ICECVI (International Center For Excellence In Cardio-vascular Imaging)

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Abstract

The broad long term objectives are to establish, facilitate and operate an international center for cardiovascular imaging excellence that will serve a large primary and tertiary care referral base in all aspects of cardiovascular disease, from basic science research to long term outcomes assessment.

VISION

The vision is to provide state of the art cardiac imaging for diagnosis and treatment of CV disease.

MISSION

The mission is to improve the health of people with cardiovascular disease by the integration of imaging with pathophysiologic principles.

OBJECTIVES

The broad long term objectives are to establish, facilitate and operate an international center for cardiovascular imaging excellence that will serve a large primary and tertiary care referral base in all aspects of cardiovascular disease, from basic science research to long term outcomes assessment.

AIMS

The specific aims consist of 4 basic aspects.

1. A basic research facility
2. A clinical marketing division
3. An Outcomes analysis group
4. Educational endeavors to integrate with the goals of a tertiary teaching facility.

BASIC RESEARCH

The basic research at this facility will include not only physics, in–terms of the basic imaging technologies, but also assessment in cardiovascular physiology, fluid mechanics and cardiovascular perfusion. The physiologic imaging would include basic cardiac physiology and investigation with animal models into actual tissue perfusion and dynamics and may involve integration and elaboration with different contrast media. Basic research will also include computer science researchers and computer visualization techniques.

Funding opportunities in congestive heart failure, acute myocardial infarction and coronary imaging from a basic principle standpoint are ripe for investigation by an integrated team of physicists, animal, computer graphics and cardiac researchers.

Optimal industrial liaison integration using the plethora of adjacent biomedical companies could lead to sponsorship for doctoral or post-doctoral students with grants that would provide access to these research groups. These associations would empower investigations and industrial liaisons in a sponsorship relationship that would create open and free communication and that would equip graduate students to have industrial input into potential areas of investigation, but that would not necessarily limit their academic freedom.

Lastly, basic research would also involve integration with the epidemiology section of the School of Public Health to be able to evaluate basic issues regarding disease prevalence and incidence rates and being able to use and develop appropriate statistical modeling and other tools for decision analysis investigations.

CLINICAL MARKETING

This function would allow the integration with the academic and nearby private health care system to advance the

formation of an integrated cardiovascular medical data base record and would form a cardiovascular imaging record database with creation ultimately with a one stop shop. This one stop shop would allow integration in an out patient center with CT angiography, MR angiography, MR perfusion, Nuclear Medicine and Stress Echo studies for the patients being referred via the health care system.

Marketing would facilitate promotion of these techniques to the general community and the integrated health care system community. There would be a comprehensive single organ evaluation and integration with vascular surgeons, cardiology and cardiothoracic surgeons, along with nuclear medicine studies for functional questions that might be relevant in that setting. This ultimately would form the core and nexus for the center for providing clinical care in the existing inpatient construct and in the ultimate aforementioned outpatient model. This would also act as a central location for which training issues could ultimately be addressed.

A focal point for marketing this center would be the chest pain clinical diagnosis track where MRI could obviate multiple studies in the acute chest pain setting. Such an approach could be promoted to administration on a cost-efficacy basis by allowing more efficient use of cardiac ICU space, and to the community by providing a means of rapidly excluding MI in noncardiac chest pain patients.

OUTCOMES ANALYSIS

Clinical trials and a clinical coordinator would be managed via–the outcomes analysis arm of this center which would have ties with School of Public Health projects. This would enable obtaining multi-institutional grants and performing longitudinal studies via the construction of large outcomes data base using the patients generated via the clinical marketing center mentioned above and through the actual integrated health care system. These outcomes analysis would promote long term studies to validate the applicability and improved health care and patient outcomes of the basic research discussed initially. Similarly current work to use MRI in cardiac drug trials could be expanded and MRI endpoints could be validated for outcomes assessments of newer drugs.

EDUCATION

Education would have multi-pronged areas of responsibilities;

1. Graduate students in the bio-engineering and computer science departments integration with existing basic science projects with visualization computer graphics techniques would be highly desirable. The integration of doctoral students in the medical school, particularly in physiology, would also be useful as these tools could ultimately be used in basic animal research. In addition, graduate students in the School of Public Health and Epidemiology and BioStatistics would be able to assist in outcomes analysis and clinical trials projects and as such they would be able to be educated more in cardiovascular disease and epidemiology.
2. Medical students would benefit from faculty interaction, particularly through the cardiovascular physiology course in the pre-clinical curriculum and in their actual clinical rotations by this one stop shop center that would allow them to interact both with radiology cardiovascular imagers and cardiology.
3. Residents would benefit from an integrated cardiovascular rotation with detailed work with CT angiography, MR angiography, contrast kinetics and image processing techniques along with cardiovascular, anatomical and perfusion studies. This would promote integration with standardized teaching schools and a learning center and would allow organ based teaching over the course of their individual cardiovascular rotation.
4. Fellows would benefit and as such there would be integration of 4 areas of fellowship within the cardiovascular imaging center; there would be 4 fellows, each doing a 3 month rotation within the cardiovascular imaging center where they would be exposed, not only to all standard vascular imaging, but also cardiac, nuclear medicine and conventional angiography. The angiography fellow would benefit from a 3 month cardiovascular imaging rotation, as would the body imaging fellow and a standard cardiology fellow. A dedicated cardiovascular imaging fellow would benefit from a structured fellowship curriculum, consisting of 3 months in nuclear medicine, 3 months on cardiovascular MRA, 3 months on CT angiography, and 3 months in conventional angiography. Their rotation during 3 months of conventional angiography would also provide the

flexibility and opportunity for the angiography fellow to spend 3 months in the cardiovascular imaging rotation. This would advance the integration of the invasive and non-invasive cardiovascular imaging sections and for a more uniform training approach.

5. The ability to have an advanced cardiovascular fellowship over 2 years where there is a detailed one year research component that would equip the fellow to pursue research training in the School of Public Health and to pursue a detailed research project through the Center for Cardiovascular Imaging would be beneficial and would establish the center as a training nexus for the leaders of the future in cardiovascular imaging.

6. Ultimately, integration of the cardiovascular imaging center fellow and the angiographic fellow with international centers and elective rotations where they would have the opportunity to visit other centers of excellence would be a means of training the next generation of CV researchers. In particular centers that may be performing more conventional angiography than is currently available within the United States, may be a useful adjunct in their training and liaisons with international facilities could be constructed. For example, the Australian medical system has limited access to MRA and as such an extreme amount of conventional angiography is performed in diagnostic settings. This would create the opportunity for an academic exchange program to be constructed, wherein Australian angiography trainees would benefit from non-invasive cardiovascular imaging training and our cardiovascular imaging trainees would benefit from more exposure to conventional angiographic techniques in a higher volume setting.

7. Visiting fellows would be facilitated in the cardiovascular imaging center, not only from around the country and world but also specifically from the integrated health care system in order to help build bridges and ties within the medical school and throughout the tertiary referral base. These fellows would have access to a learning center using Internet technology. They would have the opportunity to participate in readouts and the evaluation of normal subjects to learn the basics of some of the imaging sequences. Visiting fellowship electives could be constructed with either 4 or 12 week rotation periods with an appropriate fee structure. These visiting fellowships would provide the situation for the formal fellows to have an opportunity to assist in developing their training skills and would allow the residents an opportunity to explore the interest and need for cardiovascular imaging in the general community.

STRUCTURE

The long term anticipated structure would consist of a director with– subsections in; cardiovascular MR, angiography liaison, cardiology, nuclear medicine, research management, and marketing. Initially many of these responsibilities could be shared among a smaller number of persons. The liaison with the community and industry would, hopefully, allow for permanent training spots and faculty position equivalents to be constructed–that would improve the funding autonomy of this center. A specific time table would have to be constructed in greater detail as more information specific to clinical demands and interest in the community are provided.

The basic research goals are relatively in place and could be strengthened during the first few years with a goal of the second year firming up and using the educational goals discussed above to be able to strengthen clinical referrals and the liaisons with the integrated health care system.

The integration with the School of Public Health could be established between years 2 and 3 for existing projects, with newer projects integrated over time. Ultimately, these vehicles could be used to help solicit the formation of the one stop shop facility with the goal of establishing a preliminary outcomes group in year 5. At year 10, a re-evaluation examination of the clinical and educational demands, along with the research successes and focuses of the facility, would require input from an independent review panel that could assist in evaluation of the facilities and the center, itself.

References

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