

SPECIAL ARTICLE

The dawn of Clinical Oncology education in Greece

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Summary

Major advances in cancer research, escalating improvements in cancer management and epidemic increase of cancer incidence drive today Clinical Oncology disciplines into most appealing and challenging medical practices. In reflection, medical schools worldwide consider upgrading their curricula on cancer education. In this article we portray the current situation of undergraduate cancer education and professional training in Clinical Oncology in Greece. In this country the need of systemic education in Oncology was early realized by pioneer oncologists two decades ago and since then it gets steadily improving. Today, intra- and extra-curriculum education activities are intense and offer advanced teaching and training opportunities at both undergraduate and postgradu-

ate levels. Medical and Radiation Oncology are two officially recognized specialties of Medicine in Greece and have both contemporary education curricula which are officially portrayed in the establishment acts. Centers accredited as training centers for Clinical Oncology have regular commitments to teaching and develop structured training programs; however, the burden of service commitments and shortage in senior staff compromise in some cases the educational activities. Finally, generous training and research grants offered by National and European scientific bodies provide now advanced educational opportunities to willing young oncologists.

Key words: Clinical Oncology, medical education, medical oncology, oncology training, radiation oncology

Introduction

Upgrading cancer medical education

Considered a hopeless disease for decades, cancer has drawn little attention in the curricula of medical schools worldwide in the past [1,2]. However, major advances in cancer research have propelled Clinical Oncology into to a most challenging medical discipline [3]. We have now reached to the point whereby a lack of therapeutic options of the past is often replaced by the dilemma of choice among several therapeutic options available. Cancer management requires today increasingly complex decisions and turns gradually more personalized with the help of molecular genetic tools [4-7].

In the current era we are witnessing Clinical On-

cology to making continuous progresses in prophylaxis, diagnosis and therapy of cancer, by capitalizing on the ever-expanding achievements in cancer research. Moreover, oncologists confront today increasingly more cancer survivors than ever before. It becomes apparent therefore, that we are now in need for intense and quality education in Clinical Oncology in order to equip medical students and young trainee oncologists with up-to-date knowledge, skills and attitudes.

In Greece the need to upgrade medical education on cancer was recognized early and has enthusiastically been adopted by the community of oncologists during the last two decades. Today educational activities are developed in three axes (academic curriculum, extra curriculum seminar activities and a dense program of focused courses and national conferences) and both levels (undergraduate and postgraduate).

Undergraduate academic education

Facts and needs

It is an indisputable fact that the number of patients with cancer continues to increase to near-epidemic dimensions, making this disease a major health issue in Europe and the world [8,9]. Cancer ranks currently second as cause of death worldwide, with the World Health Organization forecasting that by 2020 the annual global death toll will rise to above 15 million people [10]. Besides, several million people are living today with a cancer history, and all these people need long-term specialized monitoring and care, and therefore well-trained doctors [11-18]. It is estimated that about one-third of cancer cases can be prevented and another third might be cured if detected early and treated properly [19-22]. Therefore, tackling the cancer issue in the outlook of a continuous increasing amount of knowledge sets high challenges to Medical Schools. However, curricula of Medical Schools worldwide are reacting slowly so far to address the clinical reality of this deadly disease [23-26].

Many educators call for attention to the importance of the early foundations of knowledge for the future attitudes of professionals. Therefore, it is acknowledged that medical students need to receive comprehensive knowledge about cancer management before graduation, because, as medical doctors, they will unavoidably confront cancer patients regardless the medical disciplinary they will practice. It is believed that a solid base of knowledge gained during the undergraduate period will equip doctors with the necessary discipline towards cancer and its prevention [27].

The need for updated curricula is widely recognized. The International Union Against Cancer [Union Internationale Contre le Cancer (UICC)] has already tackled this issue with a monograph on cancer education for medical students published in 1994. That monograph described global concerns about the status of student education about cancer [28]. Moreover, a recent publication by Cave et al. surprised broadly the medical community. The authors showed that 39% of UK medical students leave Medical School without having received specific oncology teaching and 31% of the doctors met fewer than 10 patients with cancer at Medical School [29].

Undergraduate education in Oncology has been repeatedly criticized as inadequate in many Medical Schools but it is now that voices for upgraded curricula are heard. Moreover, structured framework-curricula in Oncology for medical students have been proposed and evaluated [30-34]. Among them the Australian "Ideal Oncology Curriculum", which is also endorsed by

UICC, is considered a well balanced training proposal, built to be used as an ideal guide for designers of cancer curricula [35].

Moreover, UICC and the WHO-Collaborating Centre for Cancer Education (WHO-CCCE) have started an international pilot project which aims to develop a network among Medical Schools in order for them to learn from each other's cancer education strategies and experiences [1].

Finally, some educators have suggested to re-design the learning and teaching environment in order to promote greater student participation and engagement. As a tool, they have suggested to introduce e-Learning methods. Aitken and Tabakov have recently published a paper on e-Learning materials in X-ray diagnostic radiology, nuclear medicine, radiotherapy, ultrasound and magnetic resonance imaging for medical physics graduates and other healthcare professionals and have concluded that e-Learning material looks promising and provides a framework for further developments in the field. This form of teaching can be seen as a challenge for offering at both undergraduate and postgraduate level an homogeneous knowledge of high standards to all those who live within a certain geographical area [36].

In Greece

As in many European countries, and opposed to the USA and Canada where medical degrees are second entry degrees and require several years of previous study at the university level, the study of Medicine in Greece does not require precondition undergraduate coursework. Therefore students lack an in depth knowledge of basic sciences when they enter Medical Schools. Normally, students are granted admission to state-run Medical Schools after succeeding top scores at nation-wide entry exams to tertiary education. In Greece Medical School lasts 6 years. In the first 3 years students are taught basic sciences relevant to medicine and also biological subjects (physics, chemistry, biology, biochemistry, genetics, anatomy, physiology, pathophysiology, microbiology), while the last 3 years are dedicated to "clinical" subjects, among which Clinical Oncology has not been included as yet. Therefore, undergraduate education in Oncology in Greece is currently fragmented across disciplines, which may result in potential flaws, duplications or omissions of cancer knowledge and skills.

Given the curriculum underperformance in Oncology, academic oncologists have constantly persuaded improvements during the last decade. However, medical students consider the attempted improvements rather insufficient. In one University medical students required

that more emphasis should be given on the psychosocial aspects of cancer care, truth telling, and ethical topics, which indicates that apart from offering updated medical knowledge, undergraduate education in Oncology should target a proper attitude towards all cancer-related issues [37].

To illustrate the current status, medical students at the University of Ioannina, have the opportunity during their 5th year of studies to attach themselves to the Oncology division wards for an approximately 4-week training period. During that period, students are encouraged to get involved in problem-based diagnostic exercises, imaging studies interpretation, clinical examination and also get experience in supervised intervention practices and treatment planning and prescription. Adequate exposure of students to this common disease seems to reduce the fear of contact with cancer patients, and enhance their knowledge and skills in cancer prevention, early diagnosis, and treatment of potentially curable tumors and in the management of terminally ill patients. The feedback of students about this educational activity is commonly enthusiastic and is usually scored high.

In regard to Radiation Oncology the 7 Medical Schools in Greece, staffed with 12 academic teachers, do not offer structured specialized courses in their undergraduate curriculum. Radiation Oncology teaching is scattered among various disciplines, involving only treatment results and students receive low levels of exposure to patients with cancer receiving radiotherapy. Disappointingly, not even a minimal, dedicated time course during the academic year is scheduled in teaching curricula. Amazingly though, an elective course on “Radiobiology and Radiotherapy Principles”, which is taught at the 6th year of studies in the University of Patras, is usually chosen by approximately 20 students per year (out of 150), which underscores their interest in the subject.

In an attempt to overcome the existing underperformances in undergraduate oncology education, and until new curricula are developed, a network of academic oncologists of Medical Schools started 3 years ago an extra-curriculum initiative to boost a state-of-the-art knowledge on cancer for graduating medical students with expressed interest on the subject. These are one-week intense courses organized every summer, in rotation by each Medical School. They offer comprehensive teaching that covers molecular oncology, epidemiology, prevention, state-of-the-art clinical management and basic research in approximately 60 scholar students every year.

Overall, Academic Oncology in Greece supports that time has come for Clinical Oncology to evolve

to a compulsory examined subject in the curricula of contemporary Medical Schools. This is considered a priority to ensure that all graduating students meet the minimum high standard in cancer management that is expected from modern doctors.

Postgraduate vocational training

In the world

The importance of quality training of medical doctors in Clinical Oncology is a well-recognized issue, mostly impelled by the rapid growth in medical technology and in the advances of fundamental knowledge of cancer cell biology, which have made big impacts on genetics, screening, early diagnosis, staging, and overall treatment of cancer. The need of uniform training is further impeded in a world of internationalization of health care, exchange of specialists, and rapid flow of information over borders.

In Medical Oncology, ESMO/ASCO Task Force published in 2004 the first “Recommendations for a Global Core Curriculum in Medical Oncology” [38]. Moreover the American Society of Clinical Oncology (ASCO) published one year later a revised version of “Competence Comprising Curriculum” guidelines for Medical Oncology, which were initially created in 1997 in response to the lack of a basic structure for Oncology in the training curriculum of the Accreditation Council on Graduate Medical Education (ACGME). The Competence Comprising Curriculum emphasizes the formal instruction in 14 thematic units and multiple sub-topics and claims an educational framework around which a training program should be developed [39].

Radiation Oncology is interdisciplinary by its nature. Medical care delivered to patients receiving radiation therapy involves close cooperation of radiation oncologists with a number of medical specialists but also with medical physicists and radiation therapy technologists. The second characteristic of this specialty is that its trainees should receive a sound knowledge from a wide spectrum of disciplines, to mention radiobiology, radiation physics, imaging and skills on handling patients (patient positioning and immobilization) and of course evidence-based medicine. These facts forced Radiation Oncology Societies and other governmental bodies around the world to join efforts in developing a comprehensive curriculum for postgraduate training although training systems vary widely in different countries [40-42]. In Europe, the European Society of Radiation Oncology (ESTRO) has endeavoured to produce state-of-the-art guidelines for the infrastructure of training departments for training in Radiation Oncology

within Europe, in order to harmonize training. These guidelines were developed taking into account the updated European Core Curriculum for Radiotherapists by an expert panel jointly appointed by the European Union of Medical Specialists and ESTRO and were endorsed by representatives of 35 European nations (including Greece) during the Brussels Consensus Conference on December 14, 2002. This document contains specific recommendations for a 5-year training curriculum, but also for infrastructural aspects of training departments, but the responsibility for the implementation of the standards and guidelines set in this Core Curriculum lies with the local and/or national training bodies and authorities [43,44].

In Greece

Medical Oncology and Radiation Oncology are both recognized medical specialties in Greece. Medical Oncology is the youngest among medical disciplines recognized 10 years ago. Taken together, approximately 250 certified medical and radiation oncologists serve patients with cancer in Greece.

Teaching courses and vocational training in Clinical Oncology started with the establishment of the Scientific Societies of Medical Oncology [HeSMO 1986, <http://www.hesmo.gr>] and Radiation Oncology [HeSRO 1988, <http://www.eeao.gr/default.asp>]. However, optimal training in both specialties is yet considered to be in its beginnings.

Medical Oncology

In Greece a core curriculum for Medical Oncology is officially portrayed in the establishment act of this medical specialty [Presidential Decree 201/98]. According to the act, a Medical Oncology trainee should acquire adequate knowledge and skills capabilities in “counseling, diagnosis, systemic therapy, conducting clinical research, co-coordinating multidisciplinary management of cancer and end-of-life support of cancer patients”. The standard requirements are a total training period of 6 years, beginning with training in Internal Medicine for 2.5 years, followed by 6-month training in Hematology and 3 years full-time clinical training in Medical Oncology.

The majority of centers accredited as training centers for Medical Oncology in this country have regular commitments to teaching. However, education and training programs do not follow in all institutes a formally developed consensus-based curriculum. The curriculum in Medical Oncology in Greece practically follows the ESMO/ASCO recommendations,

but adherence to educational curriculum cannot always be guaranteed, because the burden of service commitments and the small numbers of oncologists often compromise educational activities.

Radiation Oncology

Radiation Oncology is a highly specialized discipline of Clinical Oncology and involves a deep understanding of cancer biology but also of radiation physics and medical imaging [45,46]. Back in 1984, Wong and Fairy suggested that the lack of interest among medical students to choose Radiation Oncology as a specialty and job opportunity was due to misconceptions about training in the practice of Radiation Oncology and proposed various methods to academic teachers to erase these misunderstandings [47].

In Greece, Radiation Oncology training lasts only 4 years, the shortest training programme among all specialties. This programme includes 6 months in Radiology, 6 months in Internal Medicine and 3 years full-time training in Radiation Oncology. HeSRO has exercised a great deal of pressure on the Greek Governments since 2000, in an attempt to introduce a new, 5-year curriculum, without success. Currently the content of training in Radiation Oncology in Greece is the responsibility of each accredited training centre and is shadow-guided by a structured logbook for trainees in the medical specialty of Radiation Oncology developed by the ESTRO and the European Board of Radiotherapy [48].

Extra-curriculum educational activities

The “*Hellenic Academy of Oncology-HACO*” offers replenishment to potential practical shortcomings of official training. HACO is an established educational activity developed and organized by the Hellenic Society of Medical Oncology in cooperation with the Hellenic Society of Radiation Oncology (Figure 1). It offers 3-year postgraduate education courses of high standards to trainees in Clinical Oncology fields. Thematic seminars are organized every 3 months in which about 70 participants attend 18 - 20 hours of interactive lessons, and are assessed for knowledge uptake by written tests at the end of each module. Lessons are sponsored and therefore are offered free of charge; travel and board expenses and also educational material are all granted by HeSMO. Experienced clinical oncologists and also specialists in cancer pathology, medical imaging, molecular biology and biostatistics from Greece and abroad serve as teaching faculty in this activity. In addition HeSMO publishes and distrib-



Figure 1. Cactus blossoming: The symbolic logo of the Hellenic Academy of Oncology designed by the well-renowned painter Dimitris Mytaras.

utes to all its members a series of thematic books edited on the occasion of the HACO activities.

In addition, the HeSRO runs in the context of continuous medical education courses for trainees. Up to now, 16 two-day courses have been organized on every aspect of Radiation Oncology (Physics, Radiobiology and Oncology), and each course accommodates approximately 45 trainees.

Finally the National and European scientific bodies now provide on a competitive basis an increasing number of training and research grants and educational scholarships to young doctors with interest in Clinical Oncology. Moreover, young oncologists are encouraged to pursue active membership in regional, national and international scientific societies; active participation in research; and presentation and publication of scientific studies. These educational grants aim to increase transfer of knowledge and clinical competence for the practice and research of Clinical Oncology in Greece.

Screening and prevention

Screening, prevention and genetic consultancy teaching, although improving, is currently at a low point in this country, because they are practiced and implemented in a nonsystematic way as yet. According to the ESMO/ASCO guidelines, also adopted in Greece, trainees should be capable of assessing the increased risk of

second cancers in the patient and hereditary cancer in the patient's family. They should be aware of the principles for genetic screening and counseling. With awareness of this, postgraduate oncologic training is now directed towards educating young oncologists in genetic counseling and cancer prevention. Increasing use of genetic screening and establishing specific hereditary cancer clinics will hopefully boost this attitude [49].

Concluding remarks

Advances in cancer research, improvements in cancer management and increases of cancer incidence have driven Medical and Radiation Oncology into most challenging medical disciplines worldwide. However, undergraduate education in Oncology in Greece is currently fragmented across disciplines, which is thought to result in significant flaws in knowledge. Confronting this situation, academic oncologists in Greece work towards upgrading Clinical Oncology into a compulsory-examined subject in Medical Schools. This is considered a priority to ensure that all graduating students meet the minimum high standard in cancer management that is expected from modern doctors. In regard to professional training, centers accredited as training units follow structured training programs although the burden of service commitments and shortage in senior staff compromise occasionally the educational activities. In Greece extra-curriculum education activities are currently intense and offer rich teaching and training opportunities at both undergraduate and postgraduate levels.

References

1. Haagedoorn EM, De Vries J, Robinson E. The UICC/WHO-CCCE Cancer Education project: a different approach. *J Cancer Educ* 2000; 15: 204-208.
2. Curreri AR. The role of the medical school in cancer education. *Proc Natl Cancer Conf* 1960; 4: 701-704.
3. Gralow J, Ozols RF, Bajorin DF et al. Clinical cancer advances 2007: major research advances in cancer treatment, prevention, and screening - a report from the American Society of Clinical Oncology. *J Clin Oncol* 2008; 26: 313-325.
4. Escudier B. Advanced renal cell carcinoma: current and emerging management strategies. *Drugs* 2007; 67: 1257-1264.
5. Djulbegovic B, Kumar A, Soares HP et al. Treatment success in cancer: new cancer treatment successes identified in phase 3 randomized controlled trials conducted by the National Cancer Institute-sponsored cooperative oncology groups, 1955 to 2006. *Arch Intern Med* 2008; 168: 632-642.
6. Bakemeier RF. Cancer education - lessons from the past. *J Cancer Educ* 1997; 12: 9-16.
7. Roukos DH, Murray S, Briasoulis E. Molecular genetic tools shape a roadmap towards a more accurate prognostic prediction and personalized management of cancer. *Cancer Biol Ther*

- 2007; 6: 308-312.
8. Karim-Kos HE, de Vries E, Soerjomataram I, Lemmens V, Siesling S, Coebergh JW. Recent trends of cancer in Europe: a combined approach of incidence, survival and mortality for 17 cancer sites since the 1990s. *Eur J Cancer* 2008; 44: 1345-1389.
 9. Jemal A, Siegel R, Ward E et al. Cancer statistics, 2008. *CA Cancer J Clin* 2008; 58: 71-96.
 10. Frankish H. 15 million new cancer cases per year by 2020, says WHO. *Lancet* 2003; 361: 1278.
 11. Ganz PA. A teachable moment for oncologists: cancer survivors, 10 million strong and growing! *J Clin Oncol* 2005; 23: 5458-5460.
 12. Fossa SD, Loge JH, Dahl AA. Long-term survivorship after cancer: how far have we come? *Ann Oncol* 2008; 19 (Suppl 5): v25-v29.
 13. Travis LB, Yahalom J. Cancer survivorship: facing forward. *Hematol Oncol Clin North Am* 2008; 22: 365-371.
 14. Ganz PA. Monitoring the physical health of cancer survivors: a survivorship-focused medical history. *J Clin Oncol* 2006; 24: 5105-5111.
 15. Smith SK, Zimmerman S, Williams CS, Preisser JS, Clipp EC. Post-traumatic stress outcomes in non-Hodgkin's lymphoma survivors. *J Clin Oncol* 2008; 26: 934-941.
 16. Hammond C, Abrams JR, Syrjala KL. Fertility and risk factors for elevated infertility concern in 10-year hematopoietic cell transplant survivors and case-matched controls. *J Clin Oncol* 2007; 25: 3511-3517.
 17. Ferrell BR, Winn R. Medical and nursing education and training opportunities to improve survivorship care. *J Clin Oncol* 2006; 24: 5142-5148.
 18. Demark-Wahnefried W, Pinto BM, Gritz ER. Promoting health and physical function among cancer survivors: potential for prevention and questions that remain. *J Clin Oncol* 2006; 24: 5125-5131.
 19. Hiatt RA. The future of cancer surveillance. *Cancer Causes Control* 2006; 17: 639-646.
 20. Cho WC. A future of cancer prevention and cures: highlights of the Centennial Meeting of the American Association for Cancer Research. *Ann Oncol* 2008; 19: 205-211.
 21. Ganz PA, Kwan L, Somerfield MR et al. The role of prevention in oncology practice: results from a 2004 survey of American Society of Clinical Oncology members. *J Clin Oncol* 2006; 24: 2948-2957.
 22. Stewart BW, Coates AS. Cancer prevention: a global perspective. *J Clin Oncol* 2005; 23: 392-403.
 23. Anonymous. Cancer: a global response to a global problem. *Lancet* 2008; 371: 1552 (Editorial).
 24. Ma X, Yu H. Global burden of cancer. *Yale J Biol Med* 2006; 79: 85-94.
 25. Costanza ME, Gaw VP. Design, implementation, and evaluation of a longitudinal cancer curriculum. *J Cancer Educ* 1987; 2: 217-223.
 26. Smith WT, Tattersall MH, Irwig LM, Langlands AO. Undergraduate education about cancer. *Eur J Cancer* 1991; 27: 1448-1453.
 27. Sanidas EE, Aggelaki S, Xomeritaki H, Godikakis E, Tsiftsis DD. The influence of undergraduate medical cancer education on students' sensitivity towards cancer. *J Cancer Educ* 1993; 8: 19-23.
 28. Cancer education for undergraduate medical students: curricula from around the world. International Union Against Cancer (UICC): Geneva, 1994.
 29. Cave J, Woolf K, Dacre J, Potts HW, Jones A. Medical student teaching in the UK: how well are newly qualified doctors prepared for their role caring for patients with cancer in hospital? *Br J Cancer* 2007; 97: 472-478.
 30. Peckham M. A curriculum in oncology for medical students in Europe. *Acta Oncol* 1989; 28: 141-147.
 31. Weidner J, Michielutte R, Hoban JD, Cooper MR, Davis S. Evaluation of an oncology curriculum. *J Cancer Educ* 1990; 5: 37-41.
 32. Pavlidis N. Undergraduate education in oncology in the Balkans and Middle East. The Metsovo Statement, April 4, 1997. *Ann Oncol* 1997; 8: 1281.
 33. Estevez RA, de Estevez OT, Cazap EL et al. Undergraduate teaching of oncology in Argentina. *J Cancer Educ* 1988; 3: 111-115.
 34. Jeeva I, Jayasawal R, Kermani N, Pauri P. Oncology curriculum in developing countries and the lessons to be learned. *J Clin Oncol* 2007; 25: e12 (Comment).
 35. Koczwara B, Barton MB. The ideal oncology curriculum for medical students. *J Clin Oncol* 2006; 24: 5334; author reply 5334. <http://www.cancer.org.au/File/PolicyPublications/IdealOncologyCurricDEC07.pdf>
 36. Aitken V, Tabakov S. Evaluation of the e-Learning material developed by EMERALD and EMIT for diagnostic imaging and radiotherapy. *Med Eng Phys* 2005; 27: 633-639.
 37. Karamouzis MV, Ifanti AA, Iconomou G, Vagenakis AG, Kalofonos HP. Medical students' views of undergraduate Oncology education: a comparative study. *Educ Health (Abingdon)* 2006; 19: 61-70.
 38. Hansen HH, Bajorin DF, Muss HB, Purkalne G, Schrijvers D, Stahel R. Recommendations for a global core curriculum in medical oncology. *J Clin Oncol* 2004; 22: 4616-4625.
 39. Muss HB, Von Roenn J, Damon LE et al. ACCO: ASCO core curriculum outline. *J Clin Oncol* 2005; 23: 2049-2077.
 40. Semrau R, Hansemann K, Adam M et al. Quality of training in radiation oncology in Germany. Results of a 2006 survey. *Strahlenther Onkol* 2008; 184: 239-244.
 41. Donaldson SS, Halperin EC. Subspecialty training and certification for radiation oncology. *J Am Coll Radiol* 2004; 1: 488-492.
 42. Cox JD, Flynn DF, Pittman DD, Brady LW, del Regato JA. Radiation oncology: postgraduate medical education in the United States, 1988. *Int J Radiat Oncol Biol Phys* 1989; 16: 1577-1582.
 43. Rottinger E, Barrett A, Leer JW. Guidelines for the infrastructure of training institutes and teaching departments for radiotherapy in Europe. *Radiother Oncol* 2004; 70: 123-124.
 44. Baumann M, Leer JW, Dahl O et al. Updated European core curriculum for radiotherapists (radiation oncologists). Recommended curriculum for the specialist training of medical practitioners in radiotherapy (radiation oncology) within Europe. *Radiother Oncol* 2004; 70: 107-113.
 45. Samant R, Malette M, Tucker T, Lightfoot N. Radiotherapy education among family physicians and residents. *J Cancer Educ* 2001; 16: 134-138.
 46. Levitt SH, Purdy JA, Perez CA, Vijayakumar S (Eds): Technical basis of Radiation Therapy: Practical Clinical Applications (4th Edn). Springer, 2008.
 47. Wong F, Fairey RN. Radiation oncology-the misunderstood specialty. *J Can Assoc Radiol* 1984; 35: 144-148.
 48. Hunter RD, Maciejewski B, Leer JW, Kinay M, Heeren G. Training logbook for radiotherapy. *Radiother Oncol* 2004; 70: 117-121.
 49. Roukos DH, Briasoulis E. Individualized preventive and therapeutic management of hereditary breast ovarian cancer syndrome. *Nat Clin Pract Oncol* 2007; 4: 578-590.