Duke University Health System

Catharine W. Cummer
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Via Email

Bernetta Thorne-Williams
Analyst
Healthcare Planning and Certificate of Need Section
North Carolina Division of Health Service Regulation
Medical Facilities Planning Branch
2714 Mail Service Center
Raleigh, NC 27699-2714

Re: Comments Regarding Project J-11386-17
UNC Rex Hospital Fixed PET-CT Scanner

Dear Ms. Thorne-Williams:

The Duke University Health System, Inc. d/b/a Duke Raleigh Hospital hereby submits the enclosed comments regarding the certificate of need application filed by UNC Rex Hospital for a second fixed PET-CT scanner in Health Service Area IV. We appreciate your consideration of these comments in connection with that application.

Very truly yours,

Catharine W. Cummer

Catharine W. Cummer

Enclosure

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COMMENTS REGARDING APPLICATION FILED BY UNC REX HOSPITAL

FOR AN ADDITIONAL FIXED PET-CT SCANNER

PROJECT ID # J-11386-17

Duke University Health System, Inc. d/b/a Duke Raleigh Hospital ("Duke") hereby submits these comments regarding the application filed by UNC Rex Hospital ("UNC Rex") for a second fixed PET-CT scanner (Project ID # J-11386-17). For the reasons set forth below, the UNC Rex application is not conforming with all applicable review criteria and is not the most effective application in this review.

Comparative Analysis

The UNC Rex application is comparatively inferior to Duke's on several key measures. These factors are discussed below.

Comparative Factor	Duke Raleigh/Ranking		UNC Rex/Ranking	
Enhance Market Competition/New Fixed PET Provider	Yes	1	No	2
Increase Weekly Days of Scheduled PET Access on campus	Yes	1	No	2
Necessary for Coordination of Care Existing Major Cancer Center without Existing Fixed PET Scanner	Yes	1	No	2
Increase Geographic Access	Yes	1	No	2
Eliminate Mobile PET Fees	Yes	1	No	2
Operational Date	11/1/2018	1	1/1/2019	2
PY3 Gross Revenue/Procedure	$ 7,214	2	$ 6,550	1
PY3 Net Revenue/Procedure	$ 1,895	1	$ 1,937	2
PY3 Operating Expense/Procedure	$ 862	1	$ 1,138	2
PY2 Medicare %	58.5%	2	62.1%	1
PY2 Medicaid %	3.3%	1	3.3%	1
HSA IV Patient Origin	85.0%	1	86.7%	1
Referring Physician Letters of Support	Yes	1	Yes	1
Radiologist/Interpreting Physician Letters of Support	Yes	1	No	2
LINACs	4	1	4	1
Existing System Utilization per Fixed PET-CT Scanner	2935	1	2327	2

Enhance Market Competition/New Fixed PET Provider

Duke Raleigh Hospital's project will create a new fixed PET provider in Wake County and will increase market competition. UNC Rex's project will not.

Increase Weekly Days of Scheduled PET Access on campus

Duke Raleigh Hospital's project will increase the days per week that PET services are available on its campus; UNC Rex's project will not.

Necessary for Coordination of Care Existing Major Cancer Center without Existing Fixed PET Scanner

Duke Raleigh Hospital's project enhances the coordination of oncology services at an existing major cancer center that lacks a fixed PET scanner; UNC Rex's project does not. Both centers have 4 LINACs on which they provide radiation oncology.

Improve Geographic Access

Duke Raleigh Hospital's project increases geographic access to full-time PET services in a new location in Wake County; UNC Rex's project does not.

Eliminate Mobile PET Fees

Duke Raleigh Hospital's project allows for the elimination of mobile PET service agreement fees, and allows for the redeployment of mobile PET access to other locations in the state; UNC Rex's project does not.

Operational Date

Duke Raleigh Hospital projects an earlier operational date than UNC Rex.

PY3 Revenues and Expenses per Procedure

While Duke projects a higher gross revenue per procedure than UNC Rex ($7214 v. $6550), on the more relevant calculation of net revenue per procedure, which reflects the actual costs to payors and patients, Duke's project is comparatively superior to UNC Rex's ($1895 v. $1937). Similarly, Duke has much lower operating expenses per procedures ($862 v. $1138).

Medicare and Medicaid

The applicants project identical percentages of Medicaid patients. UNC Rex projects only a slightly higher percentage of Medicare patients than Duke, although this may reflect the application's unreasonable projections related to cardiac patients.

HSA Patient Origin

Rex has a slightly higher projected patient origin from HSA IV, although the difference is not significant.

Physician Letters of Support

Both projects reflect significant physician letters of support from referring physicians, but only Duke provides documentation of support from interpreting physicians. UNC Rex provides

no letters from radiologists other than from its Medical Director, calling into question the provision of professional services to support this project.

LINACs

Both applicants operate 4 linear accelerators in Wake County and are major cancer centers, although only Duke Raleigh Hospital does not have a fixed PET scanner already.

System Volume per Scanner

Even excluding UNC's PET-MR and Wake Radiology's PET-CT scanner, both of which are highly underutilized, UNC system-owned fixed PET-CT scanners (UNC Rex and UNC Hospitals) in the service area performed 6980 procedures on 3 fixed PET-CT scanners, for an average of 2327 procedures per scanner. Duke University Health System facilities including Duke University Hospital and Duke Raleigh Hospital performed 5,870 procedures on 2 fixed scanners and 1.75 days of a mobile scanner, for an average of 2,935 procedures per fixed scanner or 2,498 scans per scanner on 2.35 scanner equivalents.

Nonconformity with Review Criteria

The UNC Rex application fails to conform with several key statutory criteria.

Criterion 1

(1) The proposed project shall be consistent with applicable policies and need determinations in the State Medical Facilities Plan, the need determination of which constitutes a determinative limitation on the provision of any health service, health service facility, health service facility beds, dialysis stations, operating rooms, or home health offices that may be approved.

The need for an additional fixed PET scanner in HSA IV in the 2017 State Medical Facilities Plan was generated specifically by the prong of the methodology regarding the existing of a major cancer center without a fixed PET scanner. It is undisputed that the only major cancer center in the service area (and the state) without a fixed PET scanner is Duke Raleigh Hospital. UNC Rex Hospital, while a major cancer center, already has a fixed PET scanner.

In fact, UNC Rex acknowledges that some patients who choose to receive their cancer services from Duke Raleigh Hospital clinics currently get PET scans at UNC Rex Hospital. Because Duke Raleigh Hospital does not have full time PET services available, many patients necessarily receive their procedures at other providers. This underscores the need for fixed PET capacity at Duke Raleigh, where no such scanner exists. UNC Rex cannot rely on utilization from patients that do not have access to fixed PET scanning services at their selected oncology provider, and at the same time claim that oncology provider has no need for fixed PET scanning services. By this logic, no new provider would ever be able to offer services, contrary to the spirit and intent of both the CON law and the PET methodology in particular.

Criterion 3

(3) The applicant shall identify the population to be served by the proposed project, and shall demonstrate the need that this population has for the services proposed, and the extent to which all residents of the area, and, in particular, low income persons, racial and ethnic minorities, women, handicapped persons, the elderly, and other underserved groups are likely to have access to the services proposed.

UNC Rex fails to demonstrate the need for its proposed service as required by Criterion 3, as its projections are not realistic and supported by utilization trends for this technology. UNC Rex's application relies heavily on unsupported projections of growth in cardiac PET procedures. UNC Rex has only offered cardiac PET imaging in the past few years, and it is not entirely surprising that its volumes for that particular procedure therefore increased from virtually zero to the current level. However, there is no basis for assuming that its utilization will continue to grow at the rate projected in the application. Specifically, UNC Rex bases its volume projections on the assumption that cardiac PET will account for 50% of all cardiac imaging procedures in the future. This is unreasonable and at odds with the actual utilization of this technology.

PET is the highest-cost cardiac imaging modality, and payors are generally very restrictive in authorizing reimbursement for cardiac PET procedures. Providers are generally required to perform other imaging first and only resort to PET procedures if other modalities are inconclusive. Specifically, cardiac patients able to undergo exercise stress tests are typically required to receive SPECT procedures after exercise stress tests, not PET procedures. Reflecting these general requirements, Dr. David Wolinsky, immediate past-president of the American Society of Nuclear Imaging, was recently quoted as saying that "SPECT commands more than 90 percent of the nuclear cardiology market" because SPECT is universally reimbursable and it is a lot harder to get a PET scan done. "Recent Advance in Cardiac Nuclear Imaging Technology," Nuclear Imaging, September 19, 2017, p. 4 (https://www.dicardiology.com/article/recent-advances-cardiac-nuclear-imaging-technology) (attached). Dr. Wolinsky also explains that PET imaging only allows for pharmacological stress test imaging, which is "not ideal" compared to SPECT imaging from an exercise stress test. Therefore, while cardiac PET imaging may be a useful tool for some patients, it is unreasonable and unsupported to project that cardiac PET will overtake SPECT and all other imaging modalities to the extent that it would account for half of all cardiac imaging as UNC Rex projects.

The only basis for UNC Rex's assumption that cardiac PET will account for 50% of cardiac imaging within 5 years comes in unsupported estimates in form letters provided by its employed physicians. These estimates are directly contradicted by the experience of other, larger cardiology providers nationwide. For example, at the Cleveland Clinic, the #1 ranked heart program by US News and World Report, only 1% of heart-related imaging comes from

PET studies (Cleveland Clinic Heart & Vascular Institute 2015 Outcomes (2016) page 7, https://my.clevelandclinic.org/-/scassets/files/org/outcomes/2015/outcomes-hvi.ashx?la=en)

1. Echocardiograms 78,162
   Cardiac CT scans 7747
2. Cardiac MRI scans 3286
3. Stress tests 7910
4. Nuclear cardiology tests
   a. Tc-Myoview-rest 4344
   b. Tc-Myoview-stress 4252
   c. Rubidium heart (PET) 824
   d. FDG heart (PET) 501
   e. MUGA 82 N-13
   f. ammonia heart 52

Duke University Hospital (whose cardiology program is ranked 11th in the country) performed **16** cardiac-related PET studies last year. And most notably, UNC Rex does not provide any data at all about UNC Hospitals' cardiac PET volumes, although UNC Hospitals has provided cardiac PET for several years and has purportedly "met the growing need for PET services for cardiac, oncology, and other patients" (See Form C Assumptions, page 7).

UNC Rex's assumption about the use of cardiac PET to replace other cardiac diagnostic modalities is also called into question by UNC Rex's proposed investment in additional cardiac catheterization equipment. UNC Rex claims that the increase in PET utilization reflects the decline in utilization of other modalities. On page 35 of its application, UNC Rex describes benefits of cardiac PET imaging over diagnostic cardiac catheterization. However, UNC Rex failed to provide any discussion relative to any correlation between its cardiac cath utilization and cardiac PET utilization during recent years and moreover failed to provide any discussion regarding the impact of future cardiac cath procedures at its hospital on projected PET volumes. This is particularly relevant considering that at the time UNC Rex submitted its CON application to acquire a second PET scanner it also had a CON application under review to develop a fifth piece of cardiac cath equipment (CON Project I.D. # J-011336-17).

Finally, UNC Rex's assumptions about projected growth of cardiac imaging overall are also overly aggressive. UNC Rex's growth in cardiology services resulted primarily from the concerted recruitment of existing physicians within Wake County, primarily one major cardiology practice that previously practiced primarily at WakeMed, not from the addition of providers to the market. See news articles at: http://www.newsobserver.com/2011/12/12/1705580/losing-hearts-brings-worries-to.html; http://m.bizjournals.com/triangle/news/2013/08/19/rexs-new-cardio-practice-goes.html?r=full.) UNC Rex's historic growth in cardiac imaging resulted in large part from this practice acquisition, and does not support future utilization increases in cardiac imaging at the aggressive projected rates.

Criterion 4

(4) Where alternative methods of meeting the needs for the proposed project exist, the applicant shall demonstrate that the least costly or most effective alternative has been proposed.

UNC Rex has not proposed the least costly or most effective alternative. It identifies the following alternatives: 1) status quo; 2) use another fixed scanner in Wake County, namely Wake Radiology's; or 3) use a mobile scanner. However, it does not demonstrate that its proposed project is the least costly or most effective alternative compared to these other options.

1) Status quo

As set forth in further detail below, the UNC system that includes UNC Rex has 3 fixed PET scanners in HSA IV, including 2 fixed PET-CT scanners at UNC Hospitals in Chapel Hill. UNC Rex's application documents that the fixed PET-CT scanners at UNC Hospitals have significant available capacity. PET services are considered a regional service with a multi-county service area. Therefore, it is reasonable for UNC Rex to use system capacity already available in the service area for patients as needed.

Even if UNC Rex believed there was some advantage to having the system's capacity available in Wake County, a less costly and more effective alternative method of meeting its proposed need would be the relocation of a PET scanner within the UNC Healthcare System from UNC Hospitals to Wake County. UNC Hospitals' 2017 license renewal application shows that 1596 of its 3934 identified PET-CT patients (40.5% of the total) hail just from Wake County and the following counties that are east and south of Wake County, closer to UNC Rex than to Chapel Hill: Bladen, Brunswick, Craven, Cumberland, Harnett, Johnston, Lee, Nash, New Hanover, Pender, Robeson, Wake, Wayne, and Wilson. Therefore, a shift of capacity from Orange to Wake County could allow for the treatment of these patients closer to home.

2) Use existing scanner at Wake Radiology

UNC Rex disingenuously claims that it is not effective to use the existing fixed PET-CT operated by Wake Radiology in Cary because that scanner is "more accessible" to Duke than to UNC Rex. This is patently false. While, as set forth below, Duke has no affiliation with the Wake Radiology PET scanner, UNC Rex has a direct and exclusive relationship with Wake Radiology, of which it completely omits any mention. On January 10, 2017, UNC Rex announced that "UNC REX Healthcare and Wake Radiology are creating a joint venture to combine the organizations' outpatient imaging assets into a single entity, and forming a partnership to provide professional services at all UNC REX locations…Joining forces will enable Wake Radiology and UNC REX to provide specialized inpatient and outpatient radiology imaging services for more patients, closer to home." (See UNC Rex Hospital press release,

attached (emphasis added)). Wake Radiology's website expressly identifies UNC Rex as its only "hospital partner" in Wake County (https://www.wakerad.com/locations/hospitals/).

Consistent with this partnership, UNC Rex identifies Dr. David I. Schulz, the Director of PET-CT services at Wake Radiology, as the Medical Director for the proposed UNC Rex PET services (although the application conveniently fails to mention the practice where Dr. Schulz works). In light of this relationship, any claim that UNC Rex does not have "access" to or any relationship with the PET scanner owned and operated by its exclusive radiology services provider under the direction of UNC-Rex's own proposed Medical Director is patently ludicrous. UNC Rex provides no explanation why it could not have Wake Radiology physicians interpret PET scans performed on Wake Radiology's existing equipment rather than on a new scanner at UNC Rex Hospital for any UNC Rex patients who need PET procedures. To the extent that the SMFP's PET methodology recognizes the importance of coordinated cancer care including PET services, it appears that Wake Radiology physicians already provide that coordinated care for UNC Rex patients.

While UNC Rex undergoes contortions to try to distance itself from its partner Wake Radiology, it contends that the PET scanner operated by Wake Radiology should somehow be attributed instead to the Duke University Health System "system of care" by virtue of Duke's recent decision to enter into collaboration with WakeMed to enhance cancer care in Wake County. This is incorrect.

Duke's collaboration with WakeMed does not result in any change in ownership in any facility, including any facility in which either entity has an ownership or financial interest. Rather, the collaboration improves the coordination of cancer care for patients in Wake County by providing a more programmatic approach to caring for cancer patients across the Duke and WakeMed systems. The goal is to streamline, enhance and expand the delivery of oncology care in Wake County through combining Duke's cancer research and treatment program with WakeMed's surgical expertise. Additionally, as stated in news releases regarding the collaboration, the collaborative "will be anchored at Duke Raleigh Hospital and will combine a variety of Wake County-based Duke Cancer Institute specialty services, locations and cancer clinical research programs with the surgical cancer capabilities at WakeMed's hospitals." Wake Radiology's PET scanner is not a site or service included in any programmatic coordination. Accordingly, Duke has no relationship or affiliation with Wake Radiology or its physicians. Duke has no ownership or financial interest, no right of control, and no affiliation with the PET scanner operated by Wake Radiology. Wake Radiology's equipment is not integrated into Duke's electronic health record system.

Even WakeMed's role in the operation of this scanner appears to be limited at best:

- The scanner is owned by a joint venture that includes WakeMed, but Wake Radiology manages, operates, and provides exclusive professional services for that PET equipment.

- The PET scanner is not located in a WakeMed facility, but rather in a Wake Radiology practice identified as "Wake Radiology Cary PET-CT." WakeMed does not list PET as an imaging service offering (see https://www.wakemed.org/imaging-services).
- The services provided by Wake Radiology are not connected to WakeMed's electronic health record system.
- WakeMed plays no role in scheduling or other operational matters.
- WakeMed does not bill for services provided on the scanner.
- No WakeMed employees provide patient care.
- WakeMed has no professional contract for radiology services with Wake Radiology

Accordingly, UNC Rex's dismissal of the option of using existing capacity at Wake Radiology for its PET scanning needs is inappropriate.

3) Mobile PET Scanner

UNC Rex also dismisses the alternative of using an existing mobile PET scanner, but in doing so ignores the option of converting one of the UNC system's existing underutilized PET scanners to a mobile pursuant to Policy TE-1. The UNC Healthcare system operates fixed scanners at Nash and High Point Regional Hospital, at respective utilizations of 11.7% and 21.63%. Either of these scanners could easily accommodate existing volume at several UNC sites as a mobile and would be a more effective alternative than adding yet another fixed PET scanner within a health care system that operates several underutilized scanners already.

Criterion 5

(5) Financial and operational projections for the project shall demonstrate the availability of funds for capital and operating needs as well as the immediate and long-term financial feasibility of the proposal, based upon reasonable projections of the costs of and charges for providing health services by the person proposing the service.

Because UNC Rex's projections are not based on reasonable assumptions regarding need and utilization, its financial and operational projections are flawed, and the application is not conforming with Criterion 5.

Criterion 6

(6) The applicant shall demonstrate that the proposed project will not result in unnecessary duplication of existing or approved health service capabilities or facilities.

In this review, because the need determination was generated based on the need for coordinated cancer care at a major cancer center, not overall capacity and utilization in the service area, analysis of whether the proposed projects will unnecessarily duplicate existing services is especially important. UNC Rex disregards the capacity of several PET scanner providers with which it is directly integrated. This renders its application nonconforming with Criterion 6.

UNC System

UNC Hospitals has 2 fixed PET-CT scanners and a PET-MR scanner in Health Service Area IV. While UNC Rex is a separately incorporated affiliate and therefore UNC Hospitals may not technically be the "applicant" for the UNC Rex project, it is undisputed that UNC Rex is part of the UNC Health Care System. In Section A, Question 1, UNC Rex expressly identifies that its holding company is "UNC Rex Healthcare, Inc.," and further that "the University of North Carolina Health Care System is the sole member and parent of UNC Rex Healthcare, Inc." PET scanners have a multi-county service area, reflecting the regional nature of this service. Therefore, UNC's existing PET scanning capacity in the same service area, both on its two PET-CT scanners and also its PET-MR, is relevant to this review.

As set forth in UNC Rex's CON application, UNC Hospitals provided 3934 procedures on two PET-CT scanners in 2016, reflecting – in UNC Rex's own words – "2016 Additional Capacity in Procedures" of 2066 at UNC Hospitals, for a total of 2835 procedures worth of additional PET-CT capacity within the UNC System in the service area. See application, p. 65. As discussed above, a significant percentage of UNC's PET-CT patients hail from Wake County and counties that are east and south of Wake County. These scanners are therefore already available to and used significantly by patients throughout the service area proposed to be served by UNC Rex.

In addition, UNC's PET-MR provided only 56 procedures in FY 16 as reflected in its license renewal application, reflecting significant "available capacity" on that equipment also. The literature provided in UNC Rex's application specifically identifies PET-MR as an alternative to PET-CT in cardiac and oncology imaging. "Originally developed for neuroimaging, PET/MRI is an exciting new modality for cardiovascular imaging.... CMR has excellent soft tissue characterization that would complement PET molecular imaging, particularly in understanding infarct viability, ventricular remodeling, inflammatory processes and infiltrative diseases." Clinical Utility and Future Applications of PET/CT and PET/CRM in

Cardiology, Exhibit C1.D, page 2; see also Future of Thoracic PET Scanning, Exhibit C1.S, page 29 ("The CMS has put out recent statements that oncologic FDG-PET scanning will be reimbursed for the same indications regardless of whether a patient is imaged on PET scan, PET/CT scan, or PET/MRI scan.") Therefore, the significant existing capacity on UNC Hospitals' existing PET-MR scanner is directly relevant to the purported need for increased cardiac imaging services. Regardless of whether the PET-MR is included in the planning inventory for the State Medical Facilities Plan, this equipment is an "*existing or approved health service capability or facility*" that must be considered under Criterion 6.

Given this significant PET capacity available in the UNC System, UNC Rex's project does not sufficiently address how its project does not "unnecessarily duplicate" existing health care capabilities even within its own hospital system.

Wake Radiology

UNC Rex has an exclusive contract with Wake Radiology to provide imaging services for its patients, uses Wake Radiology's director of PET services as its own PET Medical Director, and is Wake Radiology's only "hospital partner" in Wake County. Wake Radiology's existing PET scanner is highly underutilized, operating at approximately 17% of capacity. See UNC Rex Application, p. 98. UNC Rex's project therefore also unnecessarily duplicates the PET scanning capabilities under the direct control of its exclusive radiology provider and partner. See discussion under Criterion 4 above.

Criteria 7 and 8

(7) The applicant shall show evidence of the availability of resources, including health manpower and management personnel, for the provision of the services proposed to be provided.

(8) The applicant shall demonstrate that the provider of the proposed services will make available, or otherwise make arrangements for, the provision of the necessary ancillary and support services. The applicant shall also demonstrate that the proposed service will be coordinated with the existing health care system.

UNC Rex's silence on its relationship with Wake Radiology as described above is notable in another respect: UNC Rex states that it will not bill for the professional services, yet nowhere in its application does it document who will perform professional services in connection with the projected PET procedures. If Wake Radiology will not provide interpretations of UNC Rex's PET scans, then UNC Rex's omission of this information is a fundamental flaw in its application, as it then fails to "show evidence of the availability of resources, including health manpower and management personnel, for the provision of the services proposed to be provided"

(Criterion 7) and to "demonstrate that the provider of the proposed services will make available, or otherwise make arrangements for, the provision of the necessary ancillary and support services" (Criterion 8). In contrast, Duke specifically identifies the Private Diagnostic Clinic, PLLC, as the practice that will provide professional services and includes multiple letters of support from its radiologists for this project.

Criterion 18a

(18a) The applicant shall demonstrate the expected effects of the proposed services on competition in the proposed service area, including how any enhanced competition will have a positive impact upon the cost effectiveness, quality, and access to the services proposed; and in the case of applications for services where competition between providers will not have a favorable impact on cost effectiveness, quality, and access to the services proposed, the applicant shall demonstrate that its application is for a service on which competition will not have a favorable impact.

As set forth above, UNC Rex's application does not create any new provider of fixed PET services, does not reflect need for the proposed services, and does not efficiently utilize the existing assets within its system. The application is therefore nonconforming with Criterion 18a.

Attachments

1. "Recent Advance in Cardiac Nuclear Imaging Technology," Nuclear Imaging, September 19, 2017

2. Excerpt, Cleveland Clinic Heart & Vascular Institute 2015 Outcomes (2016)

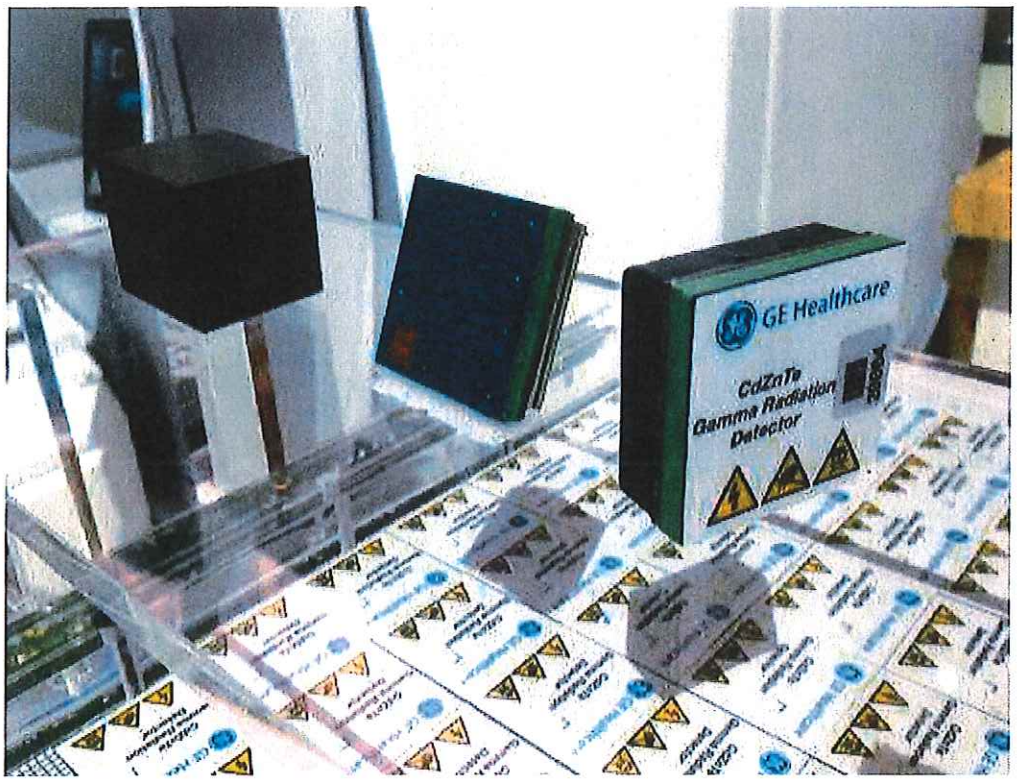
3. UNC Rex January 10, 2017 Press Release: "UNC REX Healthcare and Wake Radiology to Form New Partnership and Joint Venture"

4. Wake Radiology website information

FEATURE | NUCLEAR IMAGING (/CHANNEL/NUCLEAR-IMAGING) | SEPTEMBER 19, 2017| DAVE FORNELL

Recent Advances in Cardiac Nuclear Imaging Technology

CZT SPECT cameras, new stress-only protocols and emphasis on lowering dose top the list



A display of CZT SPECT gamma camera detectors at RSNA 2016. These detectors are more sensitive than those used in older cameras, allowing for faster scans or lower radiation dose.

Cardiac nuclear myocardial perfusion imaging (MPI) has been a mature area of imaging for years, but has recently started a transformation with new technologies, protocols and applications. This is partly due to the availability of technologies, concerns about dose, competition, reimbursement and concerns over isotope availability.

"We have been practicing nuclear cardiology since the late 1970s, so people think of it as a stable and well-established modality, but if you look at the past five years, there has been a tremendous amount of advance in nuclear cardiological techniques," said Prem

Soman, M.D., director of nuclear cardiology at the Heart and Vascular Institute, University of Pittsburgh, and president of the American Society of Nuclear Cardiology (ASNC). "We have a whole new generation of SPECT cameras, we are expanding our imaging applications, we have made great strides in reducing our radiation dose, and PET is becoming more widely used, so I am very excited about the future of cardiac nuclear imaging."

He said there have been advances in both imaging modalities used for nuclear cardiology, positron emission tomography (PET) and single photon emission computed tomography (SPECT). This includes new, more sensitive SPECT detector technology, new imaging systems and new ways to use the imaging to better quantify perfusion.

Watch the VIDEO "PET vs. SPECT in Nuclear Cardiology and Recent Advances in Technology," (https://www.dicardiology.com/videos/video-pet-vs-spect-nuclear-cardiology-and-recent-advances-technology/5550898514001)a discussion with Soman at the 2017 ASNC Today meeting.

Newer SPECT Cameras Can Lower Dose or Speed Imaging Time

The traditional analog SPECT gamma cameras use sodium-iodide scintillation crystals, and the new cadmium zinc telluride (CZT) SPECT detectors are based on solid state technology. The new CZT detectors allow for a much smaller footprint for the imaging system, including for office-based imaging or very small imaging suites, Soman explained. The CZT cameras also do not have to rotate around the patient, which makes imaging much easier and efficient than the older technology. The design of the collimators on the newer cameras also offers greater sensitivity. These advantages allow SPECT to be used in new ways, including shorter exams, lower radiation doses or for new techniques like absolute blood flow quantification.

CZT detectors can enable either lower dose or faster imaging speeds. Using normal radioisotope doses, these cameras can image much faster than conventional cameras, reducing scan times or the radioisotope dose exposure, explained Randy Thompson, M.D., attending cardiologist, St. Luke's Mid-America Heart Institute, Kansas City. However, he said some centers might not be able to take full advantage of the efficiency for faster scans because there are other steps involved in the imaging process that usually cause bottlenecks. "The camera imaging is not really rate limiting to that level," he explained.

Thompson said St. Luke's Mid-America Heart Institute uses the radiation dose reduction aspect of the newer cameras. "We have embraced a very low-dose protocol," he said. "Sometimes it means imaging longer or even repeating images, but radiation dose reduction has been dramatic."

ASNC recommends half of all patients scanned using SPECT should have a dose of 9 mSv or less of radiation. Thompson said for comparison, 11 mSv is a more standard dose for SPECT. "We now have it down where half of our patients now have a median dose of under 3 mSv," he said.

To achieve these lower doses, most patients receive stress-only, low-dose exams. "Some of the patients we image this way have a tenth of the dose previously used in the standard approach," Thompson explained. "If you have enough of those patients in your laboratory, of course the average/median dose comes down a lot. Our average dose in 2009 was about 18 mSv, and now our median dose is around 7.5 mSv, and our mean dose is under 3 mSv."

However, Thompson said low-dose protocols do not work for all patients. He explained it is difficult to get good image quality with obese patients at lower doses. Some patients might also be better served with faster imaging, including those who cannot hold still for long periods of time because of back problems.

Soman said the old standard dose for SPECT for an average sized patient was about 8-10 millicurie (mCi) of Technetium (Tc-99m) for a resting study and about 24-30 mCi for a stress study. Today, he explained his lab uses a 5 mCi rest and a 15 mCi stress study, resulting in a total body dose of about 6 mSv of radiation. He explained the new ASNC guidelines calling for 9 mSv or less of dose is easily achievable using the new CZT cameras. "You can go down much lower, and there are studies looking at stress-first imaging with only 3-5 mCi of dose. We use that protocol sometimes and the average dose is less than 2 mSv," he said.

Thompson pointed out lower dose protocols will take time to see wide adoption. The proliferation of the new CZT camera technology into the field also takes time and money, as centers slowly replace older equipment over the course of several years.

"The CZT images do look a little different, and there is a learning curve in reading them," Soman said. "But, it is not prohibitive and anyone can learn how to read on a CZT system."

Any centers thinking of replacing older SPECT cameras should consider CZT systems, Soman said. "The efficiencies of the camera and the image quality and the ability to do other things in the future like flow qualification are very good reasons to go with CZT detector technology," he said.

While the newer CZT scanners offer advantages, Thompson said there are some advantages of the older SPECT scanner technology. This includes the ability to fit extremely obese patients, which may not fit into the smaller confines of the CZT scanners. These cameras also are less expensive. He said a refurbished SPECT scanner

may cost half as much as a new CZT scanner, which will allow some smaller centers to still offer nuclear perfusion imaging at an affordable price. However, he said the future of SPECT will be with the newer CZT cameras.

"Many cameras are old and everybody is pressed to buy new equipment, but there are a lot of ways for people to do better quality scans," said David Wolinsky, M.D., director of nuclear cardiology at Cleveland Clinic Florida and immediate past-president of the American Society of Nuclear Cardiology (ASNC). "Many systems will allow themselves to have software upgrades to do iterative reconstruction. And simply doing better processing will give you better quality images with hopefully less false positives and less need to cath people who end up having normal coronary artieries and do not need a procedure."

Wolinsky said new CZT SPECT detectors have had a big impact on cardiac nuclear imaging. He said CZT can offer faster cameras, better photon counts and better images. "For older patients you can't lie down for a long time, you can image them much quicker, and for the younger patients where you don't want to give them a lot of radiation dose, you can given them a lower dose," he explained.

Watch the VIDEO "Implementing CZT SPECT Cardiac Protocols to Reduce Radiation Dose," (https://www.dicardiology.com/videos/video-implementing-czt-spect-cardiac-protocols-reduce-radiation-dose/5550898520001) an interview with Thompson.

Watch the VIDEO "Trends in Nuclear Cardiology Imaging," (https://www.dicardiology.com/videos/video-trends-nuclear-cardiology-imaging/5415042006001) an interview with Wolinsky.

PET vs. SPECT

"You always want to exercise people on a treadmill if you can and then they can go under a SPECT camera," Wolinsky said. "You also can get very good adjunct information from an exercise stress test." With PET, the half-life of the radioisotopes used is very short, so PET imaging only allows for pharmacological stress test imaging, which he said is not ideal. But, for less optimal patients who have issues exercising or who may be high risk, pharmacologic stress is fine to use and they may be better suited to PET.

There are also reimbursement issues regarding PET that play a big role in medical decision-making. He said SPECT is universally reimbursable and it is a lot harder to get a PET scan done. "So, SPECT commands more than 90 percent of the nuclear

cardiology market," Wolinsky said. "So to be able to add better SPECT cameras to allow use to do the same thing we have always done but get better results is really very important."

For larger institutions and research centers that are imaging larger numbers of high-risk patients, or if they want to image for sarcoid or inflammation, Wolinsky said PET offers a better option.

He said there have been concerns about SPECT radioisotope availability in the past. This prompted new protocols to image using less isotope, which also reduced patient radiation exposure. This includes stress-first or stress-only imaging.

Unlike SPECT, PET does offer some new ways to use nuclear imaging beyond MPI. Soman said this includes a big push with PET to diagnose sarcoidosis, amyloidosis, inflammation and dyssynchrony assessment.

Thompson said some of the newer PET assessments are gaining momentum. He cited a new category III CPT code for a PET myocardial perfusion imaging add-on for absolute quantitation of myocardial blood flow. This goes into effect Jan. 1, 2018. The assessment can help reduce the possibility of false negative exams and improve the accuracy of PET MPI studies. A category III code does not mean the service will be reimbursed, but is seen as a first step. Thompson said it allows providers to speak with payors to ask if the code can be made reimbursable under their insurance plans.

Watch the VIDEO "New CPT Reimbursement Codes for Cardiology," (https://www.dicardiology.com/videos/video-new-cpt-reimbursement-codes-cardiology/5506473951001) an interview with Thompson.

Reasons PET Has Not Replaced SPECT

There was a lot of discussion more than 10 years ago when positron emission tomography (PET) first entered the market that it might replace SPECT as the dominant cardiac nuclear imaging technology. However, despite several advantages of PET over SPECT, including improved image quality, PET technology uptake has been very slow. In the intervening years, SPECT technologies have also improved. This includes use of both CZT detectors and iterative reconstruction software to help enhance images and reduce dose.

"PET has some very distinct advantages, but SPECT is much more widely available," Soman said. "But, there are some big differences in the delivery of the tracer."

For PET centers that use ammonia as a tracer, the cyclotron that produces the isotope needs to be very close to where the imaging is done due to its very short half-life. With rubidium, an Rb-82 generator is used to create a 75-second half-life tracer in the imaging room. With SPECT, Soman said imaging centers can get a unit dose with much longer half-lives delivered from a remote production facility very easily.

"I think this is one of the reasons why PET technology has taken longer than we expected to implement," Soman explained. "But, there has been a rapid increase over the past few years for centers doing cardiac PET."

Combined PET-CT and SPECT-CT Scanners

Much of nuclear imaging is done on smaller SPECT cameras, but the large medical imaging system vendors have pushed the adoption of newer hybrid imaging systems that combine nuclear imaging with a computed tomography (CT) scanner in one gantry. This combination allows for CT attenuation correct on the nuclear images to produce more accurate scans. It also adds CT anatomical image overlays to better visualize the coronary anatomy and better pinpoint where blockages causing perfusion defects are located. Lastly, the CT offers the ability to perform a CT calcium scoring exam of the coronary arteries.

"I think CT adds a lot," Wolinsky said. "The ability to add calcium scoring is an important piece of information, it adds tremendous value. It is very good for primary prevention and risk identification and adds to the prognostic value of nuclear scans, whether they are PET or SPECT. Also, knowing the calcium score helps you interpret the nuclear scan and helps add prognosis value to the imaging. I think if anybody had a choice, they would want to get a SPECT-CT or a PET-CT."

However, he said costs for these systems are significant and the people making buying decisions for imaging systems are not the same people as a decade ago. He said some hospital administrators who hold the purse strings today do not always understand the value of nuclear imaging or how an expensive new technology is used to improve patient outcomes. "A hospital really doesn't care if they make their money doing toenails or treating heart disease, as long as they make money," Wolinsky explained. "So, we are trying to educate service line managers, hospital administrators and referring physicians about the value nuclear imaging brings to the patient and the service line."

Basics of Perfusion Imaging and Competition From CT

One criticism of nuclear imaging is found in its industry joke nickname misspelling of "unclear imaging." Image resolution of SPECT has traditionally shown fuzzy images of the basic shape of the myocardium from the radioactive isotope uptake by the heart muscle and its radiation being detected by cameras outside of the body. This functional imaging shows perfusion defects where there is a lack of radioactive tracer uptake, indicating low or no blood perfusion due to ischemia or an infarct. However, nuclear imaging is unable to accurately show where the exact blockages are located.

CT is traditionally thought of as an anatomical imaging modality, which can produce sharp images of the coronary anatomy, including the ability to visualize blockages inside the arteries. Nuclear imaging has traditionally been used as a follow-up imaging test to determine the severity of blockages on the function of the heart. However, computed tomography (CT) advanced visualization software can now perform perfusion imaging similar to a nuclear scan by mapping iodine contrast levels in the myocardium during the cardiac cycle. Areas of low blood perfusion have lower concentrations of iodine. This software is now offered as part of the post-processing software available with CT scanners. It is also offered by the main third-party CT advanced visualization software vendors. The technology is still being studied in trials to build data to show it is equal to nuclear perfusion imaging. However, cardiac CT advocates say it is only a matter of time before the technology sees wider adoption, especially in the cost-conscious environment of healthcare reform.

Another CT technology that may offer advantages over nuclear is virtual fractional flow reserve (FFR) mapping software. Interventional cardiology uses FFR catheters to invasively measure coronary flow past blockages to determine if the narrowing should be stented or not. FFR-CT can perform a noninvasive FFR assessment for the entire coronary tree at once to show the hemodynamic/functional impact of all blockages. FFR-CT shows a color-coded 3-D reconstruction of the coronary tree that can be rotated on any axis to show the exact source of perfusion defects in the arteries. One software company has had U.S. Food and Drug Administration (FDA) clearance for FFR-CT since November 2014, but there are limitations to the technology — mainly its cost, need to send patient datasets to a supercomputer in California and the time to results, which can take several hours. However, as the technology improves and overcomes these obstacles to adoption and the cost decreases, it may see wider adoption, especially for acute chest pain patients.

Related Content of Nuclear Imaging Advances

Managing Dose in PET and SPECT Myocardial Perfusion Imaging (https://www.dicardiology.com/article/managing-dose-pet-and-spect-myocardial-perfusion-imaging)

Advances in Cardiac Nuclear Imaging (https://www.dicardiology.com/article/advances-cardiac-nuclear-imaging)

PET vs. SPECT - Will PET Dominate Over the Next Decade? (https://www.dicardiology.com/article/pet-vs-spect-will-pet-dominate-over-next-decade)

Moving Awareness to Action in Nuclear Medicine Dose (https://www.dicardiology.com/article/moving-awareness-action-nuclear-medicine-dose)

Editor's Choice for Most Innovative Nuclear Imaging Technology Advances at SNMMI 2014 (https://www.itnonline.com/videos/editors-choice-most-innovative-technology-snmmi-2014/3634009260001)

Philips Launches CardioMD IV Cardiac SPECT Solution at ASNC 2017 (https://www.dicardiology.com/product/philips-launches-cardiomd-iv-cardiac-spect-solution-asnc-2017)

ASNC and SNMMI Release Joint Document on Diagnosis, Treatment of Cardiac Sarcoidosis (https://www.dicardiology.com/content/asnc-and-snmmi-release-joint-document-diagnosis-treatment-cardiac-sarcoidosis)

New PET-CT Scan Improves Detection in Rare Cardiac Condition (https://www.dicardiology.com/content/new-pet-ct-scan-improves-detection-rare-cardiac-condition)

VIDEO: Clinical Decision Support Requirements for Cardiac Imaging (https://www.dicardiology.com/videos/video-clinical-decision-support-requirements-cardiac-imaging/5487646320001) - an interview with Rami Doukky, M.D., system chair, Division of Cardiology, professor of medicine, Cook County Health and Hospitals System, Chicago, at the 2017 American Society of Nuclear Cardiology (ASNC) Today meeting.

New Expert Consensus Outlines Strategies to Improve Myocardial Perfusion Imaging in Women (https://www.dicardiology.com/content/new-expert-consensus-outlines-strategies-improve-myocardial-perfusion-imaging-women)

Lantheus and GE Healthcare Sign Agreement for Worldwide Development, Commercialization of Flurpiridaz F-18 (https://www.dicardiology.com/content/lantheus-and-ge-healthcare-sign-agreement-worldwide-development-commercialization)

Study Reveals Low Adoption of IAEA Recommendations for Reduced Nuclear Cardiology Radiation Exposure (https://www.dicardiology.com/content/study-reveals-low-adoption-iaea-recommendations-reduced-nuclear-cardiology-radiation)

Large Nuclear Cardiology Laboratory Slashes Radiation Dose 60 Percent in Eight Years (https://www.dicardiology.com/content/large-nuclear-cardiology-laboratory-slashes-radiation-dose-60-percent-eight-years)

VIDEO: MACRA's Impact on Cardiology - an interview with Kim A. Williams, Sr., M.D. (https://www.dicardiology.com/videos/video-macras-impact-cardiology/5420500524001), chief of cardiology at Rush University Medical Center, Chicago and former president of both the American College of Cardiology (ACC) and ASNC, explains the impact of healthcare reform on nuclear perfusion imaging.

University of Missouri Research Reactor Files to Start U.S. Production of Medical Isotopes (https://www.dicardiology.com/content/university-missouri-research-reactor-files-start-us-production-medical-isotopes)

New PET Radiotracer Identifies Inflammation in Life-Threatening Atherosclerosis (https://www.dicardiology.com/content/new-pet-radiotracer-identifies-inflammation-life-threatening-atherosclerosis)

Automated Radiosynthesis Modules May Improve Cardiac Nuclear Imaging (https://www.dicardiology.com/article/automated-radiosynthesis-modules-may-improve-cardiac-nuclear-imaging)

Societies Call for Focus on Radiation Dose Optimization in Nuclear Cardiology (https://www.dicardiology.com/content/societies-call-focus-radiation-dose-optimization-nuclear-cardiology)

PET Imaging Visualizes Hard-to-Diagnose Cardiac Amyloidosis (https://www.dicardiology.com/content/pet-imaging-visualizes-hard-diagnose-cardiac-amyloidosis)

PET/CT Effective in Detecting Calcium Blockages to Assess Heart Attack Risk (https://www.dicardiology.com/content/petct-effective-detecting-calcium-blockages-assess-heart-attack-risk)

New Report Finds U.S. Supply of Critical Medical Isotope Vulnerable (https://www.dicardiology.com/content/new-report-finds-us-supply-critical-medical-isotope-vulnerable)

ASNC/SNMMI Release Updated Procedure Standard for PET Nuclear Cardiology Scans (https://www.dicardiology.com/content/asncsnmmi-release-updated-procedure-standard-pet-nuclear-cardiology-scans)

SPECT Systems Comparison Chart (https://www.dicardiology.com/content/spect-systems)

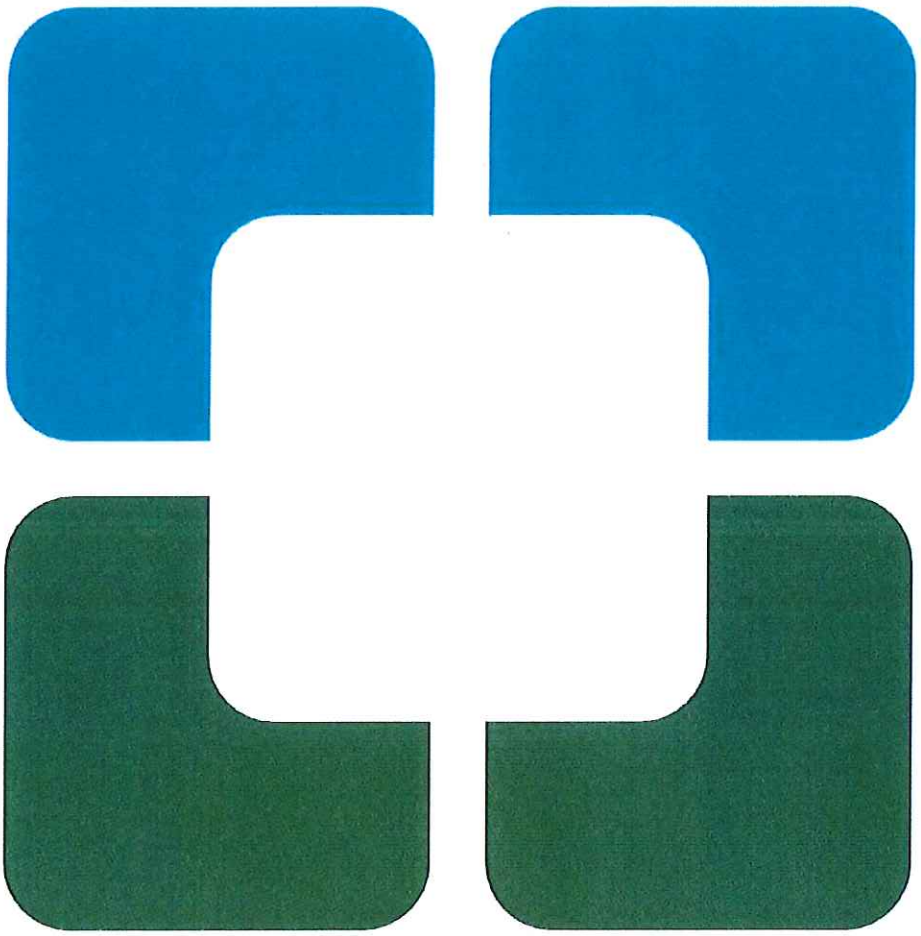
PET/CT Systems Comparison Chart (https://www.itnonline.com/content/petct-systems)

SPECT-CT Systems Comparison Chart (https://www.itnonline.com/content/spect-ct-systems)

Comparison charts will require a login, but it is free to register and it only takes a moment.

Sydell and Arnold Miller Family

Heart & Vascular Institute



Cleveland Clinic

2015 Outcomes

Aortic Surgery

Open ascending aorta and aortic arch repairs	720
Open descending aorta and thoracoabdominal repairs	66
Open abdominal aortic aneurysm repairs	85
Endovascular ascending aorta repairs	7
Endovascular descending aorta and thoracoabdominal repairs	216
Endovascular abdominal aortic aneurysm repairs	93

Cardiovascular Medicine Procedures

Interventional Cardiology

Diagnostic cardiac catheterizations	8153
Interventional cardiac procedures	1610
Percutaneous aortic valvuloplasties	47
Percutaneous mitral valvuloplasties	41
Percutaneous atrial septal defect and patent foramen ovale closures	32

Electrophysiology

Electrophysiology ablations	1559
Ablations for atrial fibrillation	863
Device implants	1435
Leads extracted	180

Diagnostic and Cardiac Imaging

Echocardiograms	78,162
Cardiac CT scans	7747
Cardiac MRI scans	3286
Stress tests	7910
Nuclear cardiology tests	
Tc-Myoview-rest	4344
Tc-Myoview-stress	4252
Rubidium heart (PET)	824
FDG heart (PET)	501
MUGA	82
N-13 ammonia heart	52

Patients from *76 countries* received cardiovascular care at Cleveland Clinic in 2015.

Patients from all *50 states* traveled to Cleveland Clinic in 2015 for cardiovascular care.

UNC Health Care

My UNC Chart

UNC CareLink

Published on January 10, 2017

UNC REX Healthcare and Wake Radiology to Form New Partnership and Joint Venture

Patients will benefit from high quality, lower cost and specialized care closer to home

RALEIGH, N.C. – UNC REX Healthcare and Wake Radiology are creating a joint venture to combine the organizations' outpatient imaging assets into a single entity, and forming a partnership to provide professional services at all UNC REX locations.

Joining forces will enable Wake Radiology and UNC REX to provide specialized inpatient and outpatient radiology imaging services for more patients, closer to home. In addition, patients will benefit from lower costs at UNC REX locations across Wake County.

"As hospital systems become more responsible for caring for populations of patients, Wake Radiology's greater footprint allows UNC REX patients to have convenient access to highly specialized imaging services," said Steve Burriss, president of UNC REX. "Wake Radiology has a long history of providing excellent imaging care in our community, and we are pleased to partner with them."

Wake Radiology is the oldest and largest outpatient imaging provider in the Triangle. Its more than 50 radiologists are organized in clinical teams trained in specific subspecialties, reducing the need for duplicate imaging, and providing quick response times for referring physicians.

"As the health care landscape continues to evolve, we strive to enhance our ability to serve patients across our region with subspecialty radiology," said Dr. Lyndon K. Jordan III, President and Managing Partner of Wake Radiology. "We look forward to co-developing high quality, value-based imaging services to the increasing number of patients at UNC REX facilities and throughout the area."

About UNC REX Healthcare

For more than 120 years, UNC REX Healthcare has provided expert care for the Wake County community and surrounding areas. With more than 6,000 co-workers, UNC REX is a private, not-for-profit health care system and is a member of UNC Health Care. UNC REX provides various health care services throughout Wake County with facilities in Apex, Cary, Garner, Holly Springs, Knightdale, Wakefield and downtown Raleigh. To learn more, click here.

About Wake Radiology

Founded in 1953 by Albert M. Jenkins, MD, FACR, Wake Radiology is proud to be the oldest and largest outpatient imaging provider in the Triangle. Since then, Wake Radiology has expanded to include more than 50 radiologists at a dozen locations in Wake County and beyond. Wake Radiology has been first to introduce numerous methods of imaging as well as introducing subspecialized radiology to Wake County. To learn more, click here.

Media Contact

For media inquiries and to arrange interviews, please contact:

Alan Wolf, UNC REX Healthcare
919-784-4467

Related News

- 373 UNC Health Care Physicians Named to 2017-2018 Best Doctors in America® List August 18, 2017
- UNC REX Healthcare and UNC Medical Center Co-workers to Collect School Supplies for Students August 8, 2017
- Durham Bulls "Field of Hope" Raises Money for Cancer Treatment and Research July 31, 2017
- UNC REX Healthcare to Hold Community Forum for Holly Springs Community Hospital June 21, 2017
- REX Blood Services to Hold 'Save Our Summer' Blood Drive on Friday, June 23 June 19, 2017

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Upcoming Events

Oct
2
Mon

Cooking Demonstration
11:30 AM - 12:30 PM
Improve your healthy cooking skills by attending a free cooking demonstration in our state-of-the-art Heart & Vascular Hospital.

Oct
7
Sat

Carolina Hurricanes
7:00 PM - 11:00 PM
Opening night for the Carolina Hurricanes

Oct
8
Sun

Walk for Hope
8:00 AM - 3:00 PM
29th Annual Thad & Alice Eure Walk for Hope

Oct
12
Thur

North Carolina State Fair-Round-the-Clock CPR Education Booth
7:00 AM - 11:00 PM
UNC REX Healthcare CPR Education Booth

Oct
14
Sat

leTour de Femme
7:30 AM - 5:00 PM
le Tour de Femme is a women's only full-metric century, half-metric century and fifteen-mile bicycle ride October 14th, 2017 in Cary, N.C.

More Events >>

UNC REX Healthcare
4420 Lake Boone Trail
Raleigh, NC 27607, USA
919-784-3100

LOCATIONS

Cary

Chapel Hill

Fuquay-Varina

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Morrisville

Raleigh – North Hills

Raleigh – West

Smithfield

Wake Forest

Our Hospital Partners

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Our Hospital Partners

Since 1961, Wake Radiology has proudly provided 24/7 inpatient radiology services to our hospital partners throughout the greater Triangle. Today, our radiologists support patients at UNC REX Healthcare and Maria Parham Health, a Duke LifePoint Hospital in Henderson.

Our Radiologists are subspecialty trained and come from the finest universities and teaching hospitals in the country. Our physicians are board-certified by the American Board of Radiology (ABR) and provide the comprehensive imaging services patients need whether inpatient, outpatient or being treated in emergency department.

About UNC Rex Healthcare

UNC REX HEALTHCARE

For more than 120 years, UNC REX Healthcare has provided expert care for the Wake County community and surrounding areas. With more than 6,000 co-workers, UNC REX is a private, not-for-profit health care system and is a member of UNC Health Care. UNC REX provides various healthcare services throughout Wake County with facilities in Apex, Cary, Garner, Holly Springs, Knightdale, Wakefield and Raleigh. To learn more, visit rexhealth.com.

About Maria Parham Health

MARIA PARHAM MEDICAL CENTER
A Duke LifePoint Hospital

Maria Parham Health, a Duke LifePoint hospital, is a regional hospital in Henderson, North Carolina, serving people in north central North Carolina and southside Virginia. As a part of Duke LifePoint Healthcare, Maria Parham offers a combination of Duke University Health System's world-renowned leadership in clinical excellence and quality care, and LifePoint Health's extensive resources, knowledge and experience in operating community hospitals. It is fully accredited by The Joint Commission and CMS. To learn more, visit mariaparham.com.

Cary PET-CT

300 Ashville Avenue, Ste. 180, Cary, NC 27518

Mon - Fri 8:00am - 5:00pm

PRINTABLE MAP

GET DIRECTIONS

919-232-4700

Cary

Cary - Diagnostic Imaging

Cary Breast Center

Cary MRI

Cary PET-CT

Cary Vein Center & Interventional Services

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Cary PET-CT

Nuclear Medicine Imaging in Cary, NC

At Cary PET-CT, Wake Radiology's technologists and radiologists conduct noninvasive PET scans to help detect and diagnosis disease. Scans normally take two hours and are conducted in a comfortable setting. PET, or positron emission tomography, is a form of nuclear medicine imaging. When you visit our Cary imaging center for a PET-CT scan, you will receive a small amount of radiotracer, which is injected into your vein then you rest quietly for a period of time before scanning can begin. Wake Radiology's technologists and radiologist use PET-CT for the brain & body to diagnose cancer, lung nodules and many other body abnormalities.

The Benefits of a Cary PET Scan with Wake Radiology

PET-CT scans and nuclear images have proven to be extremely effective in diagnosing illnesses or conditions that other diagnostic imaging techniques cannot. The Cary PET-CT Suite offers a unique outpatient setting with parking just steps from our registration desk and a scan room that has picture windows overlooking a serene natural area. To learn more about PET-CT scans and nuclear medical imaging, call us at **919-854-2190** or visit our contact page for more information on scheduling your PET scan at Wake Radiology. *Wake Radiology's Cary medical center provides PET scans to patients in Cary, Raleigh, Wake Forest, NC and beyond.*

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David I. Schulz, MD

Director of PET-CT Services
Body Imaging Radiologist
PET-CT Imaging Specialist

Dr. David I. Schulz joined Wake Radiology in 2009. Originally from Lansing, Michigan, Dr. Schulz received his medical degree from Michigan State University's College of Human Medicine and completed his residency in internal medicine at Sparrow Hospital at the Michigan State University in Lansing. He completed his residency in diagnostic radiology and a fellowship in abdominal imaging at Duke University Medical Center in Durham.

Dr. Schulz is a body imaging radiologist and PET-CT imaging specialist at Wake Radiology. He also serves as director of the practice's PET-CT imaging services. Dr. Schulz is board certified in diagnostic radiology by the American Board of Radiology (ABR). He is a member of the Radiological Society of North America (RSNA), American College of Radiology (ACR), American Roentgen Ray Society (ARRS), North Carolina Medical Society (NCMS), and the Wake County Medical Society (WCMS).

Specialties:

- Body Imaging
- PET-CT

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- How 3D Mammography Changed My Life
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