REPORT TO THE AAPM THERAPY PHYSICS COMMITTEE

Report No. 138
October 16, 2010 – March 15, 2011

ADMINISTRATIVE

The RPC grant was renewed for another 3 years. The funding level for the RPC grant for the next 3 years has been reduced by 10%. Even though the summary statements and score (21) were excellent, the grant period was limited by the NCI’s reorganization of its clinical trial program based on the IOM’s recommendations. In 2013 all cooperative study groups and associated programs such as the RPC will have to resubmit for funding. The RPC, in collaboration with QARC, ITC and RTOG QA, are harmonizing their efforts and will submit a proposal for a groupwide radiotherapy QA network with multiple PIs. A meeting of all of the current QA office PIs was just held at QARC on April 4, 2011. We will submit an outline of what the network will look like to NCI who will then draft an FOA. We believe the RPC is in a unique position in that its activities are unique and are well understood by the NCI and community.

There have been a couple of personnel changes since the last report.

Since Geoff Ibbott became the new Chairman of Radiation Physics at M. D. Anderson Cancer Center, his percent effort on the RPC grant has been reduced to 10% to allow him to continue to perform the proton site visits until we have new staff trained. Michael Moyers continues to assist the RPC during 2012 as a proton therapy expert. He will be funded thought a grant with MGH using federal share funds. These federal share funds will also support the addition of a post-doc position to help with the proton therapy QA program.

David Followill officially became Director and PI of the RPC on October 1, 2010.

Stephen Kry, Ph.D. has joined the RPC as a medical physicist and Assistant Professor. Stephen comes to us from the MDACC clinic, is board certified, has a large amount of experience with performing dosimetry measurements and is well published (37 publications to date).

Robert Pinney, a OSLD/TLD technician, retired at the end of February, 2011. Rechelle Tull has been hired to fill this vacant position.

The RPC is in the process of trying to hire another Ph.D. medical physicist, and possibly a senior secretary.

STUDIES AND RESULTS

The RPC presently monitors 1,842 megavoltage therapy sites in North America, Europe, and elsewhere in the world, that participate in cooperative group clinical trials funded by the NCI or collaborating with the NCI. The cooperative groups monitored include ACOSOG, ACRIN, CALGB, COG, ECOG, GOG, NABTT, NCCTG, NSABP, RTOG and SWOG. We also communicate regularly with the Cancer Trials Support Unit (CTSU) to assure that institutions participating through their programs are properly monitored. Today, nearly 100 EORTC members and other international participants are taking advantage of the RPC’s remote audit programs.

a) International Harmonization: Several of the NCI sponsored study groups (eg. RTOG, GOG) have opened clinical trials to international participants. In addition there are two international cervix studies, the OUTBACK trial and the International Evaluation of Radiotherapy Technology Effectiveness in Cervical Cancer (IntERTECC) that have the support of NCI and will require the RPC to provide QA monitoring. As a result, the RPC now monitors 225 international institutions and that number may increase with the addition of these two new trials. We have requested funding to add additional staff for the two new international cervix trials. For now, international participants in US NCI-funded clinical trials are expected to meet all the same auditing requirements as US members. However, it may be that some of the quality assurance offices in other countries might be able to provide this service in a manner that is considered equivalent to the RPC’s QA support.

b) On-Site Dosimetry Reviews: RPC physicists continue to make visits to US study group members to conduct on-site dosimetry reviews. The RPC presented to the TPC adHoc site visit team procedures to evaluate on-board imaging systems, more detailed audit of MLCs and implementation of the new QA guidelines of AAPM TG-142 report. Since the last report, the RPC has visited 9 institutions including one proton center.

c) Visits to Proton Therapy Centers: In response to a mandate from the NCI, the RPC has developed procedures and assembled the equipment to conduct on-site dosimetry visits to proton facilities. These visits are conducted for the purpose of approving centers for participation in NCI sponsored clinical trials. During 2010 visits were made to 5 proton centers. Visits were conducted to M. D. Anderson Cancer Center, University of Florida Proton Therapy Institute (UF), Massachusetts General Hospital, Francis H. Burr, Proton Therapy Center (MGH), Indiana University Health Proton Therapy Institute. It needs to be admitted that the current scope of the RPC’s mission needs to be further defined and clarified to assure that the RPC remains unique in the community.
Center (IU), and University of Pennsylvania Roberts Proton Therapy Center (Penn). Reports for these visits have been sent to MDACC and MGH and the reports for the other 3 are being finalized. A funding proposal has been sent to MGH to assist with the RPC’s proton therapy QA program to credential the majority of the US proton centers for participation in NCI funded clinical trials. The additional funding will fund equipment purchases, visits and revisits (for scanned beams) to the following sites:

- Re-visit MDACC for spot scanning
- Re-visit UF for scanned beam
- Re-visit MGH for scanned beam
- Procure-Chicago for scanned beams
- Procure-Oklahoma for scanned beams
- Loma Linda for scattered beam
- Hampton for both scattered and scanned beams

This funding from the MGH federal share funds will also be used to develop a national standard for proton beam calibrations.

d) **VA Agreement:** The agreement with the Veterans Administration to provide remote audits and on-site dosimetry reviews at an increased frequency to VA radiation therapy facilities has been implemented and is well underway. To date all VA centers have received OSLD, 7 centers have been visited and 9 centers have received one of the RPC’s IMRT phantoms.

d) **OSLD:** Shipments of OSLD have been occurring since June 1, 2010 and the transition has gone smoothly. The reporting time back to the institution has decreased with OSLD. In addition the efficiency in reading the OSLD has improved dramatically. We can read 2½ times the number of OSLD beam checks in the time it took us to read the same number of TLD beam checks. The overall results of the OSLD output checks have been nearly identical to the last 5 years of TLD audits for both electron and photon beams.

e) **Credentialing Processes:** The RPC participates in the credentialing of institutions for protocols involving advanced technologies including HDR brachytherapy, IMRT, stereotactic radiosurgery (SRS), stereotactic body radiation therapy (SBRT) and proton therapy. This activity is partially supported by a subcontract from the Advanced Technologies for Clinical Trials grant. Credentialing activities include, but not limited to, questionnaires, knowledge assessments, benchmark cases and phantom irradiations. Since the RPC phantom program started in 2001, nearly 2300 phantoms have been sent to institutions and the vast majority have been irradiated. The pass rate now is between 75% - 82% depending on the phantom. The pass rate has improved somewhat in recent years. The figure below shows the number of phantoms shipped each year with our projection of over 500 phantoms shipped in 2010.

f) To enable the RTOG to credential institutions for a spine-metastases protocol (RTOG 0631), the RPC modified the lung phantom to have a spine structure containing a PTV and appropriate OARs. We now have 8 of these phantoms to be distributed to institutions for evaluation. See Figure 2. Due to the tight constraints for this protocol, the irradiation pass criteria is ±5%/3mm. The pass rate for this phantom is near 60%.
g) **Phantoms for Proton Beams:** As part of the mandate from the NCI, the RPC is investigating modifications to the anthropomorphic phantoms to make them suitable for proton beams. The first phantom to be modified was the pelvic phantom, for which a new dosimetry insert was manufactured for the TLD and film dosimetry systems. The lung phantom has been redesigned and new materials have been chosen for the lung material; this phantom has been irradiated at MDACC and MGH.

Another head phantom with a target simulating a meningioma has been built and has been irradiated with both scattered and scanned proton beams at MDACC. This head phantom is a rando phantom head that is being modified to hold RPC dosimeters.

h) **Outreach:** Drs. Ibbott and Followill, Mr. Aguirre, and Ms. Alvarez attended the IAEA Dosimetry Symposium held in Vienna, November 9-12, 2010. Numerous presentations and posters were presented regarding QA activities at the RPC such as the OSLD audit program, phantom credentialing program, heterogeneity correction algorithms, and overall credentialing programs administered by the RPC. In addition there was an international QA harmonization meeting where representatives from the various QA offices around the world discussed the need for common goals and terminology.

i) **Planning Workstation:** An educational grant from Varian Corporation enabled the RPC to acquire two new Eclipse treatment planning workstations. The TPSs are being used for training purposes and to re-calculate institutions’ treatment plans for verification. The licensing issues have been resolved and both systems are up and running. We have also had a Varian onsite brachytherapy training session. These two TPSs will greatly enhance our abilities to QA patient treatments electronically.

j) **Webpage:** The RPC webpage continues to be updated. The most valuable feature continues to be credentialing information and the list of institutions participating in clinical trials. A new Facility Questionnaire is being developed that will be administered through the RPC website.

k) **Publications:** During the past grant period, the RPC published 59 peer reviewed articles, 10 conference proceedings articles and generated 85 abstracts. The RPC staff are members of 25 AAPM task groups, working groups, subcommittees and committees that have resulted in 13 publications.

**PARTICIPANT FEE:**

- Institutions invoiced FY11: 1636
- No XRT/Canceled/Inactive: 0
- Institutions paid: 1313

**PUBLICATIONS AND ABSTRACTS**

**Publications Accepted/Published (2005-present):**


ABSTRACTS


INVITED ARTICLES


LETTERS TO THE EDITOR/NEWSLETTERS


BOOK CHAPTERS


PRESENTATIONS

INTERNATIONAL ACTIVITIES

J. Francisco Aguirre presented a poster at the IAEA International Symposium on Standards, Applications, and Quality Assurance in Medical Radiation Dosimetry, Vienna, Austria, November 8-12, 2010.

Paola Alvarez presented a poster at the IAEA International Symposium on Standards, Applications, and Quality Assurance in Medical Radiation Dosimetry, Vienna, Austria, November 8-12, 2010.

David Followill made two presentations at the IAEA International Symposium on Standards, Applications, and Quality Assurance in Medical Radiation Dosimetry, Vienna, Austria, November 8-12, 2010.

Geoffrey Ibbott made two presentations at the IAEA International Symposium on Standards, Applications, and Quality Assurance in Medical Radiation Dosimetry, Vienna, Austria, November 8-12, 2010.


David Followill presented at the RTOG SBRT Workshop, San Diego, CA, January 13, 2011.


Andrea Molineu attended the BHPA Symposium, Charleroi, Belgium, February 2-6, 2011.

Paola Alvarez attended the BHPA Symposium, Charleroi, Belgium, February 2-6, 2011.
David Followill presented at MD Anderson Cancer Center’s Institutional Grand Rounds, Houston, TX, March 11, 2011.

Geoffrey Ibbott presented at MD Anderson Cancer Center’s Institutional Grand Rounds, Houston, TX, March 11, 2011.

David Followill presented at the RTOG Study Chair Workshop, Philadelphia, PA, March 15, 2011.

**VISITS TO INSTITUTIONS**

1. Jessica Leif performed radiological physics measurements and reviewed patient dosimetry at the Abbott Northwestern Hospital, Minneapolis, MN, October 18-20, 2010.

2. J. Francisco Aguirre performed radiological physics measurements and reviewed patient dosimetry at the Hotel Dieu de Quebec, Quebec City, Canada, October 25-29, 2010.

3. Paola Alvarez performed radiological physics measurements and reviewed patient dosimetry at the Hotel Dieu de Quebec, Quebec City, Canada, October 25-29, 2010.

4. Andrea Molineu performed radiological physics measurements and reviewed patient dosimetry at the Carolinas Medical Center, Charlotte, NC, November 15-17, 2010.

5. Andrea Molineu performed radiological physics measurements and reviewed patient dosimetry at the VA Medical Center, Houston, TX, December 6-8, 2010.

6. Carrie Amador performed radiological physics measurements and reviewed patient dosimetry at the VA Medical Center, Houston, TX, December 6-8, 2010.

7. David Followill performed radiological physics measurements and reviewed patient dosimetry at the VA Minneapolis Hospital, Minneapolis, MN, December 13-15, 2010.

8. Jessica Leif performed radiological physics measurements and reviewed patient dosimetry at the VA Atlanta Medical Center, Atlanta, GA, December 14-16, 2010.


11. Paola Alvarez performed radiological physics measurements and reviewed patient dosimetry at the Ben Taub General Hospital, Houston, TX, January 31, 2011.

12. Paola Alvarez performed radiological physics measurements and reviewed patient dosimetry at the VA Dallas Medical Center, Dallas, TX, February 21-23, 2011.


14. Jessica Leif performed radiological physics measurements and reviewed patient dosimetry at the VA Hines Medical Center, Hines, IL, March 1-3, 2011.

**MEETINGS ATTENDED**

1. J. Francisco Aguirre attended the SWOG Meeting, Chicago, IL, October 22-23, 2010.


3. David Followill attended the ASTRO Meeting, San Diego, CA, October 30-November 2, 2010.


5. Franklin Hall attended the ASTRO Meeting, San Diego, CA, November 2-4, 2010.

6. Ashley Hollan attended the ASTRO Meeting, San Diego, CA, October 31-November 4, 2010.

7. Irene Harris attended the ASTRO Meeting, San Diego, CA, October 31-November 4, 2010.


13. Irene Harris attended the GOG Meeting, San Diego, CA, January 26-29, 2011.


Respectfully submitted,

[Signature]

David Followill, Ph.D.
EXPENDITURES OF THE RADIOLOGICAL PHYSICS CENTER
(RPC Grant and the Advanced Technology Consortium Subcontract)
October 16, 2010 – March 15, 2011

**PERSONNEL (salaries, fringe benefits):** $939,957
7 Physicists, 3 Research Dosimetrists, 2 Sr. Physics Assistants, 1 Informatics Manager, 1 Database Administrator, 1 Programmer Analyst I, 1 Radiological Physics Supervisor, 4 Radiological Physics Technicians, 1 Sr. Coordinator of Research Data, 1 Coordinator of Research Data, 1 Department Administrator, 1 Office Manager, 1 Sr. Administrative Assistant, 1 Administrative Assistant, 1 Sr. Secretary, 1 Secretary and 3 Graduate Research Assistants.

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<th>Radiological Physics Center</th>
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<td>Leif, Jessica</td>
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<td>Aguirre, Francisco</td>
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<td>$7,611.16</td>
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Meetings:

| Aguirre, Francisco          | 10/22-23/10 SWOG Meeting, Chicago, IL $899.86 |
| Aguirre, Francisco          | 10/30-11/4/10 ASTRO Meeting, San Diego, CA $1,226.01 |
| Followill, David            | 10/30-11/2/10 ASTRO Meeting, San Diego, CA $1,297.48 |
| Ibbott, Geoffrey            | 10/30-11/3/10 ASTRO Meeting, San Diego, CA $0- |
| Hall, Franklin              | 11/2-4/10 ASTRO Meeting, San Diego, CA $643.27 |
| Hollan, Ashley              | 10/31-11/4/10 ASTRO Meeting, San Diego, CA $269.00 |
| Harris, Irene               | 10/31-11/4/10 ASTRO Meeting, San Diego, CA $802.05 |
| Molineu, Andrea             | 11/10-13/10 ACOSOG Meeting, Ft. Lauderdale, FL $278.36 |
| Followill, David            | 1/12-16/11 RTOG Meeting, San Diego, CA $1,000.57 |
| Leif, Jessica               | 1/13-16/11 RTOG Meeting, San Diego, CA $689.48 |
| Followill, David            | 1/26-29/11 GOG Meeting, San Diego, CA $745.29 |
| Leif, Jessica               | 1/26/29/11 GOG Meeting, San Diego, CA $810.12 |
| Harris, Irene               | 1/26-29/11 GOG Meeting, San Diego, CA $727.88 |
| Leif, Jessica               | 3/1-3/11 ABS Meeting, West Palm Beach, FL $399.21 |

Total $9,788.58
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| Children's Oncology Group | COG | QARC | 3D Benchmark Case  
| | | | IMRT Benchmark Case/Phantom  
| | | | CT/MRI Fusion Benchmark  
| | | | Lung Phantom  
| | | | International Participation  
| | | | Proton Credentialing  
| Eastern Cooperative Oncology Group | ECOG | QARC | Annual TLD/OSLD Auditing  
| | | | Phantom Credentialing (IMRT H&N)  
| European Organization for Research and Treatment of Cancer | EORTC | RPC | International Participation  