



EUROPEAN COMMISSION
Directorate General Health and Consumer Protection - Europe Against Cancer
Programme

ESQUIRE Project:

Education, Science and Quality assurance In Radiotherapy in Europe
Grant Agreement (2001CVG2-005)

FINAL REPORT

February 2003



EUROPEAN COMMISSION
Directorate General Health and Consumer Protection - Europe Against Cancer
Programme

ESQUIRE Project:

Education, Science and **Q**uality assurance In **R**adiotherapy in **E**urope
Grant Agreement (2001CVG2-005)

Project Starting date: AUGUST 1, 2001 – Project Ending date (year 1) 30 September 2002

ESQUIRE CO-ORDINATION AND MANAGEMENT STRUCTURE

GENERAL PROJECT LEADER

H. Svensson, Radiation Physics Dept, Umeå University, S-901 85 Umeå, Sweden, tel +46-90
7853891, fax +46-90 7851588. E-mail: hans.svensson@radfys.umu.se

PROJECT MANAGEMENT

ESTRO Office

Av. E. Mounierlaan 83, 1200 Brussels – Tel.: +32.2.7759340 Fax: +32.2.7795494/70
E-mail: info@estro.be - Web site: <http://www.estro.be>

Project Managers

Jean-Marc d'Hooghe, General –Coordinator, tel.+32.2.7759343 – jeanmarc.dhooghe@estro.be
Germaine Heeren, Project Development and External Relations, tel. 7759344 -
germaine.heeren@estro.be
Christine Verfaillie, Project Coordinator, tel. +32.2.7759349 – christine.verfaillie@estro.be

Supporting staff

Roselinne Nisin, Logistic Officer, tel.+32.2.7759345 –roselinne.nisin@estro.be
Lea Minnen, Manager data base, tel.+32.2.7759346 – lea.minnen@estro.be
Talbot Frederic, Accountant, tel.+32.2.7759341 – frederic.talbot@estro.be

Task Leaders:

Task 1 - EQUAL: European QQuality Assurance Laboratory

Dutreix Andrée, Tel.: 33.1.43.508870 - E-mail: andree.dutreix@wanadoo.fr

Task 2 - REACT: Record, Educate and Ameliorate the Consequences of Treatment

Ann Barrett: fax: 01603 593752 - Tel:01603 591105 - e-mail:ann.barrett@uea.ac.uk

Task 3 – EDRO: EDucation for Radiation Oncology

Michael Baumann - UK Carl Gustav Carus

Tel.: 49.351.4582095 - Fax: 49.351.4585716 - E-mail: michael.baumann@mailbox.tu-dresden.de

Task 4 - EPOQART (renamed EQART: European Institute for Quality Assurance in RadioTherapy

Eric Lartigau - Tel.: 33.3.20295911 - Fax: 33.3.20295972 - E-mail: e-lartigau@o-lambret.fr

Dominique Huyskens - Tel.: 32.16.347600 - Fax: 32.16.347610 - E-mail:

edmee.boyen@uz.kuleuven.ac.be

Task 5 – QUASIMODO: QUality ASssurance in Intensity MODulated Radiation Oncology

Ben Mijnheer - Tel.: 31.20.5122203 - Fax: 31.20.6691101 - E-mail: bmijnh@nki.nl

TASK 6 - BRAPHYQS: BRACHytherapy PHYSics Quality Assurance System

Jack Venselaar - Tel.: 31.13.5947743 - Fax: 31.13.5947683 - E-mail: venselaar@bvi.nl

Overall ESQUIRE achievements

Every year, an estimated number of 0.8 to 1.2 million cancer patients are treated with Radiotherapy (RT) in the EU. For most types of malignant disease RT and surgery remain the only treatment modality which can achieve local tumour control and long term survival. In the past decade the cure rate for cancer has gone up by almost 5%. Earlier detection and gains derived from a multidisciplinary approach and combined modality treatments contribute to better treatment outcome. The largest single contribution to the improved outcome figures was however made by the generalised introduction of hormone therapy and RT in the treatment of prostate cancer.

It was demonstrated (Eur J Cancer 2000Mar; 36 (5):615-20) that every gain in the quality of radiotherapy delivery results in a substantial gain in the uncomplicated cure probability

In 18% of all patients the local or loco-regional RT-treatments still fail and 6 to 8% of cured patients pay for their survival with largely avoidable late effects which severely affect their quality of life. . The most important reasons for failure are considered to be poor treatments, tumours with difficult location and tumours resistant to current radiation treatment. Measures suggested to remediate this situation are: improved quality control of radiotherapy, conformal treatments, and introduction of hadrontherapy. Activities in all these fields have been initiated by the European Society for Therapeutic Radiology and Oncology (ESTRO). The most important gains in the immediate future can however be expected from a better education of the RT professionals, from the introduction of optimised high precision treatment schedules and from the implementation of stringent quality standards for RT delivery.

Thanks to the robust EU support given for 6 major action lines integrated in the ESQUIRE project, ESTRO has been able to develop a broad strategy to address these issues in a vigorous and coordinated way. More than 150 experts contribute to the project in very active parallel networks. As the 2nd largest cancer society world-wide (5.700 members) and well connected to the national scientific and professional RT societies, ESTRO has a choice of instruments for disseminating the results of its projects and for encouraging implementation.

ESQUIRE, has now entered its 2nd contract year. It is already clear right now that the project

- will result in lasting quality assurance (QA) infrastructures (Task 1, EQUAL Lab and Network) and Task 4 (EQART European Institute for Quality Assurance in Radiotherapy)
- in QA guidelines and newly developed QA tools, based on a broad European expert input and consensus. Guidelines, which will be the object of separate publications are being developed by task groups 2 (REACT), 5. (QUASIMODO) and 6 (BRAPHYQS),
- and in a comprehensive body of guidance for a European education system for the different disciplines involved in RT (Task 3: EDRO).

Support was provided to :

- in total 142 junior professionals for participating in 10 intensive one-week teaching courses (Task 3 EDRO)
- As a contribution to the spread of excellence in the practice of RT in Europe, 18 technology transfer grants for short visits to other departments were provided.
- Young professionals were encouraged to choose for a research career through a competition for 7 research training fellowships.
- On the basis of a comparative analysis of national systems (EQART-ROSI Network) a web-based European incident reporting system was developed. This system will allow safety officers in radiotherapy departments to share their experience and pinpoint problem situations which may lead to errors in the treatment delivery. Errors, often small breaks in the quality chain, can compromise treatment outcome if allowed to go undetected. A coincidence of several errors can lead to radiation accidents where large groups of patients are exposed to lethal doses or to under-dosage which denies them the chance of cure.
- Esquire has brought European radiotherapy to the forefront:
 - ESTRO has achieved a world leadership in the field of education for radiotherapy. Its ambitious teaching programme attracts participants from all over the world including from America's leading institutes.
 - Two comprehensive teaching books, drawing on the extensive experience of ESTRO's brachytherapy and radiobiology teaching teams, could be made available to a wide public at low cost thanks to a modest but decisive logistic Esquire support to the editors and private copyright ownership and publication by ESTRO which cuts out profit margins of publishers and distributors.
 - ESTRO has become a prime partner for the International Atomic Energy Agency (IAEA), which is the WHO division for the radiological disciplines. Joint EQUAL (task 1)-IAEA research projects and shared expertise for the development of QA procedures, provide a prestigious international platform for the Esquire activities and allow European radiotherapy to have a major input in setting standards for the codes of practice in RT. Recognising the quality label of the ESTRO teaching programme, IAEA supports every year the participation of up to 250 physicists and radiotherapists from applicant countries and newly independent states to ESTRO teaching courses, thus adding a considerable multiplication effect to the ESQUIRE effort.

Food scares and chemical, biological and nuclear threats currently high up in the political agenda are reflected in a new SANCO multi-annual programme with different priorities. The impact of ESQUIRE will however outlast an anticipated and hopefully temporary funding gap. A continuity in

EU support, adding financial clout to moral leadership and the selfless commitment of dedicated professionals, will however be necessary to give scientific societies like ESTRO the means to translate spectacular progress in technological and scientific developments to tangible gains for the cancer patient at the grass roots level.

Molecular imaging as biological input for individualised, tumour and cell specific RT treatment plans and customised dose delivery, combined with intensity modulated photon, high energy electron, proton or ion beams (FP6 DG RTD applications BioART and BioCARE), will set new benchmarks for the role of radiotherapy in cancer care. These developments will however put unprecedented demands on the already high complexity of the software systems needed to support them. The race of the end-users, co-ordinated by ESTRO, to develop the tools, systems and guidelines to verify them, and to provide in the education and training for their implementation, will be forced into a yet higher gear. Dosimetric audits by the ESQUIRE-EQUAL lab have already revealed that the risk of serious software errors in commercial treatment planning systems, resulting, if undetected, in potentially dangerous dosimetric deviations (see further in report), increases along with the increase in treatment complexity. Only with EU support will well structured, dynamic and representative European Scientific Societies like ESTRO, which have the capacity to spearhead implementation of a European health care policy, be able to stay on top of the developments and win that race.

Activity report

The activities already reported on in the interim report are printed in italic

Overall, the ESQUIRE Project, consisting in fact of 6 interrelated parallel projects under the common denominator of Quality Assurance and Education for Radiation Oncology- including education for research-, can report remarkable achievements for the first 6 months of project year 1. The most rapid progress was booked by the task groups 1, 2 and 3 which could build on already well performing networks and infrastructures, put in place in the course of the past MORQA and EDRO projects which were equally supported by Europe Against Cancer. Still, also the new task groups 3 to 6 are on target or even ahead of schedule, especially task group 6 BRAPHYQS. We report on the different task groups one by one, documenting in the enclosures the reports and steps achieved. A more analytical assessment of their achievements will be submitted in the final report.

Task 1: EQUAL

Notwithstanding the funding gap of 6 months between the MORQA Project and the start of ESQUIRE on August 1, 2001, ESTRO managed to keep the EQUAL Lab operational. Also the EQUAL network kept working hard in that period, using intensive E-mail exchange, to develop a concept and methodology for the introduction of the new tests for multileaf collimated, asymmetric, small and irregular fields.

First Network Meeting

This made it possible to already discuss the feasibility of the proposed tests with the staff of the EQUAL Lab at the first network meeting of the group in Sevilla (13 to 15 September 2001). A report on the workload of the EQUAL Lab was presented and priorities for the increasing demand on its services decided on. EQUAL has indeed established a world wide reputation for the quality of its work. Already for a while it has been functioning as reference lab for the International Atomic Energy Agency (IAEA-functioning as radiation division of the World Health Organisation) and for a host of secondary standard labs. It is also regularly called on for performing the dosimetric audit of radiotherapy centres participating in collaborative trials conducted under the auspices of the European Organisation for Research and the Treatment of Cancer (EORTC), confirming its role as an essential infrastructure for the reliability of cancer research including radiotherapy procedures.

The partners reported on the participation of the radiotherapy departments in their respective countries and discussed initiatives necessary to reach the ESQUIRE target of entering 80% of all European radiotherapy centres in the EQUAL Programme.

Visit from RPC, MD Anderson, Houston

From 12 to 14 December 2001, the ESTRO EQUAL Lab received the visit of a delegation of the Radiological Physics Centre (RPC), established at the University of Texas in Houston. This institute which has already been operational for 30 years, is funded through an annual endowment of 2 to 2.5 Million \$ from the government funded National Cancer Institute (NCI) and carries out the dosimetric audits for cancer trials with a radiotherapy component in the US (before the creation of EQUAL also EUROPE was partially served by them). It became clear that the approaches, the methods and the parameters checked are different. This enforces the interest of a close co-operation between RPC and the ESTRO EQUAL Lab and network. In fact it has already started with an intercomparison of dose for different beams with ionisation chamber. For this intercomparison an agreement better than 1% was found. A Memorandum of Understanding will be worked out for the exchange of know-how and data and for regular concertation to avoid duplication of checks.

The 2nd EQUAL Network meeting

took place in Perugia from 11 to 13 January. Reports were presented on the new joint IAEA ESTRO research project on Thermoluminescent Dosimetry (TLD) Audit for off-axis points, on the RPC visit (see above), on the progress in the implementation at the national level of the EURATOM recommendation (Directive 97/43) and on the state of the art of the QA network in each country. Finally an update was given on the introduction of the MLC and Brachytherapy Physics checks (see further Task Groups 5 and 6). The protocol for these checks is ready and 16 reference centres participated in the MLC checks. An inter-comparison of their results was discussed. Good results were booked for the 10 beams checked in each centre. The availability of the new checks was announced in the Winter issue of ESTRO News and as of February all European RT centres can be enrolled in the new programme. The 20 centres participating in EORTC Trial 22991 have already applied.

In the course of year 1 of the ESQUIRE project, the EQUAL lab has kept up its efforts for enrolling European RT departments in the checks for high energy photon and electron beams. In addition new checks both on fields shaped by multileaf collimators (MLC) and on brachytherapy geometry have been developed.

Dose traceability in the EQUAL lab

Systematic annual intercomparisons with the IAEA (International Atomic Energy Agency) dosimetry laboratory and its American counterpart, the Radiological Physics Center (RPC) dosimetry laboratory were performed to assure the dose traceability. The agreement with the IAEA dosimetry lab is better than 0.2%. The differences in the calibration methods and the TLD reading methods, between the RPC and EQUAL explain the deviation of 1.3 % (6 MeV) and < 0.5 % (12 & 20 MeV) observed in the results of the inter-comparisons for the reference fields.

High energy photon and electron beam checks

Following the feasibility study for the MLC checks in 2001, 98 photon beams with MLC have been checked. These checks were performed in addition to the 260 beams (103 photon beams, 157 electron beams) in 114 radiotherapy centres from 20 countries.

As a total since the beginning of the project more than 50% of the total number of radiotherapy centres from the EU have been checked, as planned in the initial project.

The external audits performed in the ESTRO Quality Assurance programme show that the dosimetry accuracy is fairly good in reference situations but that improvements are often needed in non-reference conditions, i.e. in irradiation geometries closely simulating those used in patient treatments.

Brachytherapy programme

A feasibility test has been set up regarding the geometric accuracy in brachytherapy following the recommendations of the BRAPHYQS group. The test is performed with the Baltas phantom sent by postal way in order to check the reconstruction methods used clinically in the treatment planning systems (TPS). Since the beginning of this activity and the end of the pilot study, EQUAL has checked 16 centres including reference centres.

During its participation in the BRAPHYQS meeting in Valencia (September 2002), the EQUAL lab has also presented the pilot study for the determination of absorbed dose to water using TLD around Iridium 192 brachytherapy sources (see further Task Group 6).

EQUAL-IAEA/WHO co-operation

In the framework of a co-ordinated IAEA-EQUAL research project (IAEA E2 4012), the EQUAL lab carried out a feasibility study for TLD-based Quality Audits for Radiotherapy Dosimetry in Non-reference Conditions

As part of a 2nd joint research project, EQUAL tested the new IAEA Code of Practice based on standards of absorbed dose to water for high energy photon and electron beams.

Publications

The significance of the EQUAL activities for the European Radiation Oncology community can be properly assessed by the large number of publications it has generated in just 1 year. No less than 3 articles and 7 abstracts were published in peer reviewed journals. In addition, the project was reported on at 8 national and international meetings. Also on the ESTRO website and in each of ESTRO's 3 Newsletters published in the course of the 1st contract year, EQUAL has been given a high degree of visibility.

Task 2: REACT

Record , Educate and Ameliorate the Consequences of Treatment

The REACT network met for the first time in Lisboa from 18 to 20 October. One of the aims of REACT is research in methods of management of treatment related complications. With this ESQUIRE priority in mind, ESTRO organised, in co-operation with the Hyperbaric Medicine Group, a Consensus Meeting on "Hyperbaric Oxygen (HBO) Therapy in the treatment of Radio-induced lesions in normal tissues". This conference, attended by 190 participants, was co-chaired by REACT network partner and ESTRO Secretary General, Eric Lartigau and several REACT and ESQUIRE partners played a key role in it. While many presentations gave evidence of the effectiveness of HBO in preventing or attenuating late effects in normal tissue, it was decided that still further research was needed for the objective clinical validation of HBO treatment. HBO facilities are generally only available in harbour cities for the treatment of decompression diving accidents. For this reason it is a problem to accrue sufficient patients in clinical trials on a national or regional basis. Therefore the clinical trials which will be initiated will be open for world wide participation .

To bring in more expertise around treatment strategies for radio-induced lesions and for the bio-statistical analysis of the research to be carried out, it was decided to enlarge the group with some experts in the field: Martin Stuschke, Department Head, University of Essen; Karl-Axel Hartmann, acting department Head, Univ. of Düsseldorf; Bernard Dubray, Department Head, Rouen; Andrew Kramar, Biostatistician, Montpellier; and Christine Haie, Head Brachytherapy Department at IGR, Villejuif, France, for her great expertise in side effects of brachytherapy.

The REACT network partners attended the Consensus meeting. It was followed by the first Network Meeting. The main action points for this year:

- *The development of a patient questionnaire to gain insight in the patient's perception of the side effects of successful radiotherapy treatment. This questionnaire was in the meantime developed and validated by the REACT network. It will shortly be dispatched to all ESTRO members.*
- *The development of education programmes for the recognition and recording of consequences of treatment. A first module of such a programme, focusing on strategies to prevent radiation morbidity through adequate follow up was meanwhile developed. A preliminary programme is included in enclosure. The proposed teaching course is scheduled to be organised at the 21st Annual ESTRO Meeting in Praha on 17 September 2002.*

- *Development of consensus on levels of complexity for recording consequences of treatment. The European vision, as developed in the Europe Against Cancer supported MORQA Project and discussed at the MITRE meeting in Brussels (Dec. 2000) will be presented at a joint meeting with the American Radiation Oncology Society at a conference where a consensus on a new international late radiation effects grading system will be developed (to take place in St. Petersburg, Florida, from 14 to 16 April, 2002). 4 ESTRO REACT experts were invited as speakers. Since all their costs will be reimbursed, this REACT activity will entail no costs for the ESQUIRE project.*
- *The progress on all 4 project lines will be discussed at the 2nd REACT network, scheduled to take place in Norwich from 7 to 9 June 2002.*

23 Network partners participated in and contributed to the REACT network meeting in Norwich (7-9 June, 2002). The meeting was divided in 3 sessions designed to address

- 1) optimisation of follow up
- 2) development of level one recording of outcomes and
- 3) patient involvement in assessment of toxicity

1) There is no consensus on the necessity, frequency and timing of patient follow up and by whom it should be performed. Some studies indicate that follow up is not useful in improving overall survival rates. The members of the group agreed that follow-up has much wider aims which include care, support and education of the patient and documenting outcome of treatment. An audit document to look at the current outcomes of follow up, to be completed both by patients and doctors was agreed upon. The audit will be conducted in the departments of the network partners over a 2-month period. 2 bio statisticians in the group will look into databases of clinical studies to see whether the timing of follow-up can be optimised. The results of the audit will be analysed and reported on in the next network meeting scheduled to be hosted by the Italian network partner in Genova from 1 to 3 March 2003-02-28

2) The group agreed that three levels for reporting of toxicity should be considered. Level 1 for routine clinical practice, level 2 for clarifying questions raised in level 1 recording and level 3 for clinical trials

A simple level 1 reporting system was discussed, based on the patient's perception of outcome and assessment criteria agreed upon.

For Level 2 recording it was discussed which questions asked to the patients would be most informative. Large data-bases were identified which should be mined to determine these questions using the technique of item data banking as presented by one of the participants. This task will be carried out by the 2 bio-statisticians in the group

As to level 3 recording: concern was expressed about the little weight that has been given to the European input for the establishment of new CTC criteria after the joint ESTRO-ASTRO meeting in St. Petersburg, Florida, to which REACT partners participated. It was decided not to withdraw from the joint seminars and to give comments on the first draft.

3) Patient's perspective on outcome. Two network partners reported their experience with patient

questionnaires. It was decided that selected members of the group would join the ongoing studies on the correlation of the patients' perception of quality of Life and the scoring of late effects by clinicians. No new questionnaire will be developed.

TASK 3 – EDRO :

Education for Radiation Oncology

If there is a single medical speciality for which the concept “Europe” and “European Space for Professionals” is fast becoming a reality, it is radiation oncology. Due to the fact that the number of professionals involved is relatively small and that along with advances in diagnostic imaging and computing, the technology for the precise delivery of the treatment is developing at a breathtaking pace, a European approach to the provision of adequate teaching and training is the only option. ESTRO has in the past already delivered enormous efforts for this. The ESQUIRE support however has injected in the process a momentum which would have taken many years to reach or might never have materialised. It is hard to overestimate the effect of the multifaceted EDRO project. The outcome of investment in education can be evaluated only in a long- term perspective. A measurable outcome is an enormous surge in the number of “junior members” in the Society. That means that ESTRO, thanks to the EU support, has been able to offer them one of the most desirable commodities: access to knowledge and a European perspective. Measurable is also the generosity and enthusiasm with which many experts involved in EDRO have been contributing their scarce free time. As a result, several of the sub- task groups are ahead of schedule and we are confident to more than reach the goals set out in the project application.

3.1. Development of curricula

3.1.1. Curriculum for radiation oncologists.

The group met right after the start of the project on 8 August 2001 to decide on a strategy, a detailed work plan and concept. As homework for the group, curricula from 8 representative countries, including the US were collected, read, analysed and compared. An official mandate was obtained from the professional radiation oncology societies (UEMS) in view of the future recognition and implementation. At the 2nd meeting of the group (4-5 December 2001) a division of the work to be carried out in 3 sub tasks was decided on and a first draft will be discussed at the third meeting of the group scheduled from 31 May to 3 June. At this meeting the draft curriculum will be discussed with the trainers and juniors of the pilot group now experimenting with the new logbook system for practical training.

Meeting 31 May-2 June

At this meeting the 3rd draft of the Education and Training Committee for the European curriculum and logbook system was thoroughly discussed with a group of radiotherapists responsible for the training programme in their institute who had volunteered to participate in the pilot groups. For the first time, trainees were invited to give input from their own perspective. They also found time to exchange ideas and views on training in Europe. The overview of training documented here reflects the personal experience of the participating trainees and is not a comprehensive review of training in Europe. The overview of training documented hereafter reflects the personal experience of the participating trainees and is not a comprehensive review of training in Europe. With all its limitations, it does shed some light though on the large variability still existing in Europe and on the huge effort still to be delivered to achieve harmonised quality standards for education and training in Europe.

It may take a further 10 years to see a convergence towards the new, commonly agreed on standards for which a formal endorsement from the national scientific and professional radiation oncology societies will be sought at a

meeting already scheduled for November 1, 2002. An invitation to this meeting together with a final draft of the documents was circulated to them immediately after the meeting.

| | GERMANY | HUNGARY | ITALY | POLAND | SPAIN | SWEDEN | TURKEY | UK |
|--------------------------------|---|--|---|--|--------------------------------|---|--------------------|--|
| Number of years in training | 5 | 5 | 4 | 5 | 4 | 5 | 3-4 | 5 |
| Speciality | Radiation Oncology | Radiation Oncology | Radiation Oncology | Radiation Oncology | Radiation Oncology | Oncologist Joint training in chemo-therapy and radiotherapy | Radiation Oncology | Clinical Oncologists Joint training in chemo- and radiotherapy |
| Can prescribe chemo-therapy | Yes | No | Yes | Yes | No | Yes | Yes | Yes |
| Assessment process | Oral exam at the end of training Local | Written and oral and practical exam at the end of training National | Oral exams during training. Practical /oral exam at the end Local | Practical and theoretical at the end of training National | No exam Assessment by tutor | No exam Continuous appraisal | Oral exam Local | Written/oral /practical exams National |
| Responsibility for licensing | State Chamber of Physicians | University | University | Government | Government | Government | Gov | Government |
| Written core curriculum | No | Yes | Yes | Yes | No | Yes | Yes | Yes |
| Log book | No | Yes | Yes | Yes | No | Yes | No | Yes |
| External audit of training | No | No | No | In progress | No | Yes | No | Yes |
| Programme director | No | Yes | Yes | Yes | No | Yes | No | Yes |
| Personal tutor | No | Yes | Yes | Yes | No | Yes | No | Yes |
| Compulsory theoretical courses | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes |
| Protected study time | No | No | No | No | No | No | No | Yes |
| Rotation to other specialties | Yes | Yes | Yes | | Yes | Yes | Yes | No |

3.1.2. Curriculum for Radiation Physicists

More or less the same procedure was followed as for 3.1.2. The difference however is that thus far never a European curriculum specific for radiation physics was developed. In view of implementation at the national level the President of the European Federation of Physics in Medicine (EFOMP-Federation of National Medical Physics Societies) was invited to participate in the exercise. The group has been working really hard. At the first meeting of the working party (Sevilla, 20-22 September 2001), the scope of the work was explored and the principles laid down which should be addressed. National curricula and international guidelines had been collected and circulated in advance. A tight timetable was drafted with a very effective work distribution. Each of the participants was given part of a first draft to prepare before the next meeting. At the 2nd meeting of the working party (Barcelona, 8-10 February 2002) additional reference documents were circulated and discussed. General

educational issues around mobility of physicists in Europe, accreditation and legal issues pertaining to the status of “qualified or specialist medical physicist” were discussed. The chapters of a first draft prepared by the different members of the WP were discussed one by one in detail and a method for integrating a 2nd reworked version in a consistent order agreed upon. The group will meet again in Brussels (from 5 to 7 April 2002) with the expectation to have a 2nd draft to discuss which then, after redrafting, can be sent for comments to the national medical physics societies.

Nothing spectacular to report for the 3rd meeting of the group (Brussels, 5 to 7 April) except very intensive work sessions where every definition and every word of the 2nd (and for several chapters already 3rd) draft were tested on their proper understanding from different cultural national/cultural perspectives. A very tight schedule was agreed upon for the final work to be carried out in time for prior circulation and final endorsement by representatives of the national medical physics societies, due to meet at the EFOMP meeting in Eindhoven, from 20 to 23 May, 2003.

3.2. Mobility in Radiation Oncology: a European training manual/record (Logbook system)

Mobility of professionals within the EU is guaranteed by European law. In practice however many obstacles stand in the way of implementation. National Boards, functioning as watch dogs to keep up minimum standards in their profession, are –often justifiably- concerned about the quality of education and training in other EU countries. This type of barrier can be removed only by a bottom-up approach, by working as ESTRO does, at the basis and by developing common European standards. Developing a common tool for recording not only the theoretical but also the practical training and further professional development of RT-professionals, is one of the priorities the Society set for itself several years ago. Advances in further developing the idea however have been slow since meetings could only be organised in the margin of other events. Thanks to ESQUIRE we are now making genuine progress. The idea is to introduce for all the radiotherapy trainees in Europe an “EBR (European Board for Radiotherapy) Training Manual/Record (TMR)” in which permanent records are kept. It will be complemented by a pocket size recording system for use by the trainees on the wards. A 3rd version of the logbook is now being piloted in 25 European departments who have volunteered to test the system. The trainers and trainees involved in the exercise will be meeting from 31 May to 3 June. At this meeting also the first draft of the new European curriculum will be discussed. An independent review Committee, consisting of one editor per tumour site, will ensure that the level of knowledge to aim at is reviewed on a yearly basis. The TMR will be a loose-leaf “personal organiser” type of system, which allows easy updating.

The most attractive feature of the TMR is that it does not aim at homogenising the existing diversity in Europe. It will only set standards to aim at and it will be up to the trainee and the trainer to see for themselves in what areas there is still a shortfall. The TMR will describe an essential common core of knowledge and expertise and national professional bodies will be free to add on to it. The TMR will be extremely helpful when a trainee wishes to complete part of his training in another country or when staff shortages in one country can be compensated by unemployed young professionals in an other country. A short glance at the candidate’s TMR will be sufficient to give the recruiting department an insight in the level of training the candidate has achieved. We expect we will be able to add a final draft of the TMR (master logbook) and of the pocket logbook to the final report for this year. The working party on the classification of tumours of the Central Nervous System decided after a single meeting that the complexity of these tumours does not allow their classification in a standardised system such as the TNM classification.

See report on meeting together with curriculum group in Brussels from 31 May to 2 June. The outcome of this meeting was a much simplified version of the logbook where, at the suggestion of the juniors, non-essential detail in recording the training experiences was given up in favour of

simplicity more likely to induce compliance by a broad segment of trainees who wish to keep their options on a professional career elsewhere in Europe open.

3.3. Development and publishing of Teaching material

The publications steering group met twice: once in the ESTRO office and once in Lisboa. The general strategy was discussed. It was decided that ESTRO would not publish books on areas still developing rapidly such as IMRT. For these subjects yearly updated course syllabi are most suitable.

A lot was achieved in just 6 months: all the teaching teams met. The group which has worked hardest is that for the Brachytherapy book. After having laboured on this book over several years, a huge effort was delivered in the last year. Sacrificing vacations and holidays the group met 4 times for periods up to a week. Since the authors have been hosting each other privately, this is not reflected in the cost statements. What pulled them over the brink is some secretarial assistance for editing the final draft, paid for by the ESQUIRE project. We expect a copy of the book can be included in the final report.

A 2nd hard cover teaching book: "Basic Clinical Radiobiology" will be going to the press this year. It is a revised edition of a book produced earlier. In the mean time the editorial team is preparing a totally reworked edition trying to integrate in it molecular biology data. The concern is to do this without affecting the superior didactic quality of this extremely successful teaching book, which has become the standard teaching book for radiobiology world-wide. It could be offered at an affordable price thanks to a bulk order for Central Europe financed by the TEMPUS programme.

The other editorial teams met as well but are still less advanced in their work, deciding on content, reformatting schematic presentations, copyright clearance for already published graphs etc.

Parallel with the teaching books further publications of a series of booklets, providing European guidance for good practice (mix of education and quality assurance) have been put into full gear. Two were published in 2001, 2 are in final stages of preparation and 3 other ones were just initiated (Tasks 5 and 6). These booklets are extremely appreciated because they provide essential support for the introduction of new technology and best practice procedures in radiotherapy departments. The authors forsake copyright, agree with their publication in downloadable pdf-files or as open source software on the ESTRO website. Also for these booklets, the Esquire support was essential. A team of brilliant young physicists had been working enthusiastically during weekends and free time for over 2 years now on a booklet for "Monitor Unit Calculations for Advanced Techniques" but hurt themselves on an insurmountable obstacle: 3 months of computing time. Thanks to the physicist-months provided for in the Quasimodo task Group, this problem could be solved.

The Annual meeting ESTRO scheduled in Praha from 17 to 21 September was the deadline for the launch of the 2 teaching books. 250 copies were shipped to be sold in the ESTRO bookshop. The books were completely sold out after day 1 and at the time of drafting this report the total first edition of the brachytherapy handbook printed on 2000 copies is almost depleted. It counts 680 pages, 585 figures and 78 tables and would easily carry a price ticket of 250 to 300 Euro on the shelves of bookstores. Most probably it would never have found a publisher in its present format. Thanks to the ESQUIRE support for the final editing and compilation, and sponsoring by commercial companies, it can be offered for just 45 Euro. The technique for the conversion of the chapter to a web supported format will require the purchase of dedicated software.

It will also be a challenge for the ESTRO office to cope with the heavy workload for the final editing of the 5 booklets which should reach a final draft stage in the coming months.

ESQUIRE Education Fellowships

Together with the “Research training Fellowships” and the “Technology Transfer Grants”, these fellowships for attending ESTRO courses have really brought about a strong “élan européen” in the radiation oncology community. Although most of the fellowships have yet to be paid out because the season for the courses has only just started, they have been snapped up enthusiastically and to date all of them have been allocated. We include the announcements published in the ESTRO Newsletter and on the ESTRO website, the selection criteria and the application forms. ESTRO enrolls every year about 1000 junior members and fully trained professionals in one- week courses for their basic or continued education. For many of the juniors, the threshold lowering ESQUIRE fellowships have been essential. Hereafter an extract from the many “thank you EU” letters

“I have just finished going over my notes from CERRO. It is amazing how much of what was discussed is so relevant to our daily practice-even down to the tiny radiosensitive area on the cell survival curve! This has given me a few sleepless nights wondering about the relationship between it and IMRT radiation. I am very grateful for all the opportunities that this Fellowship has afforded me and for the fact that I can visit another country and still keep my family with me.” (Carol Mc Gibney, ESQUIRE research fellow, given travel grant for attending research meeting).

As long as we can make young scientists spend sleepless nights over scientific questions which may affect the treatment of cancer patients, cancer research, ESTRO and Europe Against Cancer are on the right track.

In total 142 grants were distributed. An overview is given in the annexes to this report. As mentioned before the International Atomic Energy Agency has matched the EU effort with 250 equivalent grants for participants from Central and Eastern Europe and of the Newly Independent States. To close the gap between the EU and its underprivileged neighbours ESTRO is, from its side, investing in courses with simultaneous translation into Russian. A Russian edition of one of the basic courses is organised every year.

3.4. ESQUIRE Research training fellowships

Also this part of the programme was extremely successful and the jury was faced with difficult choices. When applying, candidates had to submit their research proposal together with consent forms both from the sending and host institutes. The profound “mind expanding” impact which such an opportunity to get involved in research can have on the future perspectives and professional lives of young people is best illustrated by the comments received from one of the fellows:

“Working here in Amsterdam is a great and very stimulating experience for me. Last week Marcel Van Herk asked me to provide for two articles, me being the first author; this is a real opportunity for me and I had never expected that I would benefit that much from my expatriation. This one-year fellowship is going to be an extraordinary break for me and will certainly generate precious boost for my future. I am full of energy and have plenty ideas for the coming years. So I clearly enjoy it and take advantage of this opportunity...”(Xavier Artignan, from Grenoble, moved with his complete family).

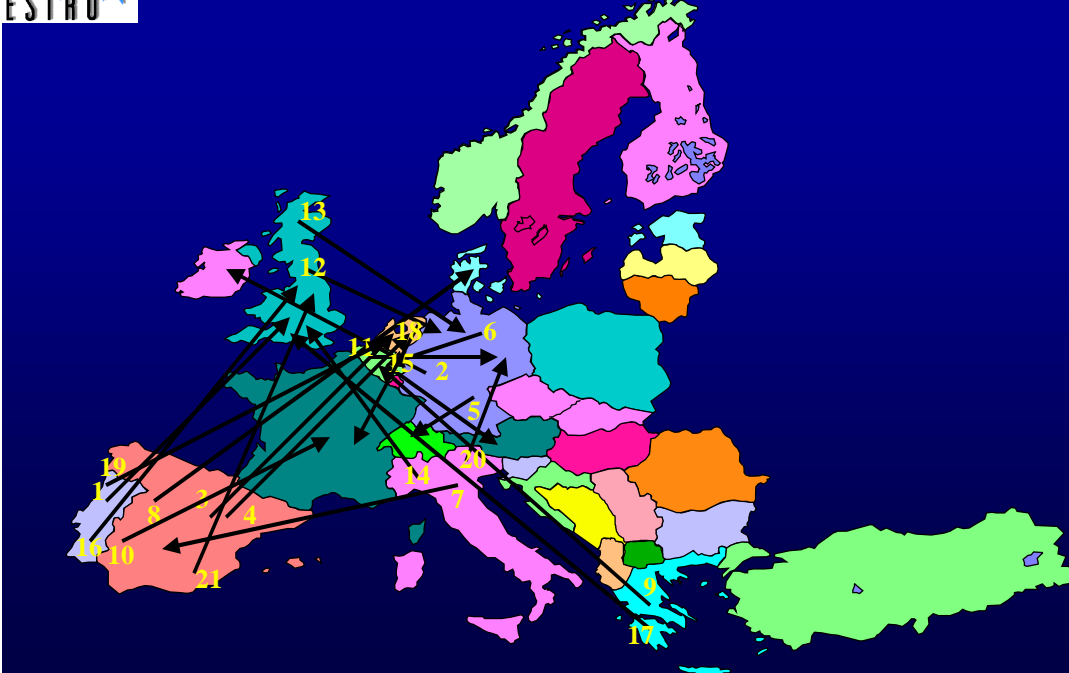
Full reports on this research training fellowship programme are provided in the appendices to this report.

3.5. ESQUIRE Technology Transfer Grants.

It is a big challenge for ESTRO to keep its teaching programme in step with the breathtaking technological advances in diagnostic and treatment technology. Without appropriate training and education, the introduction of new techniques can entail considerable risks both for the clinician and the patient, not in the least in the field of ionising irradiation. Delays in providing this kind of support mean delays in the clinical implementation of powerful, potentially life saving new tools, in daily practice. Besides educational updating there is no alternative for “look on-hands on” experience to pull clinicians over the confidence threshold for embarking on optimised, state-of-the-art treatment. It is therefore no wonder that the ESQUIRE technology transfer grants sparked a massive response. Thanks to “lean” management procedures developed over a number of years, we were able to stretch a budget, originally meant for 10 fellowships only, to provide for 17 fellowships in total. An overview of the 13 grants already allocated by 31/01/02 is included. The “objectives” formulated by the candidates in their applications, make for fascinating reading and emphasise how great the need is for this type of incentive to speed up the introduction of advanced treatment techniques. In the early 90s ESTRO was able to manage a similar programme with some funding from the industry. The mobility flows went at that time all in the same direction: from departments in Southern Europe to “centres of excellence” in North-Western Europe. The uptake was limited and the equivalent of 10.000 EURO was largely sufficient to cover the needs. The contrast with the present programme could not have been bigger. The response now is massive and the mobility requests cut across all European borders in all directions. With our final report we will submit a flow chart for the technology transfer grants. It will graphically illustrate the size of the progress that was achieved in barely 10 years. “Excellence “ is no longer the privilege of a few leading centres, but has spread all over Europe, certainly in the field of radiation oncology. There is no doubt that ESTRO, with its education and quality assurance programmes, has contributed significantly to this development. A lot of credit goes to the many volunteer experts who back them up but also to the European Commission which has provided the Society at critical moments with much needed support.

The figure hereafter gives a graphic overview of the mobility flows. The most striking difference with earlier experience is that Germany, which had a lot of catching up to do in the eighties and early nineties in the field of radiotherapy, has now become an attractive destination on the shopping list for European expertise. A detailed description of the objectives of the candidates which needed to be supplied together with their application, is provided in annex.

Flow of EDRO Technology Transfer Grants 2001-2002



TASK 4. EPOQART (RENAMED : EQART)

European Permanent Office for Quality Assurance in Radiotherapy

Renamed: *European Institute for Quality Assurance in RadioTherapy*

The huge gap between the research efforts in the US and Europe is reflected in the availability of research infrastructures and the support provided for them. In the US, 3 different institutes receive substantial government funding (adding up to more than 20 Mill. \$ per year) through the channels of the National Cancer Institute (NCI), just for ensuring the quality assurance of diagnostic and therapeutic radiology aspects of clinical research. Europe has a lot of catching up to do in this field. This was the conclusion of the report of 3 EQART missions to the US (To the RPC in Houston, the RCA in Philadelphia and QUARK in Providence). To make European Institutes and European Research less dependent on services from overseas, ESTRO created, as a first step, the EQUAL Lab for dosimetric checks in radiotherapy. This Europe Against Cancer-supported lab (Task 1-EQUAL) is performing at top level. However, dosimetry is only one of the 12 steps in the quality chain of RT treatments and it is clear that a lot of additional services will need to be developed before we can even pretend to talk with our American counterparts as equal partners. The creation of EQART under task 4 of the ESQUIRE Project is a 2nd step in building up Europe's infrastructure for research involving radiation oncology. The first task of the Institute, staffed at this moment by a physicist and a technologist in co-operation with radiation oncologists from the University Hospital KU Leuven, is to prove that also in Europe this type of Infrastructure is sustainable.

- A flyer was developed describing the services presently on offer and widely circulated.

- EQART task leaders and staff attended the meetings of the task groups EQUAL, QUASIMODO, BRAPHYQS and REACT to gain insight in the progress of the tests and QA protocols being developed by them and of the ongoing feasibility studies. These new QA products are already listed on the advertised EQART service menu so as to minimise the time lapse between the development and the implementation of the ESQUIRE research in the clinical environment, its dissemination for research purposes and its exploitation for technological and scientific development in industry.
- ESTRO hosted a visit to the EQUAL-Lab in Paris by the Directors of the Radiation Physics Centre (RPC), established in the MD Anderson Cancer Research Centre in Houston, US. This meeting was attended by EQART and ESTRO representatives. A memorandum of understanding (MOU) for future co-operation and reciprocal calibration tests was agreed upon and will soon be signed. We will report in our final report on the return visits to Houston, and on 2 other fact finding missions to the American College of Radiology (ACR) and to the QUARK QA Institute respectively which were programmed for March 2002.
- A detailed protocol listing the physical and clinical parameters to be checked for clinical studies involving radiotherapy was generated and custom made protocols were designed for testing EQART's capacity to deliver these services in 2 collaborative EORTC studies which will be initiated this year.

As is illustrated in the comprehensive report hereafter, the efforts of the EQART institute were on one hand focused on acquiring expertise and establishing relationships with similar (government funded) institutes in the US, on the other hand on developing and advertising its services to potential users. With a first success in sight, it will still be an uphill struggle for the Society to maintain this research and QA infrastructure in the absence of EU funding during the period in which it builds up its capacity and becomes established

In addition to the programmed actions an additional activity which should have an important impact on the safety of radiotherapy delivery was added: ROSIS.

On the basis of a comparative analysis of national systems, a web-based European incident reporting system was developed. To this end the newly established EQART-ROSI Network which was backed up with moral support from the EQUAL and REACT networks as well as from the EQART Institute, was created. It worked intensively and after 3 meetings which took place in Copenhagen, Leuven and Brussels respectively, has already entered a pilot phase. This system will allow safety officers in radiotherapy departments to share their experience and pinpoint problem situations which may lead to errors in the treatment delivery. Small breaks in the quality chain, and errors can compromise treatment outcome if allowed to go undetected. A coincidence of several errors can lead to incidents and even to radiation accidents where large groups of patients are exposed to lethal doses or to under-dosage which denies them the chance of cure.

Creation of "The European Institute for Quality Assurance in Radiotherapy" (EQART)

1. Publicity on EQART

A leaflet is prepared to announce the creation of EQART. In this leaflet the mission and services are described together with the EQART structure and EQART staff after discussions with the EC Network partners. A first draft of the leaflet was discussed during the 6th Biennial ESTRO meeting on "Physics for Clinical Radiotherapy" and on "Radiation Technology for Clinical Radiotherapy" in Seville (17-20 September 2001). The final draft of the leaflet is distributed at the European Cancer Conference (ECCO 11) in Lisbon (21-25 October 2001).

The organization of the EQART institute is furthermore discussed in different meetings :

- EQUAL-RPC meeting in Villejuif (12-14 December 2001)
- EQUAL meeting in Perugia (12 January 2002).
- EORTC-ESTRO meeting in Brussels (February, 15th ,2002)

Two EQART staff have visited the RPC (Radiological Physics Center) in Houston (18-22 February, 2002), because this institute became a benchmark, a reference and an authority regarding assessing institutional quality, corrective actions and providing guidelines in the state of the art of radiation therapy. Also the American College of Radiology (ACR) in Philadelphia (March 19-20th ,2002) and the Quality Assurance Review Centre (QARC) in Providence (February, 26th , 2002) were visited to have a clear overview and to create contacts for co-operation with three of the most important centers on quality assurance aspects in the United States. From May, 25th till the 28th the president of RPC (Dr. Ibbott) was in the EQART-lab for further discussion and collaboration on Quality Control Procedures.

The leaflet is also available on the website of the ESTRO (guidelines and QA)

A copy of all the reports of the visits to the United States, the leaflet and the presentation on EQART are in appendix "Task 4a".

2. Preparation of Internal guidelines for reviewing protocols

An internal document was set-up on how to collect all the necessary data for quality assurance studies (see appendix "Task 4b"). Special documents were prepared for the outline proposal of the clinical trial protocols, the protocol description from the participating centers (in general and for specific sites as there are "head and neck" and "prostatic carcinoma"). Moreover, checklists are prepared for radiation treatment QA documentation and in house checklists. Also "Individual case review forms" (for the medical coordinator) and validation forms are framed. These documents will now be reviewed and discussed with a panel of experts.

3. EQART for the clinical trials.

a. EORTC 22996

A first intergroup study (EORTC 22996 protocol) : "A phase III double-blind, randomized, placebo-controlled study of Erythropoietin when used as an adjuvant to radiation therapy in patients with head & neck squamous cell carcinoma" has contacted EQART for the quality assurance of their trial.

EQART defined for this trial the possible quality assurance aspects and discussed these items with the chairman of the study (see document : first discussion : EQART for EORTC 22996 protocol). Afterwards a quality assurance program has been defined (see document : QA checks of the radiotherapy requirements in the EORTC 22996 protocol) and a proposal for modifications on the protocol has been sent to the chairman of the study after a complete review of the document (see: Proposal for modification on the protocol (EORTC 22996) of the intergroup study...). Unfortunately for some unexpected reasons (low hemoglobin level) this trial suffers from a very low accrual rate.

b. EORTC 22991

A meeting was organized in Dijon (July 24-25th, 2002) to discuss the Quality Assurance aspects of the intensity modulated part of the radiotherapy phase III randomized study with 800 patients recruited over a period of 5 years). EQART defined for this trial the possible quality assurance aspects and developed new methods to verify the radiotherapy equipment for delivering IMRT treatments, as well as some pre treatment QA methods to check the IMRT treatment plan which should be delivered to the patient (see part 7)

Based on these proposals the QA of IMRT will be discussed within the EORTC during the EORTC Radiotherapy Group meeting in Maastricht (October, 25-26th; 2002) for further collaboration with EQART.

c. GETUG 14

EQART was also contacted by the "Groupe d'Etude des Tumeurs Uro-Génitales (GETUG)" to perform the QA of a multi-centric trial in France. A summary of the trial is included. The different aspects of the quality assurance aspects will be discussed in Paris on December 2nd.

All EQART documents about these trials are in appendix "Task 4c".

4. Development of a database for external radiotherapy data

As mentioned in the interim report a database is being developed for collecting all the data for chart review for the EORTC 22996 protocol. In the mean time the database is extended to all external radiotherapy data (not only specific for the EORTC 22996 trial). The purpose of this database is to check conformity with requested radiotherapy data in trials, to check the data transfer in the treatment chain and to evaluate measured deviations of the patient positioning.

A general overview of the structure and all the calculated fields are in appendix "Task 4d".

5. Mailed in-vivo-TLD measurements for the EORTC trial 22922/10925

After the feasibility study, which was performed in different reference centers through Europe, EQART started with a mailed in vivo dosimetry check with TLDs on patients who are participating in clinical trials. By these mailed in vivo TLD measurements, the overall accuracy of patient treatment delivery is checked by comparing the doses delivered to patients with the doses calculated by the treatment planning system.

Instruction and data sheets are developed in order to guarantee that the participating centers perform the measurements in a correct way. At this moment, TLD measurements performed on patients are evaluated from 7 different radiotherapy centers (Leuven, Jolimont, Paris, Dijon, Grenoble, Deventer and Utrecht) which are participating in the EORTC trial 22922 (a phase III randomized trial investigating the role of internal mammary and medial supraclavicular (IM-MS) lymph node chain irradiation in stage I-III breast cancer). With exception of one measurement (wrong positioning of the TLD on the patient) all deviations were within the 3% accuracy level.

Hence EQART has developed a feasible method to check the delivered dose to patients and can offer it now as an external audit. A publication (Development of build-up caps for mailed in vivo

thermoluminescence dosimetry) is now submitted for peer-review and will be published next year in Radiotherapy and Oncology.

In appendix "task 4e" data and instruction sheets and results can be found.

6. Development of EQART phantom

To check the overall performance of a department, EQART has developed a "tissue equivalent" phantom. After sending the phantom to a department, a CT-scan of the phantom is performed, the tumor located, a simulation performed, the doses are calculated and the phantom is irradiated. With film dosimetry, EQART can evaluate the treatment outcomes and can compare the difference in tumour locations and dose distribution between different centers.

Various industrial plastics have been tested to create anatomical structures in the phantom (bone, eye, brain, myelum, parotic glands, air cavities, ...) combined with a tumour that has about the same electronic density as normal human structures. For the moment the drawings for "a head and neck" phantom are finished.

The drawing of the phantom together with the results of the material tests can be found in appendix "Task 4f".

7. Development of external audits for IMRT

Intensity Modulated Radiotherapy (IMRT) is one of the new developments in treating the tumor of a patient with radiotherapy. The key point factor of implementation of IMRT in a department is obviously the Quality Assurance procedures. EQART has developed during this year a quality assurance audit for IMRT by postal film dosimetry and TLD with the existing OPERA phantom (Operational Phantom for External Radiotherapy Audit). The OPERA phantom was developed with the support of the European Union (EC Network project – Europe against Cancer DG V and is recently published in the international journal "Radiotherapy and Oncology" (number 64 – 2002 pag 317-326)-> see appendix.

Instruction sheets, data sheets and a new type of dosimetrical film (the dose range is now within the range normally given to patients) is tested by EQART for these external IMRT audits. For the moment 4 different centers with a large know-how in IMRT are testing the feasibility of the audit. (University of Gent, Radiotherapy departments in Dijon, New York and Leuven).

Instruction sheets and data sheets are in appendix "Task 4g".

8. Development of new methodologies.

a. Electronic filters

EQART is investigating whether the new international standard DICOM RT (i.e. the international protocol transfer standard for patient treatments information for radiotherapy) together with XML (extensible Markup Language) can be used to create a new means of quality assurance in European clinical trials over the internet

EQUART (European Quality Assurance Program in Radiotherapy by Monitoring Treatment Preparation) will create software platforms with appropriate filters to detect errors in the treatment process by comparing to existing standards. A presentation of the global idea can be found in appendix "task 4h".

b. Quality assurance with portal imaging devices.

EQART started to investigate the possibility to use the electronic portal imaging devices (which are now only used to verify the patient positioning on the treatment couch) for quality assurance purposes of the treatment equipment and as pre-treatment dose verification of the patient.

TASK 5. QUASIMODO

Quality Assurance in Intensity MODulated Radiation Oncology

The main objectives of this group were :

- 1. To develop guidelines for the minimum tests to be carried out for the acceptance of a new 3D- treatment planning system (TPS) or when commissioning a software update for 3D treatment planning. This task was taken on mainly with small departments and isolated physicists in mind who still want to go for optimised treatment but do not have the resources to spend months carrying out tests. Other International guidelines designed for this purpose so far are too comprehensive and would take years to carry out. The physicist cannot see the bush for the trees. The selected tests will subsequently be carried out in different technological environments and the inter-comparative study will be published. This way the work carried out should benefit the entire scientific community. The study will not only define the tests to be carried out by the end user but also those which should be performed by the companies before the initiation of acceptance tests.*
- 2. The 2nd research topic of the group was to design European guidelines for the verification of Intensity Modulated Radiotherapy (IMRT), a promising new high precision treatment technique. Thus far departments embarking on optimised radiotherapy schedules such as IMRT, were left very much to their own devices for inventing tests for this totally new treatment approach. Consequently the pace of introduction of IMRT into routine practice has been very slow. The reason for this is not only inadequate reimbursement schedules (solved at least in a few countries) but also the risk involved, the lack of security around still frequent data transmission errors within a generally complex environment of heterogeneous software systems, supplied often by no longer existing and/or a variety of technology suppliers, and this despite the introduction and implementation of DICOM RT standards.*

It is clear that even though it was decided to restrict the work to be done for objective 2 to developing and testing- procedures for the verification of IMRT without providing an actual QA service to centres embarking on clinical trials around IMRT (task to be taken over later by the EQUAL Network), a huge workload was waiting for the QUASIMODO group. For this reason it was planned that 2 FT- physicists would be made available to the task leaders in Gent and Amsterdam respectively. One non-anticipated hurdle was the prevailing scarcity on the labour market of qualified physicists to carry out the work. While Gent was successful in recruiting a physicist, the problem could not be solved thus far in Amsterdam. Although a very qualified candidate from Poland was identified and permission was obtained from the Commission to hire her, still ongoing lengthy bureaucratic procedures for obtaining a work permit have up till now stood in the way of a solution. Despite this setback, objective

1 of the 2 major Quasimodo tasks is only slightly delayed. Some work had already been carried out by a research fellow in anticipation of the project, some of it could be devolved to volunteers and some compensatory tasks could be distributed to other centres. A lot of work was performed by 3 network partners in collaboration with the International Atomic Energy Agency and a comprehensive literature review and compilation of proposed tests was made

The QUASIMODO network met for the first time in Sevilla from 14 to 16 September and a second meeting is scheduled to take place in Heidelberg, from 15 to 17 March. In Sevilla a work distribution amongst the partners was agreed upon and a decision made around what paths would be followed to reach the goals set out in the project application.

Task 2 is being carried out according to schedule:

- *An inventory of the status-*praesens* for the implementation of IMRT in the network centres was made. Overall the experience thus far accrued in Europe is rather limited and the number of patients already treated with IMRT is not impressive. The figures collected within the group suggest that in almost all centres active research as preparation for the clinical implementation is being carried out but that only in very few cases the technique has made the transition from the research phase to clinical practice.*
- *A Checklist of possible tests was drafted and comments on them were invited from the different partners*
- *The research work carried out in Gent has resulted in detailed proposals for possible tests to be carried out by the QUASIMODO partners. The proposal will be discussed at the QUASIMODO network meeting scheduled to take place in Heidelberg, from 15 to 17 March, 2002 .*

A brief report from the QUASIMODO coordinator for Esuire year 1.

Part 1: Drafting a list of essential tests for a treatment planning system

The first part of the QUASIMODO project is to identify a minimum set of quality assurance, QA, procedures and tests, which should be performed by a user of a treatment planning system, TPS, before the system is taken into clinical use. A large number of tests was generated and collected in a systematic way. In order to estimate the usefulness and workload involved in applying these tests, the current set was applied for a specific commercial treatment planning system that was recently installed in the Netherlands Cancer Institute for research purposes. The preliminary results demonstrated already some of the limitations of this particular TPS, for instance with respect to the input of patient data. Another observation was that the time involved in performing these tests is substantial. For instance, testing the anatomical description and beam description took already several man-months, while currently a lot of effort is put into performing the dosimetric tests. Obviously a selection of the most important tests is necessary.

Part 2: Verification of static and dynamic IMRT fields

In order to have an overview of the current status of intensity-modulated radiotherapy, IMRT, in the institutions participating in the QUASIMODO project, a questionnaire was distributed and returned by the 13 participating centres. Information was provided concerning the delivery technique, the computer optimisation software, the type of objective functions, the leaf sequencer software, the software for the calculation of the dose distribution and monitor units, the phantoms and dosimetry systems applied for the verification, and the clinical experience. A general conclusion from this survey was that all major accelerator and TPS manufacturers are represented in the QUASIMODO

project. As a consequence, it will be possible to compare most IMRT optimisation / delivery combinations that are currently possible to apply clinically. From the answers on the questionnaire it became also evident that until now most institutions are using IMRT to treat patients with prostate and head and neck cancer.

The next step in this part of the QUASIMODO project was the design and verification of IMRT techniques of varying degree of complexity for the treatment of prostate and head and neck cancer. It was decided to verify the “end product”, *i.e.*, the complete treatment delivery, not the dose distributions delivered by the individual fields separately. A phantom was specifically made in Gent for this project (the CarPet phantom) to verify IMRT treatments of prostate cancer. This phantom, as well as a set of photographic films, will be sent to each of the participating centres. Inside the phantom some inserts are made to position an ionisation chamber for absolute dose measurements to normalize the film data. The performance of the CarPet phantom has been tested in three centres. After adapting the phantom and modifying the procedure slightly, the phantoms will be distributed to all participating centres. The IMRT plans and the irradiated films, as well as the results of the ionisation chamber measurements, will be sent to Gent for analysis. Software has been developed to compare calculated with measured dose distributions in a number of slices.

Conclusions

A preliminary conclusion from the work finalised today with respect to Part 1 of the project is that a clearer separation has to be made between tests to be performed by the vendor of a specific TPS, by user groups (tests sites) of that system, and by an individual user. It is therefore necessary to strive for a close co-operation with the vendors of a TPS at a later stage of the project, to get their input and comments on these proposals. Performing the proposed tests by users of various treatment planning systems seems very useful before distributing the recommendations at a larger scale, which will most likely be done as an ESTRO booklet.

An interesting observation from the survey on the current status of IMRT in Europe was that almost each institution applied their own phantom / dosimetry systems for the verification of treatment delivery. An evaluation of these methods, as well as the methodology applied in this project, followed by drafting general guidelines by ESTRO for QA of IMRT planning and delivery seems therefore a logical next step.

TASK 6. BRAPHYQS

BRachytherapy **PHY**sics **Q**uality **A**ssurance **S**ystem

As mentioned before, this network has been exceptionally active:

- *An inventory was compiled of radioactive sources commonly used in brachytherapy in Europe*
- *In co-operation with the EQUAL Lab a test for checking the geometric accuracy in brachytherapy was developed. The pilot study for the test was carried out by the network partners using the Baltas phantom. A form for applying for an “ESTRO Postal check of reconstruction*

methods used clinically for brachytherapy” was developed as well as a protocol for reporting the results.

- *A study for the determination of absorbed dose to water using thermoluminescent dosimetry (TLD) powder in water around Iridium 192 and Caesium 137 brachytherapy sources was carried out by the ESTRO EQUAL Lab. Proposals for a phantom suitable for carrying out the dosimetric brachytherapy audit with postal TLD was discussed and a methodology and prototype developed. Before the phantom can be sent out it needs however still to be improved from the technical point of view, to rule out set-up errors.*

Right from the first network meeting in Sevilla (18 and 19 September 2001), the group was subdivided into 2 active working parties which will each be responsible for the publication of a booklet on quality assurance for brachytherapy Physics:

*ESTRO booklet nr. 9: “A practical guide to quality control of brachytherapy equipment”
ESTRO booklet nr 10: “Treatment Planning Systems in Brachytherapy. Source data”*

If the booklets are not too voluminous and the delivery date for the material can be co-ordinated, they can also be published in a single volume. A table of contents for each of them was already prepared and several chapters drafted.

The Brachyqs Network will meet again in Paris from 8 to 10 March

Since the last meeting of the GEC-ESTRO Steering Committee in March 2002, the Brachyqs group has had its third formal General Meeting combined with a working conference, which took place in Valencia, on September 27-29, 2002.

Friday evening almost all network members could attend the meeting. The General Meeting was further attended by representatives of ESTRO (D'Hooghe), Equal (Bongeoat, Ferreira), IAEA (Toelli), and three members of the Valencia RadOnc Department and University.

The working conferences during the Saturday were used to discuss several topics regarding the production of a booklet for the ESTRO “Physics for clinical Radiotherapy” series. For this purpose the network members were split into two groups (topic C, see below).

In the General Meeting the three main topics set for Brachyqs were discussed.

Topic A (dosimetry check)

Ferreira discussed the traceability of the calibration chain to the standard labs. An ion chamber has now been calibrated at the Dutch NMi, and the French standards lab will be involved similarly. Some differences have been observed between the results of different calibration protocols. The calibration chain for the Ir-192 spectrum seems to be established. Several measurements have been performed, e.g. for the reproducibility of the TLD method.

The network members agreed to finalize the design of the phantom. A number of phantoms will be constructed. The Equal lab will continue to perform the physics work and will report on the results at our next Brachyqs meetings. However, Ferreira himself has accepted a position at the IGR and will only be involved as an advisor. A new physicist is appointed for the Equal lab.

A problem may be the relative high standard deviation of the TLD method, as experienced until now in the lab (over 6% for the 2sd confidence level). A new statistical analysis is needed of the data. Furthermore it was agreed that a series of real measurements with the phantom at the centres of the Network members should be performed to see how the method works in practice.

As a spin-off of our discussions, the IAEA has initiated a project to compare the calibration methods at the level of the standard labs, which may lead to interesting results and hopefully to converging methodology (action of Toelli).

Topic B (geometry check)

30 Baltas' phantoms are available for the purpose of the project.

The documents were checked to accompany the phantoms, based on existing documents in use for the external photon beam audits.

An Excel sheet for data evaluation was adapted to fit the Equal procedures.

During the meeting a report was given by Venselaar of the results of the feasibility study among the Network members. A total of 24 test results from 11 different centres were available. It was concluded that we can expect to find "out-of-tolerance" results in about 10% of the cases. The "out-of-optimal" level is expected to be exceeded in 25% - 40% of the cases. In case of an "out-of-tolerance" situation the centre may be contacted for either clarification of the data or for a repeated check.

The Baltas system is considered ready for use. An announcement that the system is launched for availability among all ESTRO members is prepared (see attached document).

Topic C (booklet activities)

Two groups are defined, one dealing with *QA recommendations* and one with *AAPM TG43 source data collection*, respectively. Perez chairs the subgroup on source data collection. For the other part on QA recommendations Venselaar is the chairman.

A relation with existing IAEA reports (TEC DOCs) and procedures, e.g. regarding the source calibrations, is to be included in the work of the subgroup.

Perez gave a nice overview of all activities of his subgroup. A tremendous amount of work has already been done and many data have been collected. The selection of the data by the subgroup for inclusion in the booklet with an acceptable level of confidence is the main problem. Agreement with AAPM recommendations is aimed at.

The efforts to obtain data directly from the vendors of either the sources or the treatment planning systems were disappointing. It was decided not to continue in this way, but to explore other means of information (internet, published articles).

Details of the other chapters were discussed in both groups. First drafts of several chapters are available, but still much editing work needs to be done. These tasks were divided among the individual Network members. It just needs time.

Miscellaneous

Some ideas were discussed about the future of Brachyqs. There is strong support from the ESTRO Board to continue the Brachyqs project. At least, the first 2 topics need to be finalised and followed (task of the lab and by 2 representatives of the members, Venselaar and Rijnders). One new idea needs further exploration: the use of a phantom with a (dummy) implant of a prostate. A limited number of seeds should be implanted; CT data with contours, used source strength must be provided. The centre can be asked to reconstruct the dose distribution and this should be compared to a well-established reference dose distribution.

It was agreed upon that the contribution of some experienced radiation oncologists in this group of physicists would be very useful. Venselaar will make a proposal for the GEC-ESTRO Steering Committee.

A presentation of the Braphyqs work was given during the Antalya GEC-ESTRO meeting by Venselaar and Ferreira on behalf of the group. A new presentation is prepared for the EFOMP meeting in 2003. Several other presentations are expected, and will be held by the members in their respective country/ professional organisation.

There is a contact with the EMIR network, with the purpose to make an inventory of the use of radioactive sources in medicine. The data can be used for political decisions on production facilities. Venselaar attended a meeting in Brussels at the ESTRO office and agreed to co-operate.

The next Braphyqs meeting will take place in Oslo, March 2003 and will be hosted by Taran Paulsen-Hellebust.

Germaine Heeren,
Project Manager

Brussels, 27 February 2003

Appendices to ESQUIRE Interim Report

1. Task 1: EQUAL

1.1. Network meeting Sevilla 13-15/09/2001

- 1.1.1.1. Agenda
 - 1.1.1.2. Report Network meeting²
 - 1.1.1.3. Report D.Thwaites on the UK QA. Audit network
 - 1.1.1.4. General Overview of EQUAL Results
 - 1.1.1.5. The IAEA audit and new projects for developing countries
 - 1.1.1.6. Equal in Finland
 - 1.1.1.7. Equal in France
 - 1.1.1.8. Equal in Spain
 - 1.1.1.9. Equal in Italy
- Development of Equal Project and priorities for future actions and new checks
- 1.1.1.10 Proposal for a mailed TLD Quality Control for small field photon beams
 - 1.1.1.11 ESTRO postal dose checks for high energy photon beams using multileaf collimator

1.2. Network meeting Perugia 11-13/01/2002-03-25

- 1.2.1.1. Agenda
- 1.2.1.2. List of participants
- 1.2.1.3. Report
- 1.2.1.4. The national TLD networks supported by IAEA and a new TLD project for dose audits in non-reference conditions
- 1.2.1.5. The IAEA/WHO TLD postal dose audits and a new project for developing countries
- 1.2.1.6. EQUAL and RPC-USA Co-operation
- 1.2.1.7. Update from the Equal Lab
- 1.2.1.8. Implementation of Directive 97-43 for radiotherapy in France: work in progress
- 1.2.1.9. Quality audit programme in teleradiotherapy centres in Poland
- 1.2.1.10. Implementation plan for Euratom Directive 97/43 in the Czech Republic
- 1.2.1.11. Equal in Germany
- 1.2.1.12. Equal in Italy
- 1.2.1.13. Equal in Spain
- 1.2.1.14. Equal in Finland
- 1.2.1.15. Equal in Greece
- 1.2.1.16. Equal in Austria
- 1.2.1.17. EQUAL in France
- 1.2.1.18. State of the Art: Equal MLC and Brachytherapy checks
 - 1.2.1.18.1 MLC Fields
 - 1.2.1.18.2 Asymmetric fields
 - 1.2.1.18.3 Brachytherapy Programme

1.3. Dissemination activities EQUAL

- 1.3.1. Radiotherapy and Oncology, 55 (2000) 273-284: The ESTRO-QUALity Assurance network (EQUAL), Ivaldo H. Ferreira, Andrée Dutreix et al.

- 1.3.2. *Strahlentherapie und Onkologie 2001.N°8: The ESTRO-EQUAL Quality Assurance Network for Photon and Electron Radiotherapy Beams in Germany, Ivaldo H. Ferreira, Jürgen Richter et al.*
- 1.3.3. *ESTRO-EQUAL Network. IAEA Meeting (International Conference on the Radiological Protection of Patients in Diagnostic and Interventional Radiology, Nuclear Medicine and Radiotherapy) Malaga 26-30 March 2001, Proceedings Series, IAEA-STI/PUB/113, IAEA, Vienna, 2001: Radiotherapy Dosimetry Audit; a European programme to improve quality and safety in radiation treatments, Ivaldo H. Ferreira, Hans Svensson et al.*
- 1.3.4. *The EQUAL-ESTRO Measuring Laboratory: Application to Radiotherapy Quality Audits, IH. Ferreira, A. Bridier et al. Poster presented at 6th Biennial ESTRO Meeting on Physics for Clinical Radiotherapy, Sevilla, Spain, 17-20 September 2001*
- 1.3.5. *A mailed TLD Quality Control Proposal for Small field photon therapies. L. Nunez et al., Poster presented at Annual Meeting of Spanish Radiation Oncology Society, August 2001.*
- 1.3.6. *Website International Atomic Energy Agency (IAEA): How to join the IAEA/WHO TLD Postal Dose Audit Programme*

Detailed bound activity report included

2. Task 2: REACT

- 2.1. *Schematic Overview of Activities*
- 2.2. *Consensus Conference on "Hyperbaric Oxygen Therapy in the treatment of Radio-induced lesions in normal tissues, jointly organised by ESTRO (REACT Network) and European Committee for Hyperbaric Medicine, Lisboa, October 19-20, 2001: Announcement and Programme*
- 2.3. *Report REACT Network Meeting, Lisboa, 20.10.2001*
- 2.4. *Questionnaire of current follow-up practices after Cancer Treatment*
- 2.5. *REACT teaching Course scheduled for ESTRO Annual Meeting – Praha, 17 September 2002 – Provisional Programme*

3. Task 3: EDRO

3.1. Development Curricula

3.1.1. Development Curriculum for Radiation Oncologists

- 3.1.1.1 *Report 1st meeting working party "Curriculum Radiation Oncologists", Brussels, August 8, 2001*
- 3.1.1.2. *Report 2nd Meeting working party "Curriculum Radiation Oncologists", Brussels, 4-5 December 2001*

3.1.2. Development curriculum for Radiation Physicists

- 2.1.2.1. *Report 1st meeting working party "Curriculum for Radiotherapy Physicists" Sevilla, 20-22 September 2001*
- 3.1.2.2 *Report 2nd meeting working party "Curriculum for Radiotherapy Physicists", Barcelona, February 8-10, 2002*

3.2. Mobility in Radiation Oncology: a European training manual/record (Logbook system)

- 3.2.1. *Copy of 2nd version of Trainee pocket Log Book*
- 3.2.2. *Report of Meeting ESTRO Committee on Education and Training, Lisboa, 22.10.2001*

- 3.2.3. *Report meeting with delegates Radiotherapy Board of UEMS (European Union of Medical Specialists)*
- 3.2.4. *Progress report of chairman European Board of Radiotherapy Logbook Working Party*

3.3. Development and Publishing of Teaching Material

- 3.3.1. *Report ESTRO Education and Training Committee – Ad hoc Working Party on Publications*
- 3.3.2. *ESTRO Physics Booklets:*
 - 3.3.2.1. *Update on proposed publication schedule*
 - 3.3.2.2. *Copy booklet 5: "Practical Guidelines for the Implementation of In Vivo Dosimetry with Diodes in External Radiotherapy with Photon Beams (Entrance Dose)"*
 - 3.3.2.3. *Copy booklet 6: "Monitor Unit Calculation for High Energy Photon Beams – Practical Examples"*

3.4. Esquire Education Fellowships

- 3.4.1. *Texts E-mail flashes to ESTRO members*
- 3.4.2. *First announcement of EDRO Education Fellowships (launched before official start of Project)*
- 3.4.3. *EDRO Education Fellowships: Selection criteria and Application Form*
- 3.4.4. *List of selected grantees*

3.5. EDRO Research Training Fellowships

- 3.5.1. *Announcement with Aim of the Fellowships and criteria for Eligibility*
- 3.5.2. *Report Jury – List of Research Fellows selected*
- 3.5.3. *Application letters selected candidates with description of their research projects +progress reports from research fellows*

3.6. Esquire Technology Transfer Grants

- 3.6.1. *Announcement with Aim of the Grants and Criteria for Eligibility*
- 3.6.2. *Report Jury – List of grants already allocated on January 31, 2002*
- 3.6.3. *Applications of selected candidates with description of their project*
- 3.6.4. *Reports from Technology Transfer Grantees having already carried out their study visit*

3.7. Dissemination Activities

- 3.7.1. *ESTRO-News Summer 2001, pp.5-6: Announcement Funding for ESQUIRE Project + First call for applications for the triple ESQUIRE-EDRO Fellowship Programme*
- 3.7.2. *ESTRO News Spring 2002, pp.6,7,9: interim report from research fellows, report from a technology transfer grantee and report on curriculum development activity of radiotherapy technologists*

4. Task 4: EPOQART renamed EQART

- 4.1. *Activity Report EQART*
- 4.2. *EQART promotional leaflet*
- 4.3. *EQART representation at ESQUIRE Network meetings*
- 4.4. *RPC/ESTRO Meeting – Presentation EQART initiative to American colleagues*
- 4.5. *Meeting on Co-operation EQART-EORTC for the Quality Audits of EORTC trials*
- 4.6. *Agenda fact finding EQART delegates to RPC-Houston, US*
- 4.7. *Promotional presentation of EQART*
- 4.8. *Menu for EQART Services: protocol for QA of clinical studies –checklist-Case review forms*

- 4.9. *EQART's first success: first draft for protocol EQART services for EORTC 22996 clinical trial*
- 4.10. *Structure for relational database for EORTC 22996 EPO trial*
- 4.11. *EORTC Trial 22922/10925: Instruction sheet for mailed in vivo TLD measurements for standard IM-MS irradiation*
- 4.12. *The EQUART QA monitoring tool for the Verification of Treatment Preparation*
- 4.13 *Dissemination Activities*
- 4.1.3.1 *See enclosure 3.7.2. ESTRO News Spring 2002, pp.4 et 5 presenting EQART*

5. Task 5: QUASIMODO

- 5.1. *Report QUASIMODO network meeting 14-16 September 2001, Sevilla*
-
- 5.2. Quality Assurance of 3-D Treatment Planning Systems**
- 5.2.1. *Heidelberg Proposal for TPS tests*
- 5.2.2. *Guidelines IAEA for Quality Assurance of Radiotherapy Treatment Systems (to which 3 QUASIMODO partners contributed)*
- 5.2.3. *Quality Assurance of 3-D Treatment Planning Systems-Preliminary report of the Netherlands Commission on Radiation Dosimetry- Task Group Treatment Planning Systems*
- 5.3. Verification of IMRT**
- 5.3.1. *QUASIMODO questionnaire on current status of IMRT*
- 5.3.2. *QUASIMODO tests for IMRT- Suggestions Gent – Discussion document sent out for feed back to be discussed at network meeting*

6. Task 6: BRAPHYQS

- 6.1. *Report first BRAPHYQS Network Meeting*
- 6.2. *Follow-up document with explanatory notes for members of new network*
- 6.3. *Overview of radio-nuclides most commonly used in Brachytherapy*
- 6.4. *Study Report from EQUAL Lab supervisors: A. Bridier and I.H. Ferreira: Proposals for the determination of absorbed dose to water using TLD powder in water around Iridium 192 and Caesium 137 brachytherapy sources*
- 6.5. *Protocol + application form for new Brachytherapy Geometric Accuracy check.*

Appendices to final report

- 1. Amendment N° 1 to Grant Agreement N° S12-322029 (2001CVG2-005)
- 2. Permission to extend deadline for submitting final report to 15 March 2003
- 3. Meeting Esquire Steering Committee 25 May 2002: Agenda and Report.

4. Task 1: EQUAL

- 4.1.: Overview year 1
- 4.2 Network Meeting Sevilla:

- 4.2.1. Agenda
- 4.2.2. Report
- 4.3 Network Meeting Perugia
 - 4.3.1. Agenda
 - 4.3.2. Report
- 4.4. Progress report on Project "Monitor Unit Verification for advanced Treatment Techniques"

Bound full technical report included

5. Task 2.: REACT

- 5.1. Report REACT network meeting Lisboa, 20.10.2001
- 5.2. Announcement Meeting on " Hyperbaric Oxygen Therapy in the Treatment of Radio-Induced Lesions in Normal Tissues, co-organised by REACT group
- 5.3 Input REACT Group in meeting "LENT IV: Late Effect Criteria and Applications workshop, 14-16 April 2002, Florida
- 5.4. REACT Network Meeting Norwich, 7-8 June 2002
 - 5.4.1. : Agenda
 - 5.4.2. : Report
 - 5.4.3. : List participants
 - 5.4.4.: Proposal for REACT studies
 - 5.4.5. : Optimisation of follow-up
 - 5.4.6. : Questionnaire of current follow-up practices after cancer treatment
 - 5.4.7. : Audit of effectiveness of routine follow-up clinics – Physician's Questionnaire
 - 5.4.8. : Instructions for the physician to fill in the questionnaires
 - 5.4.9. : Audit of effectiveness of follow-up clinics: Patient's Questionnaire
- 5.5 : Programme REACT teaching course, Praha, 17/09/02
- 5.6 : REACT Meeting Praha, 18.09.02

6.Task 3: EDRO

- 6.1. EDRO Course Fellowships
- 6.2. EDRO Technology Transfer Grants –
 - 6.2.1. Flow in Europe
 - 6.2.2. Selection Criteria
 - 6.2.3. List of 21 grantees
 - 6.2.4. Address List grantees
 - 6.2.5. Application letters with project description and reports of 21 grantees
- 6.3. EDRO Research Training Fellowships
 - 6.3.1.: Criteria for Eligibility
 - 6.3.2. Listing and addresses of grantees
 - 6.3.3. Applications and reports of 7 grantees
- 6.4. Working Party Curriculum radiation oncologists
 - 6.4.1. Report meeting 8 august 2001, Brussels
 - 6.4.2. Report meeting 4-5 December 2001, Brussels

- 6.5. EDRO Education Meeting 1-2 June
 - 6.5.1. Agenda
 - 6.5.2. Report
- 6.6. Copy European Core Curriculum on Radiotherapy 1991 (ERASMUS)
- 6.7. Draft of updated European Core Curriculum for Radiation Oncologists (Radiotherapists) (ESQUIRE Project The European Radiotherapy Log Book System –rd draft)
- 6.8. Working Party Curriculum Physicists
 - 6.8.1. Report Meeting Sevilla, 56-27 September , 2001
 - 6.8.2. Report Meeting Barcelona, 8-10/02/2002
 - 6.8.3. Meeting Brussels, 6-7 April 2002
 - 6.8.4. Meeting Brussels 23-24/08: 4th draft – Overview of meeting and documents produced, collated and handled by the group.
 - 6.8.5. Abstract submitted on behalf of ESQUIRE-EDRO-Physics Curriculum group for Meeting European Federation of Medical Physics (EFOMP), Eindhoven, May 2003
 - 6.8.6. Session on European Curriculum at EFOMP meeting Eindhoven,organised by ESQUIRE-EDRO-Curriculum Physicists working party

7. Task 4: The European Institute for Quality Assurance in Radiotherapy

- 7.1. Report on creation Institute
- 7.2. Fact finding missions in the US
 - 7.2.1. Report on visit to Radiological Physics Center (RPC)
 - 7.2.2. Report on visit to the Quality Assurance Review Centre(QARC)
 - 7.2.3. Report on visit to the American College of Radiology
 - 7.2.4. Technical report with procedures, means and methods see separate attachment (1 copy only)
- 7.3. Task 4: Incident reporting group ROSIS
 - 7.3.1. Report 1st meeting, Brussels 10-11 August 2001
 - 7.3.2. Report 2nd meeting, Sevilla, 18 September 2001
 - 7.3.3. Report 3rd meeting, Copenhagen, 1 March 2002
 - 7.3.4. Report 4th meeting, Brussels, 26 May 2002
 - 7.3.5. Errors in treatment planning and delivery system, Dundee
 - 7.3.6. Errors recording system in Clatterbridge
 - 7.3.7. Publication Rosis Group: Journal of Radiotherapy in Practice, Vol. 3, Issue 1, 2002: Use of QA forms to register procedural errors in a radiotherapy department in an attempt to improve the overall process: A pilot study

8. Task 5: QUASIMODO

- 8.1. Network Meeting Heidelberg
 - 8.1.1.: agenda
 - 8.1.2.: list of participants
 - 8.1.3. Meeting report
 - 8.1.4. Quasimodo questionnaire on current status of IMRT
- 8.2. : Network meeting Gent, 25-27 October 2002
 - 8.2.1: agenda
 - 8.2.2. List participants
 - 8.2.3. Report

9. Task 6: BRAPHYQS

- 9.1. Report 1st Braphyqs Network meeting, Sevilla, 18 September 2001
- 9.2. Agenda, list participants and report of 2nd Braphyqs meeting, Paris, 8 March 2002
- 9.3. Report 3rd Braphyqs Meeting, Valencia, 27 September 2002.

10. Dissemination activities

10.1. ESQUIRE in ESTRO News

- 10.1.1. ESTRO News 49: pp.5-6; 10-12
- 10.1.2. .ESTRO News 50: pp 7-9; 10-11, 31;33
- 10.1.3. ESTRO News 51: pp 4-7; 9
- 10.1.4. ESTRO News 52: pp 6-16

10.2. Announcements ESTRO teaching courses: except 2 (Izmir and St. Petersburg) supported by ESQUIRE

10.3. Cover teaching books published with support of ESQUIRE

- 10.3.1. The GEC-ESTRO Handbook of Brachytherapy (to be put on ESTRO website)
- 10.3.2. Basic Clinical Radiobiology revised edition (still owned by Arnold Publishers- new handbook owned by ESTRO and to be made available for free downloading from website in preparation)

10.4. List publications and meeting abstracts EQUAL during ESQUIRE Project year 1.

10.5. . ESQUIRE on ESTRO website:

EQUAL + BRAPHYQS QA protocols + application forms posted.. Guidelines on education posted. New website with full reports on ESQUIRE under construction.

This report was produced by a contractor for Health & Consumer Protection Directorate General and represents the views of the contractor or author. These views have not been adopted or in any way approved by the Commission and do not necessarily represent the view of the Commission or the Directorate General for Health and Consumer Protection. The European Commission does not guarantee the accuracy of the data included in this study, nor does it accept responsibility for any use made thereof.