa and others in trying to come up with some way of getting more medical physicists trained in Japan.

So, together we developed a 5-year plan, which Juntendo University is now following. In which case they are sending medical physicists to go to the US to get their residency training, take the board examination, then come back here and work. So that after five years there will hopefully be enough board-certified medical physicists here that they can start their own residency program and actually, CAMPEP, the accrediting body, will come here and accredit the program if they are following their (CAMPEP's) guidelines. So, that is the plan.

It is imperative that financial investment in acquiring state-of-the-art radiation oncology equipment and facilities be matched by investment in staff that are responsible for the efficient and safe use of the equipment.

The five year plan instituted by Juntendo for the establishment of accredited medical physics residency program is a great development. Juntendo has taken a leadership role. And I wish them great luck.

Dr. Karasawa:
Thank you so much, Professor Khan.
Do we have any questions?

Question 1: Thank you for giving us a very excellent lecture. I have one question. Professor Komaki has shown that about 1/4 of cancer patients receive radiation therapy in Japan. In contrast, more than 60% of the patients in the United States received radiation therapy. What is this reason due to? This could be because there is a shortage of medical physicists. What do you think about that?

Dr. Khan:

I don't know exactly if that's the cause. It could be a cause, but I think it is a tradition. Traditionally, radiation oncologists have not really involved medical physicists in the treatment process. And, actually, medical physics as a profession has not been recognized in Japan compared to the US. We actually used to have the same situation you have now, maybe 20 or 30 years ago. The first residency program established in the US was in 1993. So, you can see that we also started very late. And I am proud to say that it was my institution that had the first residency program in the US. But, now, still, there are only 15 residency programs. And each residency program may have two or three medical physicists being trained. So, it is not an awful lot of people being trained. But, this board decision not to allow these physicists to come in and get board certification without going through a residency program is presently being debated so much that people are panicking about what to do now. We need physicists, but how do you get them board certified? So, hopefully, that will let people institute more residency programs. You can get in on it in the same way.

Q1: OK. Thank you very much.

Question 2:
Thank you. How is it feasible to get accreditation by the CAMPEP program for institutions in Japan which is far away? Is it within the regulations or rules of CAMPEP?

Dr. Khan:
Actually, all the rules, regulations and system for establishing a residency program are available from US-based CAMPEP. If you go on their website they will give you the entire program. They will say you should have this and that, so you follow those guidelines that they have. And after you have everything in place, and if you already have board-certified physicists, like we plan to have at Juntendo, then they already have board-certified physicists working there (there have to be at least two), and then you have to have good equipment, you have to have board-certified radiation oncologists, and all of that. These are the requirements. If you meet those requirements, then all you have to do is fill out a big form, very thick, and write down the program you have; you then send it to CAMPEP. They will look at it and if they think you have met all of the requirements, then all I think they do is send a team of three or four people who are medical physicists to come and visit your institution. And, maybe in two days, they will decide whether you meet all of the requirements and will be accredited for five years. And then after five years, if you want to be accredited further, you just invite them. There's no problem in getting the program accredited if you follow their guidelines.

Q2 (cont'):
OK. Thank you. But, we in Japan are going to establish Japanese guidelines for education and training medical physicists, we are just starting, following the American system, and so the Japan radiological society is creating a thesis…

Dr. Khan: Good.

Q2 (cont'):
And so, it's just starting. That should be the authority in Japan to certify medical physicists. But, while this is being established, the CAMPEP system should be very helpful.

Dr. Khan:
That's right. As a matter of fact, I feel with what Jutendo is doing, this will become the nucleus of training people. And then there will be other institutions that follow the same pattern, and pretty soon you will be at the same level as the US is. If the will is there, you can do everything.

Q2 (cont'):　Thank you for your advice.

Dr. Karasawa:　Any other questions?

Question 3:
One more question.　How many medical physicists are you producing each year right now in your country?

Dr. Khan:
In the US, probably maybe 30 physicists are certified and 30 physicists are passing their residency, and then taking the board examination. But, as I said, the Board still allows people who come from outside of the residency program. So, they are examining, maybe, 200 physicists a year.

Q3 (cont'):
Has the number been increasing or decreasing?

Dr. Khan:
It has been increasing, constantly.　But, now the problem is that in 2014 they have to come to a residency program.　That is a big hurdle that they have to get over.

Dr. Karasawa:　Thank you, Dr. Khan.

7. Panel Discussion

(Right to Left)
Ms. Saito
Ms. Apted
Dr. Ryan
Dr. Khan
Dr. Karasawa

Ms. Saito:　OK, so let's get started with our panel discussion.

Dr. Karasawa:　Please comment to the Japanese about how we can establish an educational system in Japan.

Ms. Saito:　Well, we have many problems in our medical field, especially our oncology field in Japan. For example, we don't have many medical oncologists, physicists, and radiation oncologists. Also, we are running short of surgeons and gynecologists and pediatricians.　Because these days, the young generation, young physicians prefer jobs or select jobs considering work-life balance or cost performance.　Could you give us some comments or suggestions on that?

Ms. Apted:　I think this is a problem we all share. In my country, Canada, we're having the same problem with academic medicine not being as attractive as it once was.　Even medicine.　A lot of Canadian physicians have moved down to the States because they can make a lot more money in the States.　But, even the States has its problems with young people not wanting to sign up for the hard, very demanding intellectual, and in other ways very demanding life that academic medicine is.　I think it's one of the toughest professions in the world, certainly the most demanding in terms of time.　So, I think what we have to do, in the States as well as Japan, we have to make these careers feasible for people to do, exciting (they really are exciting careers).　The reason I've been in medicine for 35 years is because it is an exciting field: so many changes, so many wonderful things happening, so many opportunities.　We have to communicate this to the young people and get them invested in coming in.

We also need to change our institutions so that they are more flexible, more accommodating to younger people who have different value systems than we do.　I'm 60 years old.　What my daughter who is 22 is looking for is a lot different than I have experienced in my career.　So we've got to be more open-minded and figure out what's going to attract these talented people and keep them with us.

Dr. Ryan:　It is a wonderful profession being an academic oncologist.　I think there are two things in talking to you about medical oncology in Japan that need to happen.

One is I think there needs to be a separate specialty for medical oncology within your system. It sounds like it's a shared responsibility right now and it needn't be that way.　There should be an impetus to make it a separate specialty.

The other interesting thing, and this gets to the dynamic of how we pay for health care today, is how do you incentivize a society to value academic medicine and how do you incentivize a society to value medical oncology, in particular?　You might make the argument that in the United States we actually incentivize medical oncology too much, which is why we can't get enough people to stay

with an academic career because there is too much incentive to go into the community. So we don't have it perfectly either, but we are constantly trying to create this balance.

Those would be the two biggest or largest things that come to my mind after listening to everybody talk today.

Dr. Khan: Well, I'm not a physician as you know, but I'm a medical physicist. In order to create an interest in medical physics, first of all, I think that Japan has to have some good residency programs and train physicists working in the medical centers. And once the pure physicists see that, they will be curious and they will try to find out what these medical physicists are doing.

In the US, what we do sometimes is we have the AAMP, American Association of Medical Physicists, put out special programs to attract pure physicists to get into the field. And I think Japan also has a medical physicists association and they should put out programs as to what it entails and show that it is an exciting field. Because physicists traditionally are working either with the stars or some esoteric stuff, or I shouldn't say 'esoteric.' It's basic knowledge. But they have no idea, per say, as to what medical physics entails. And I think your medical physicists association should put together a program where people can come and learn.

And also, the biggest incentive in my experience has been when people have come and asked me, "Should I get in medical physics or not?" I say that actually they should get into medical physics if for no other reason than that the salary is twice as much as in pure physics. So, that's a good incentive for them. The salary of a medical physicist is derived from patient revenue. Therefore, their salaries are about twice as much as that of pure physicists.

And, secondly, research is a great attraction for physicists. I don't believe that there are any physicists that don't crave to do research. This is the most basic science in the world. Mathematics and physics are the two most basic sciences. And research is an integral part of it. And when a physicist finds out that he can do some research with linear accelerators, with treatment designs, and so on, that's a great incentive to get him in.

Ms. Saito: (Question about medical physicist's salary)

Dr. Khan: It used to be that the head radiation oncologists had some idea about how much their staff in the medical physics should be paid and so on. Then the administrators came along, and, you know, these are business people. They are not doctors or anything. They are just administrators. And when they invest millions of dollars in the equipment, they want to hire physicists.

As far as who decides about how much the salary should be, the medical physicists association has surveyed all the medical physicists in the association as to how much each person is getting, not individually, but as to how much radiation oncologist physicist should be paid – average salaries. The top ten salaries and the average salaries are published every year.

So, if in your hospital, you want to find out how much your physicists should be paid, if you have these surveys, you just go in there and say my physicists should not be the least paid, but should be average if not a little bit more, depending on the qualifications, depending on the experience, and so on.

So, although it is also tied to the standard of living and so on, of course American physicists are the highest paid in the world. But this is done by surveys to find out how much you pay.

Question 1:　I have a question to Dr. Ryan. Mainly we are talking about how we educate specialists from oncology, but the other concern we need to think about is how we educate medical students, because until recently, we didn't have a particular program or curriculum for oncology in our university.　But, last year we established this curriculum and it has just started.　What do you think about education for medical students in the oncology field?

Dr. Ryan:　I think that's a wonderful thing that you've done.　In the medical schools in the United States the curriculum does include oncology topics from the beginning, and it's woven into the fabric of their education through years One through Four. And it's not uncommon that if you come and visit us in the oncology unit, that we will have several medical students rotating through our programs. Usually there are always one or two medical students on the oncology consult service, on the hematology consult service, on the blood-banking service.

There are also ambulatory rotations where they get to pick which ambulatory clinics they would go and shadow the attending.　So, several times a year I'll have a medical student just shadowing me in the afternoon or in the morning as I'm seeing patients. And the feedback has been tremendous.

Just to show you how fast things can change, when I was applying for fellowship in 1995, I was the only person.　I went to Columbian Presbyterian, where we weren't very nice, and I was the only person in my residency program that applied for oncology. It wasn't very popular.　And I have to say that now medical oncology in the United States is second to cardiology in being the most popular specialty that residents apply for.

So, change happens, and can happen, extremely quickly.　I think integrating medical students within the program, when it sounds like you are moving toward oncology fellowship, that there hopefully will be a panel of applicants ready-made for you because of these types of programs.

Q1:　OK.　Thank you very much.

Dr. Ryan:　I have a question.　Do patients seek out experts in cancer care?　Because in the United States, one of the drivers of oncology care is not the government, it's the patients.　The patients demand to see an expert in that particular area. And so, that's one of the reasons people come to see me, because they want to see a gastro-cancer expert, somebody who gives the chemo.　But, is there not that drive among patients in Japan?

（会場内の参加者から質問）

Dr. Ryan:　If you look at the Internet, it is loaded with that aspect.　The other thing is that people flock to cancer centers, regional cancer centers, because patients expect to see a specific expert within that regional cancer center.　So, if they don't know the name of a person, they will go to a regional cancer center because they know that they will get an expert in that particular field. Every major city in the United States has one, and every major hospital is trying to develop a cancer center because they want to keep the patients from moving from their center to the one across the street

（会場内の参加者から質問）

Dr. Ryan:　Each cancer center has its own website, but there are patient forums…

（会場内の参加者から質問）

Dr. Ryan:　Who chooses the doctor?　Well, right now we have so many patients and so few doctors that, typically, it's whoever has an open spot.　So,

not everybody who wants to see me can see me, for instance. Just because I'm the leader of the program, I have a little bit more visibility. But we run a program where I think that everyone is outstanding. The other thing is that we also present all the new patients each week in clinic. So, everybody has a fairly good feel for how each of the patients is getting treated. But the patients don't necessarily get to pick which doctor they're seeing.

（会場内の参加者から質問）

Dr. Ryan: It's very hard. I think there is only so much time in the day for some people. And, every cancer center has their go-to physicians that everybody wants to see. But we set up programs where we tell patients that Dr. so-and-so will review that particular case, but won't be able to take care of you. And most patients are OK with that.

（会場内の参加者から質問）

Dr. Ryan: But, cancer patients can't wait, so typically they see one of the junior attendings. One of the interesting things that we've noticed (you know that I run the clinic), is basically for a busy clinician in cancer right now, to stay at the same level of busyness, they only have to see about 10 new patients a month. And the reason for that is that their existing patients are living so much longer, and the treatments have become so much more intense, that they don't have to see that many new patients to maintain a full clinic.

（会場内の参加者から質問）

Dr. Ryan: There are only so many slots that people can fit into. Our biggest problem right now is hiring new medical oncologists. There are just not enough to go around… which drives up the salary.

Ms. Saito: Can I go back to that problem I mentioned previously? In order to balance the number of staff in each division, keeping a division attractive is very important, but do you think that government involvement is necessary to control the number of staff in each division? As I told you before, we are running short in some types of staff, for instance pediatricians or gynecologists. In your country, does government control of the number of staff exist?

Dr. Karasawa: Of doctors and also medical physicists. Is there any government control for the number of medical staff?

Dr. Khan: It's not because the health system is different there. It's not a government-sponsored health system. It's private health. And every institution actually decides how many people they will need on their own. The guidelines are there. Though they are guidelines, they are not regulations; they are not mandatory.

But, my understanding is that here, the government is the one who provides health care. And, therefore, I think it is more logical for them to demand that if they are spending money to have the patient treated, that the patient be treated properly, and therefore they can make sure that each institution has a sufficient number of staff and also type of equipment.

I think that probably Canada can do that more easily. I think you can comment on how the Canadian government is involved in making sure that you have full staffing.

Ms. Apted: I'd love to comment but I haven't lived in Canada since 1973.

Of course, Canada has a socialized health care system, which I highly approve of. This is one of the big problems in the United States, is the lack of

universal health care, I think. But, Canada has had its own problems keeping that well staffed. And I don't know how they establish their quotas or what their system is really.

Ms. Saito: OK. So, in your country do you have enough staff? I mean, is the total number of physicians for patients sufficient?

Dr. Ryan: Yes. Right now we do. In terms of the number of total staff, there aren't shortages yet, but there are projected shortages in the next 20 years in certain sub-specialties. And how we're going to meet those shortages, nobody really knows. The government doesn't control the number of physicians, but it does control the number of available residency and fellowship slots. And since the government accredits the individual institutions, it indirectly controls. There are no new medical schools being formed, as far as I know, in the pipeline…

Ms. Saito: Pipeline? What do you mean by 'pipeline.'

Dr. Ryan: In the planning stages. There are new medical schools being proposed, but the start-up costs and the start-up energy and time involved is so long, nobody really knows whether or not it's going to meet the future demands.

So, indirectly the government does regulate it, but it's very indirect.

Ms. Saito: So, let's move on to the next subject.

Dr. Ryan, do you have a mentoring system like M.D. Anderson Cancer Center?

Dr. Ryan: It's similar. It's not as fully developed in that sense. But, we do have a mentoring system, for instance, in the fellowship program. We have established a group of physicians who are responsible for the fellows who stay on for their second and third year who will oversee them and oversee their transition to junior faculty, and then junior faculty to senior faculty. Where the system breaks down currently is the junior faculty to senior faculty range. I think that one of the points that was brought up was the drop-out rate. There is such a large investment that goes into training somebody to be an academic clinician, somebody that can take care of patients at the highest level, who is an expert in a specific field and also has a specific expertise in an area of research. Where you see people drop-out is generally in the 35- to 40-year old age group where they have to make that transition from junior faculty to senior faculty. And I think that M.D. Anderson is ahead of the curve in terms of addressing that particular issue. But, it's a huge issue across the country. And, the number one reason for that is money – both in terms of the ease in which people can get research grants, and the second is the ease in which people can get large salaries in private practice. So, around the age of 35 – 40, which probably coincides to when people need money to raise families, there is a huge dropout.

Ms. Apted: I don't know how you finance medical education here, but someone can graduate from medical school and residency training in the United States with huge debt - $150,000 to $200,000. So, when they look at paying off this debt and they look at those high-paying jobs in private practice… that can be a real draw out of academic medicine.

Dr. Karasawa: Dr. Khan, you said that all medical physicists in the United States have to go through the residency program. How do you establish funding for these programs?

Dr. Khan: You mean, how are we going to fund these programs? That's a big problem in the United States. As a matter of fact, there is no system. The government does not pay anything.

At institutions, the administrators, who are business people, they don't want to spend any money. In training medical physicists, they would pay a staff medical physicist, but they don't want to pay for training or research. That argument goes on all the time.

Now, only a few institutions, 15 in total, have been able to establish residency programs, but that was through indirect means.

For example, in our institution when we started this, we actually somehow convinced the administrators that they could pay us some money for training these people because we cannot operate if there are no trained physicists for us. So, we convinced them that they should do that. They at first went along with it, but then later decided that they did not like it either. So, since then, the University of Minnesota has been applying for grants to the Association of American Physicists to provide some funds.

What happens nowadays is that there are companies, like Electa, Verion, Siemens and others, out of the goodness of their hearts (or whatever the reason may be because their equipment is going to be used) are providing some scholarships to the Association of Medical Physicists. Then the Association will, on a competitive-basis, for institutions that have accredited residency programs established to apply for funds, they will award half of the funding to encourage the institution to come up with the other half. So, that too is a very difficult sale.

The Association is now going to the government, HCFA (Health Care Financing Administration), because they provide funds for residency for physicians. So, they are talking to HCFA and saying that "You are providing these funds to train physician residents; there is a great need to do the same for medical physicists." And I recently have found out that they are making some headway in that direction.

Basically, my feeling is that medical physicists' training should be paid through the same funding channels as physician training is paid. There is no difference as far as radiation oncology is concerned. They have the same type of responsibilities and the same impact on quality of treatment as the physicians have. So they should really be funded by the same mechanism. In your case it should be the government who should be giving you funds to train medical physicist residents.

Ms. Saito: Time flies! And since time is limited, could you give us one comment to summarize your message and a word about your dream for your field.

Ms. Apted: My message would be, "Invest in your talent." The young talented people who are coming into this field need all of your attention. They really want to do well and really want to thrive, and I think it's our responsibility to create institutions in which they can do that.

Dr. Ryan: My message would be to sub-specialize in order to create specialists in specific types of illnesses. And I think that you'll see that patients start demanding that. We didn't start to see that until about 10 years ago. But, it's been remarkable how much that is driving the process right now. So, I wouldn't be surprised in 10 years from now that patients in Japan are driving the change.

Dr. Khan: Well, my message would be that Japan needs medical physics quite a bit. They need it badly. And the only way they can do that is to start residency programs in the universities. And that they should get appropriate funding from the government for it. Without that, I think radiation

oncology will suffer. It has suffered in the United States for many, many years. And even now, it is suffering because there are not enough trained physicists in the United States.

Ms. Saito: Thank you very much.

8. Closing Remarks Formative Force of the New Era

（樋野興夫　順天堂大学医学部病理・腫瘍学講座教授）

Thank you very much for spending your precious time and coming to Japan to give us excellent lectures.

Dr. Kominami already mentioned our program. From the end of last year, we have started a program in Japan focusing on how to establish, how to teach, and how to create “Medical oncologists”.

I also want to mention that our medical university is the oldest medical school in Japan, as you see in this pamphlet. It was established in 1838, so it is now 170 years old. Its name is JUNtendo, not NINtendo! So, please remember that our university is ‘Juntendo.’

I think that I learned a lot today. And, honestly, I got new information from your ideas. What we started today is a focus on differences – differences between the USA and Japan. Cancer is an international word. Cancer, cancer patients, and the mechanism is the same, but our cultures and societies are different. What we studied today were the differences. Knowing the differences is very important, because it is the guiding principle of transition and the formative force for a new era. It is very important to know the differences.

Are you familiar with the ‘Trias” of carcinogenesis? Like a “lifetime cancer education”, it is not automatic. What we need is stimulation. It has a process. It takes time, like education. So, we may need 20 or 30 years. It takes time to establish something.

Carcinogenesis looks like an “opened Japanese fan”. So, the formative force of “lifetime cancer education” is like this one (*points to “mutation in the *initial* gene” note on screen). This is the formative force of education, but in cancer we also need a formative force to develop cancer.

And we need a trigger. When the attack hits the proper place, then it opens, like a Japanese fan. But, it takes time.

And like a carcinogenesis, we have multi-steps. So, it takes time.

And as you know, this is Juntendo. Do you know the Ochanomizu area? (There is no elevator in Ochanomizu Station. So, we need to establish an elevator!) But, anyway, our goal is to establish a medical town in this area. Not a medical center. We want to make a medical town. Where university, hospital, students, and patients,… everybody will gather in the same place. That is what we mean by a ‘medical town.’ Our goal is to make a ‘medical town.’

Our program just started. But this is not only for cancer; it’s also for patients, students, everybody. Our final goal is death… Everybody dies. We all have this in common.

I think that our Juntendo may be a model of Japanese cancer research.

This year is the first year of international work shops. I think it is very successful. We will continue this international symposium next year, and we hope for the next five years. Thank you very much.