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MAGNETIC RESONANCE GUIDED RADIATION THERAPY:

RAISING THE BAR FOR PROSTATE CANCER CARE

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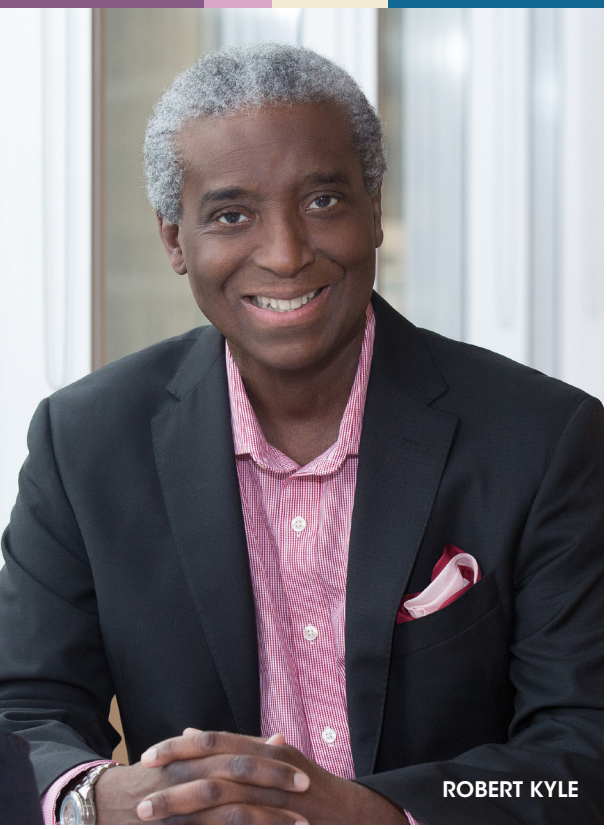
ACCURATE IDENTIFICATION AND PRECISE LOCALIZATION OF THE TUMOR IS ESSENTIAL IN RADIATION THERAPY (RT). This helps to maximize tumor control and minimize the risk of side effects. Such level of precision is important for patients with prostate cancer since the proximity of the prostate gland to other critical organs, such as the bladder and rectum, makes the delivery of targeted RT more challenging. Collateral damage to the surrounding normal tissues can sometimes lead to complications, including erectile dysfunction, urinary incontinence and rectal bleeding. As a result, the hoped-for cure may come at the cost of diminished quality of life for the patient.

Recent advancements in radiation technology, such as the integration of high quality MRI in radiation treatment planning, are making it possible to cure prostate cancer without jeopardizing quality of life. New generation MRI devices provide exceptionally clear images of the prostate, allowing for more accurate identification of the tumor region within the prostate gland, and the ability to distinguish high-grade from low-grade tumors – features that are not readily visualized by traditional methods of prostate cancer imaging, such as ultrasound or CT scan.

With the launch of the state-of-the-art Magnetic Resonance-guided Radiation Therapy (MRgRT) suite at the Princess Margaret Cancer Centre in late 2015 (see *Did You Know?*), some prostate cancer patients are now able to undergo personalized, high precision RT that was previously unavailable. CONTINUED ON PAGE 2.

"There's a concentration of state-of-the-art technology and absolutely brilliant medical people at the Princess Margaret. The staff treated me very well."

—ROBERT KYLE


ROBERT KYLE

The Radiation Medicine Program's (RMP's) Genitourinary (GU) team has pioneered the use of MRI to guide the delivery of prostate brachytherapy – a procedure in which small radioactive seeds are placed directly into the prostate. Currently, the group is examining the efficacy of conventional external beam radiation plus MRI-guided high-dose rate (HDR) brachytherapy *vs.* external beam RT alone in improving outcomes for high-risk, localized prostate cancer patients who may benefit from dose escalation strategies.

ROBERT KYLE survived a heart transplant two years ago, only to be diagnosed with aggressive, but localized prostate cancer last June. As his type of cancer was more likely to recur, Robert was recommended a treatment intensification approach to maximize his chances of a cure. Under the care of the RMP GU team, Robert received MRI-guided HDR brachytherapy in the MRgRT suite, followed by a five-week course of external beam radiation. "I felt the Princess Margaret was the best place for me to be, to treat what I've got. I knew this MRgRT facility was one of a few in the world that could offer me this sophisticated treatment. I knew it was cutting-edge when they asked me to be part of the study."

"The Princess Margaret is arguably the best cancer treatment center available today."

—ROBERT KYLE

The innovative MRgRT suite brings the unparalleled diagnostic features of MR imaging into the therapeutic space. In the case of MRI-guided HDR brachytherapy, high quality MR images are acquired to identify parts of the prostate that have increased tumor burden, allowing the brachytherapy dose to be intensified in those areas; the dose to the rest of the gland, which may have no cancer or only microscopic levels of disease, can be lowered. These factors may be individualized on a patient-by-patient basis, depending on the stage and grade of disease, to offer truly personalized treatment. For patients like Robert, the unprecedented degree of precision delivered by MRgRT means a higher chance for cure with the best possible quality of life as a cancer survivor.

DID YOU KNOW

MRGRT SUITE: A CANADIAN FIRST

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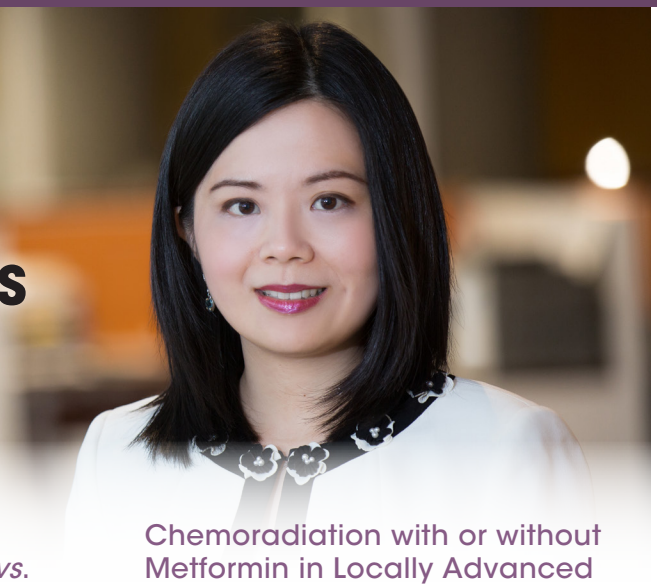
THE PRINCESS MARGARET MRGRT SUITE IS THE FIRST-OF-ITS-KIND IN CANADA. Operational since late 2015, the state-of-the-art facility consists of a 1.5 T diagnostic MR imaging scanner on a ceiling-mounted rail, which moves between a linear accelerator and a brachytherapy device for the delivery of MRI-guided cancer treatment. MR images can be acquired at the time of treatment with minimum disruption to the patient. To date, the MRgRT suite has treated close to fifty patients with prostate cancer, and recently initiated a similar program for women with gynecological malignancies.

As the only facility in Canada where MRI-guided brachytherapy is available, this unique suite is enabling cutting-edge research to be conducted at the Princess Margaret. The innovative clinical trials described in this issue provide a glimpse of the breadth of research advancements that will be achieved in this suite:

Low-Risk Prostate Cancer: The first-ever study of HDR brachytherapy focal monotherapy, which treats only the MRI-visible tumor in the prostate, has been initiated. Eligible patients must have a favorable risk profile and relatively small lesions. The study aims to maximize chances of a cure and minimize potential side effects by administering very high, so-called ablative, doses to only the MRI-identifiable lesion over few fractions. Genomic

Clinical Trials Highlights

CERVICAL CANCER TRIALS AT RMP



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Adjuvant Chemotherapy Following Chemoradiation *vs.* Chemoradiation Alone

Local PI – Anthony Fyles

MRI-guided brachytherapy has been shown to improve local control rates in patients with locally advanced cervical cancer; however, distant metastasis rates remain unchanged. This randomized phase III trial investigates whether further cycles of adjuvant chemotherapy following chemoradiation will decrease distant metastases and improve survival.

Eligible Patients: Cervical cancer patients without paraaortic nodal involvement or distant metastasis.

ClinicalTrials.gov ID: NCT01414608

Chemoradiation with or without Metformin in Locally Advanced Cervical Cancer

PI – Kathy Han

Poor tumor oxygenation (hypoxia) is associated with inferior survival in cervical cancer and resistance to RT. Metformin, a diabetes drug, has been shown to improve tumor oxygenation and consequently, tumor radiation response in animal studies; its use is also linked to better survival in diabetic cancer patients. This phase II study evaluates the efficacy of metformin to decrease cervical tumor hypoxia and thereby, improve tumor radiation response and survival of locally advanced cervical cancer patients.

Eligible Patients: Non-diabetic patients with non-metastatic cervical cancer planned for radical chemoradiation.

ClinicalTrials.gov ID: NCT02394652

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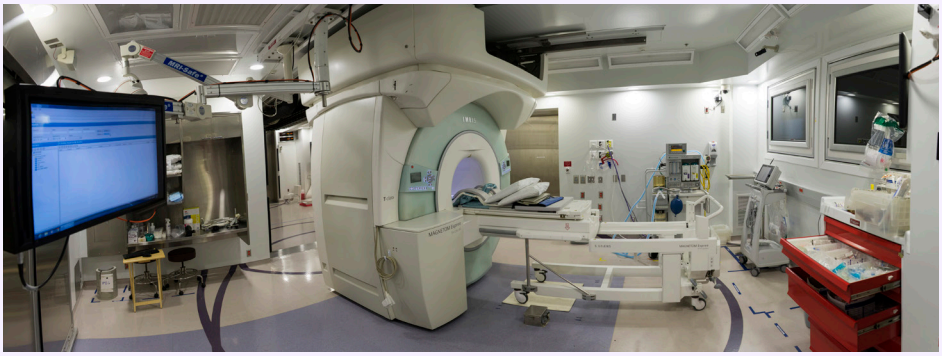
IN THE NEXT ISSUE...
PALLIATIVE RADIATION THERAPY

features of MRI-visible normal and diseased prostate will also be characterized to define biomarkers that can predict the risk of recurrence after focal treatment.

Recurrent Prostate Cancer: Salvage HDR brachytherapy with curative intent is being evaluated in patients who have developed recurrent prostate cancer after receiving external beam RT. Results for the approximately forty patients treated to date have been favorable; similar control rates (30-50% of cases) as prostatectomy have been achieved, but with minimal side effects (e.g. potency preservation, low risk of urinary incontinence and rectal side effects). The treatment may also delay the use of hormone therapy in this patient population.



HOW TO FIND US
FOR YOUR REFERRALS

We offer three ways to facilitate your requests for consultation:

1. Site Group Coordinators
Site group coordinators serve as a liaison for referring physicians, radiation oncologists and the Princess Margaret Patient Referral Centre.

2. Princess Margaret New Patient Referral Centre
Tel: 416.946.4575
Fax: 416.946.2900

3. Direct to Specific Radiation Oncologists
Referrals to specific radiation oncologists should be directed to site group coordinators.

Palliative Radiation Oncology Program (PROP)
Direct palliative radiation referral patients to our PROP coordinator. Within 24 hours, she will contact you with an appointment. Patients will be seen within a few days. PROPReferrals@rmp.uhn.ca

Coordinator **Melanie Robson**
Tel: 416.946.2901
Fax: 416.946.4657
melanie.robson@rmp.uhn.ca

Leader **Dr. Laura Dawson**
Tel: 416.946.2127
laura.dawson@rmp.uhn.ca

Emergencies For patients requiring same day consultations (e.g. spinal cord compression), please contact our Palliative Radiation Oncology referral coordinator (416.946.2901) who will identify the radiation oncologist that is best able to respond to your requests.

After-Hour Requests
Please page the radiation oncologist on call through the switchboard at 416.946.2000.

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