Editorial

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This issue of *Cancer Biomarkers* presents articles by some of the leading investigators in imaging cancer of the prostate (PCa). These articles address the state of the art in imaging PCa using magnetic-resonance imaging and spectroscopy, ultrasound spectroscopy and elastography, and positron-emission tomography. They offer hope that new, reliable, clinically usable means of imaging PCa may be on the horizon. The need for improved means of PCa imaging is urgent because current, conventional, clinical, imaging methods are seriously deficient in depicting cancerous foci within the prostate gland, and consequently, current methods are of limited use in guiding needle biopsies, planning treatment, and staging disease. However, the articles in this issue describe advanced techniques that show exciting promise for overcoming the limitations of current conventional methods, and that offer the possibility of making significant breakthroughs in PCa imaging.

One of the most-important opportunities these advanced methods may make available is focal treatment of PCa. Currently, all methods of treating cancers that are believed to be gland confined involve the entire gland. Whether the treatment is surgery, cryoablation, high-intensity therapeutic ultrasound, permanent-implantation brachytherapy, high-dose radiation, or external-beam radiation, no treatment option exists today that is safe and prudent for the patient other than treatment of the entire gland. Naturally, this exposes the bladder, urethra, neurovascular bundles responsible for sexual function, and rectum to risks of toxicity that could be avoided if imaging could provide confident knowledge of the location of cancer foci, and perhaps equally important, confident knowledge of cancer-free regions of the gland. The advanced imaging methods described in this issue of *Cancer Biomarkers* may make such knowledge available to the clinician in the near future. While each method individually has promise, even greater potential for distinguishing cancerous from non-cancerous prostate tissue may be provided by combining information from two or more modalities, e.g., by combining independent, spatially registered ultrasonic and magnetic-resonance spectral parameters.

If these exciting possibilities are realized, then detection will improved, first, by using reliable imaging to determine whether biopsies in fact are warranted, rather than relying on ambiguous PSA-related indicators and rectal palpation, and second, by using imaging to guide the biopsy needle into suspected cancerous tissue, rather than relying on the current method of systematic but blind needle placement. Better determination of the risk of extracapsular extension then will allow improved staging and treatment planning. More-objective assessments of surgical options for sparing nerves will be possible. As Dr. Christopher Porter says in his Introduction expressing the point of view of the urological surgeon, you have to see it to detect and treat PCa in the most-effective manner. Focal ablative treatments will become a practical clinical reality, and options for reducing risks of damage to the bladder, urethra, and rectum in ablative therapies will be evaluated and selected based on reliable knowledge of the spatial distribution of gland-confined cancer. Furthermore, delivering escalated doses to foci deemed to be clinically significant and graduated lower doses to regions deemed to be less significant will become possible. As Dr. Ronald Ennis says in his Introduction expressing the point of view of the radiation oncologist, such differential treatment will be practicable if reliable means of classifying and imaging prostate tissue are available. Hopefully, these methods also eventually will lead to means of distinguishing between PCa tumors that urgently require treatment and those that safely can be placed under surveillance. Subsequently, these same methods then can provide a visual way to monitor PCa tumors that are under surveillance.

Alone or in combination, these advanced imaging methods hopefully will satisfy the urgent need for re-

liable means of imaging PCa, and will enable a quantum step forward in managing the cancer that, for men in most developed countries, is the most-common non-dermatological cancer and the second-most-common cause of cancer death.