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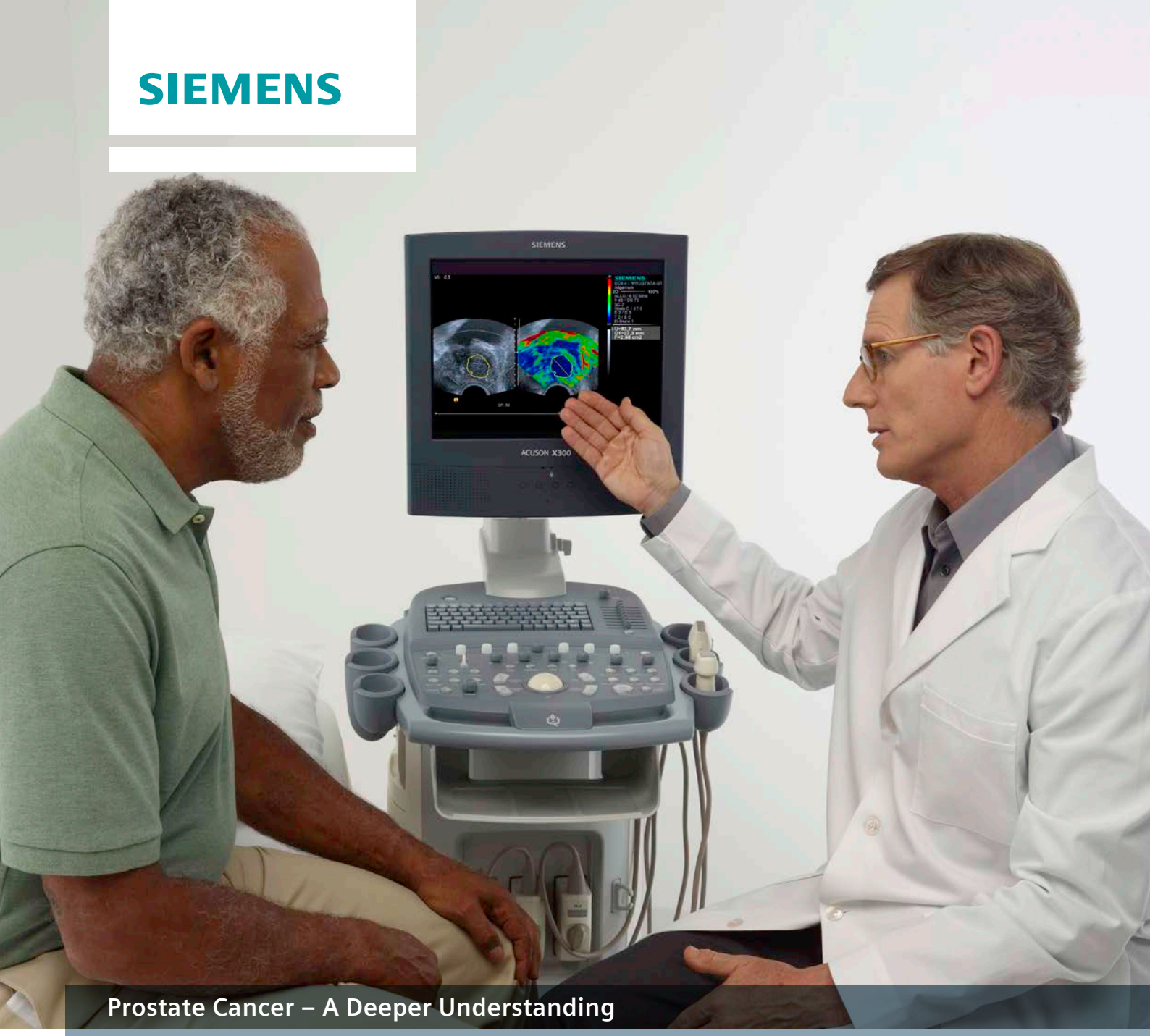


Prostate Cancer – A Deeper Understanding

Tumor Analytics
Oncology Solutions from Siemens

Answers for life.

In oncology, understanding your patient and your patient's disease is crucial ...

There have been many recent advances in detecting and treating prostate cancer, and patients – predominantly older men in their 60s and 70s – have a high chance of being cured when the tumor is found in an early stage.

To avoid potentially debilitating treatment side effects, there is ongoing discussion and research on how to add sensitivity and specificity to increase the value of screening, make staging more accurate and treatment more personalized. Overall, the challenge remains to better identify the patient's individual risk and adapt his care accordingly. Which leads to the question – *What more must we know in order to improve outcomes?*

Siemens is helping to fight the most threatening diseases – such as prostate cancer. By partnering with leading institutes and experts, Siemens helps to define new standards of care which enable medical professionals to efficiently detect diseases earlier, provide a more accurate diagnosis, and thus enable targeted therapy.

The more deeply you look, the more clearly you see your patients.

Tumors are as individual as patients themselves. At Siemens, we develop imaging, laboratory and IT solutions that help you understand the nature and behavior of individual tumors with amazing depth and clarity and guide their therapy. *Tumor Analytics* is our term for the advanced technologies that make such understanding and treatment possible.

Tumor Analytics supports you to diagnose cancer earlier and personalize its treatment. By matching the right treatment with the right patient, *Tumor Analytics* helps improve patient outcomes and reduce the overall cost of oncology care for institutions and societies.

In short: The better you understand and treat your patient's tumor, the better you can care for your patient. At the end of the day, that is what *Tumor Analytics* is all about.

Our prostate cancer portfolio.

Solutions for deeper insight

Treating cancer is complex, requiring more than one physician, more than one examination, and in some cases, more than one type of treatment. It requires resources – your staff, your laboratory, and your imaging systems.

For cancer – perhaps more than for any other disease – in vivo and in vitro monitoring are important at every step along the continuum of care.

With the right solutions in place, you create the potential for better differentiation between benign and malignant tissue, elimination of unnecessary biopsies, and optimization of examination times.

Clinical questions

For a deeper and more detailed insight into the characteristics and personality of a tumor, we need to strategically combine advanced imaging, IT and laboratory applications for diagnosis. At the same time, we must reduce the growing costs in our healthcare system – all while improving the standard of patient care even further.

To guide screening for patients at risk, characterize tumors of patients newly diagnosed with cancer as well as for those undergoing therapy and follow-up, there are three basic clinical questions we need to answer in order to better understand the nature and behavior of the tumor.

Clinical questions

Anatomy & Morphology

What is the size and location of the tumor?

Activity & Functionality

What are the functional properties?

Laboratory Diagnostic & Tumor Biology

What characteristics of the tumor can aid in diagnosis, therapy and follow-up?

Experience clinical excellence by Siemens

With decades of know-how and expertise regarding medical systems and IT solutions, Siemens is your reliable partner in successfully meeting today's clinical challenges in prostate cancer workup.

Whatever the clinical question, our broad portfolio contains everything you need to offer in patient care at the highest possible level – from ultrasound, MRI, CT, PET·CT, and PSA testing to systems designed for clinical process and workflow optimization.

Patients and their clinicians benefit from lower dose, unparalleled image quality, additional anatomical and morphological information, time savings, and much more. Moreover, you can be sure to receive everything you need from one source – Siemens.

A full range of advanced applications and technologies

	Early Detection	Diagnosis		Therapy Planning / Monitoring Therapy				Follow-up
		Guided Biopsy	*Staging / Risk Classification*	*Watchful Waiting / Active Surveillance*	*Radiotherapy / Brachytherapy*	*Prostatec-tomy*	*Hormone Therapy / Chemotherapy*	
US / TRUS	X	X[3]	X		X	X		X
MRI	X	X[3]	X		X	X	(X)	
CT			X		X		X	
SPECT Bone Scintigraphy			X					
PET·CT			(X)[2]		X	X	(X)[4]	
MR-PET			X		(X)[4]	(X)[4]	(X)[4]	
PSA Testing[1]	X[1]						X[1]	X[1]
IT Support	X	X	X		X	X	X	X

[1] In combination with DRE
[2] For patients with recurrent disease only
[3] If PSA and/or DRE are suspicious
[4] Upcoming application

Anatomy
& Morphology

How can I detect and delineate a suspect lesion more precisely?

Diagnostic confidence, patient after patient.

Image optimization and efficiency

Effective prostate cancer diagnosis requires both in-vitro and in-vivo assessments, with a combination of results guiding staging and therapy selection. Yet, current modalities may not always provide sufficient sensitivity and specificity.

Obtaining a clear description of the tumor's size and location in the body is fundamental in tumor diagnostics. Today, with increasing options in the treatment of prostate cancer, we need even more detailed anatomical and morphological information of the tumor in order to develop the right advanced diagnostic and therapeutic strategy. Due to the complexity of the required imaging data, today's physicians have a high demand for more efficient tools for data image reading and storage.

First-choice imaging modalities

- Ultrasound and Magnetic Resonance Imaging (MRI) are used predominantly in prostate cancer care in terms of tumor characterization, staging, presurgical and radiation therapy planning, therapy monitoring, and follow-up.

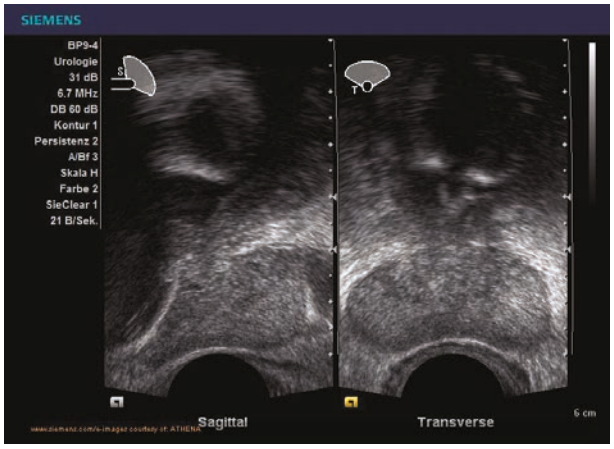
Transrectal Ultrasound (TRUS)

- The gold standard for diagnosis of prostate cancer is the histological assessment of specimens obtained by TRUS-guided systematic core needle biopsy. The method involves taking tissue samples from the prostate in a geometric pattern.
- Advanced ultrasound options, such as color power Doppler and contrast-enhanced ultrasound, offer increased sensitivity and specificity for lesion detection and localization.
- Real-time elastography represents a further ultrasound technique that can help differentiate malignant from benign tissue for lesion detection and biopsy guidance.

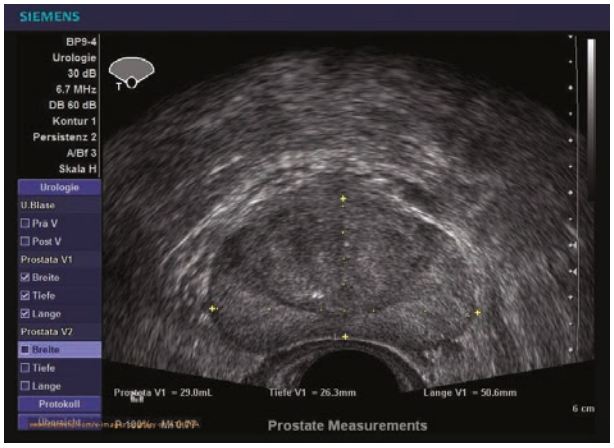
MRI

- Multi-parametric MRI is used for tumor localization and delineation in a number of scenarios. Examples include negative TRUS-guided biopsy with continued rise of PSA, relapse after initial therapy, local staging, and therapy planning.
- Siemens offers a full range of tumor staging and optimized prostate MRI applications such as *syngo*.MR General Engine Prostate Workflow & Report.
- A range of dedicated body, spine and endorectal coils are offered for the MAGNETOM 1.5 Tesla and 3 Tesla systems for optimized image quality.

ACUSON X300 Ultrasound System, Premium Edition (PE)

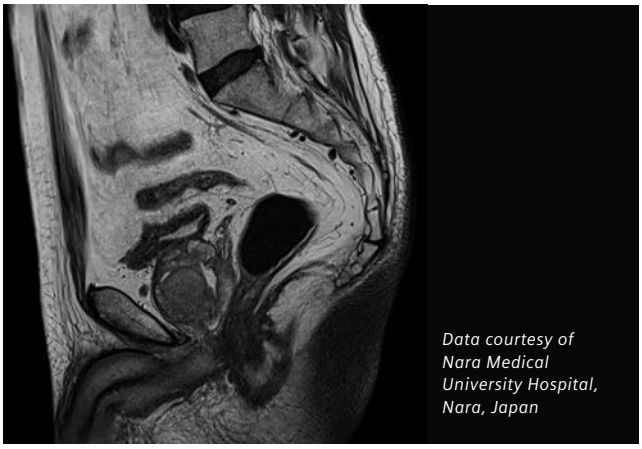


Live Bi-Plane BP9-4 Transducer provides live and simultaneous, sagittal and transversal visualization of the prostate gland.

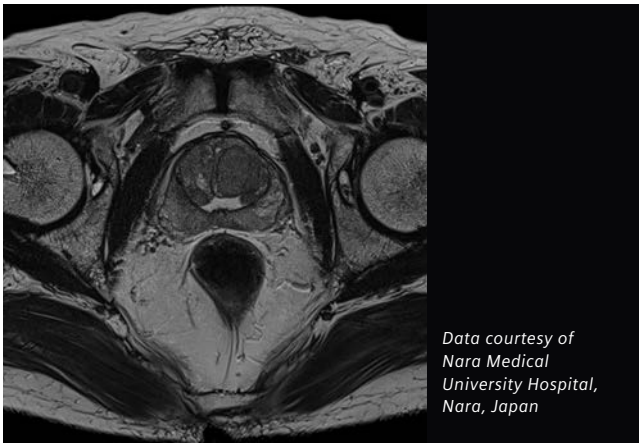


Dynamic TCE Tissue Contrast Enhancement Technology enhances tissue contrast resolution and reduces speckle for excellent differentiation of an enlarged prostate.

MAGNETOM MRI Scanner Systems

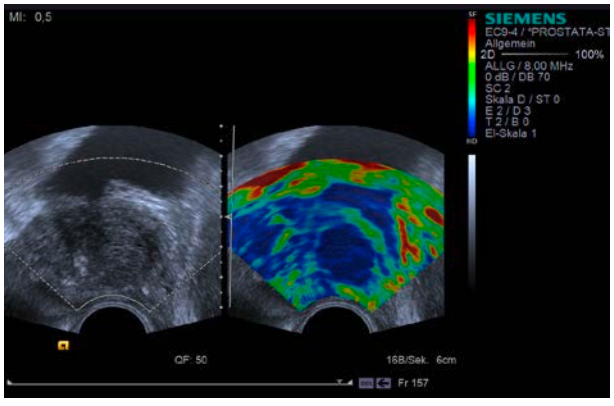


Tim and Tim 4G technology provide superb quality for high-resolution morphology imaging and examination speed.

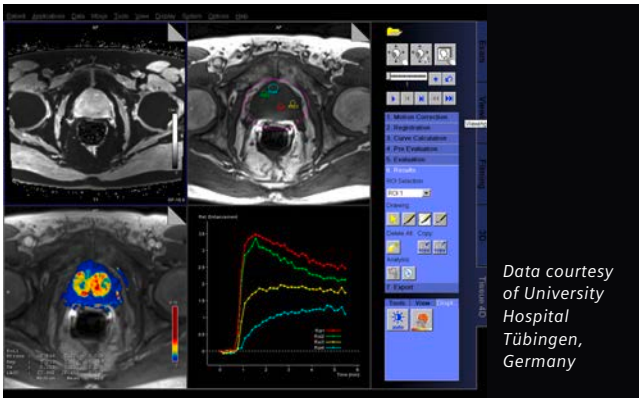


Siemens' 3 Tesla systems yield excellent resolution even with external coils only (no endorectal coil).

ACUSON S Family™ Ultrasound Systems



Strain imaging capabilities with eSie Touch elasticity imaging to assess relative tissue stiffness, enhance mass detection and visualize disease progression for a more informed diagnosis.



Analysis of dynamic contrast enhancement with *syngo* Tissue4D allows the identification of suspicious regions on the basis of characteristic differences in perfusion.

*A licensed physician may choose to use FDA-approved contrast agents in conjunction with an MRI exam, based on his/her medical opinion and discretion and in accordance with the instructions for use and indications for use supplied by the pharmaceutical manufacturer for the contrast agents.

Activity & Functionality

How can I better assess which treatment modality may be right for my patient?

Patient management at any stage of disease.

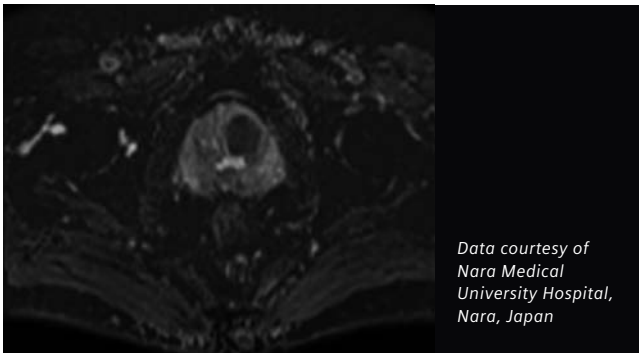
Staging, monitoring, and changing the course of therapy

With more and more advanced measures available to treat a tumor, anatomical information is often no longer sufficient to determine the most effective treatment plan for each patient. Additional information about the tumor's metabolism and other physiological characteristics, as well as its aggressiveness, can be obtained from MR, bone scintigraphy, or PET·CT and MR-PET, which may help to better select the appropriate treatment.

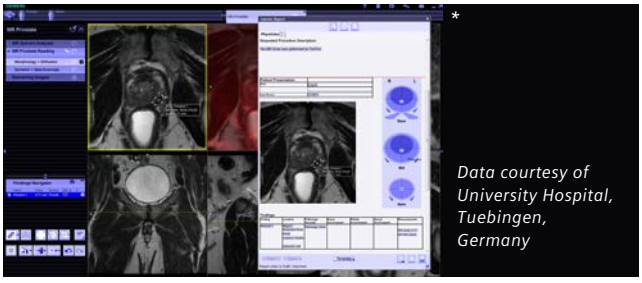
Multiparametric MRI

Next to T2- and T1-weighted images of tissue morphology, the following MRI contrasts offer additional physiological and metabolic information:

- MR diffusion-weighted imaging maps cellular density.
- Contrast-enhanced MRI allows for the analysis of perfusion and vascular permeability.
- MR spectroscopy imaging adds further specificity for tumor detection by imaging abnormal metabolism.



MR diffusion-weighted imaging maps the motility of water molecules, thus visualizing areas of abnormal cell density.



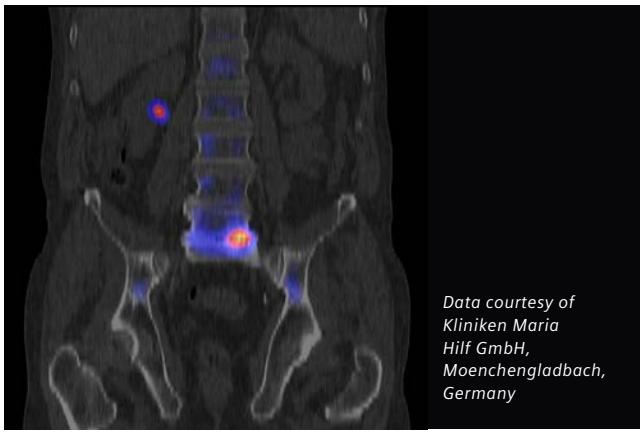
syngo.MR General Engine enables parallel multi-parametric reading, as preferred for prostate, with customized examination layouts and highly automated report generation.

Bone scintigraphy

- With bone metastases being a common complication, routine bone scans utilizing SPECT or SPECT·CT are recommended for patients with a PSA >10 ng/mL.
- Integrated diagnostic CT performed as a part of the SPECT·CT bone procedure helps improve localization and lesion characterization.

Unique hybrids for more precise molecular imaging

Hybrid imaging modalities, such as SPECT·CT, PET·CT and MR-PET, add the value of biological information to precise anatomical information – helping physicians to clearly understand tumor characteristics for more confident disease management.



^{99}mTc MDP bone SPECT·CT performed on a Symbia™ T scanner demonstrating vertebral metastases. The Siemens family of Symbia SPECT and SPECT·CT scanners features industry-leading sensitivity, enabling high-quality bone scans at the lowest possible dose.

Positron Emission Tomography – Computed Tomography (PET·CT)

- PET-CT enables precise localization of the primary tumor and earlier visualization of metastatic disease.
- High sensitivity for primary diagnosis and follow-up for high-risk patients and those with recurrent disease.
- ^{18}F-NaF PET·CT heightens lesion detection through improved molecular resolution.
- Potential new tracers may further expand the clinical use of PET·CT for prostate cancer.

Molecular MR (MR-PET)

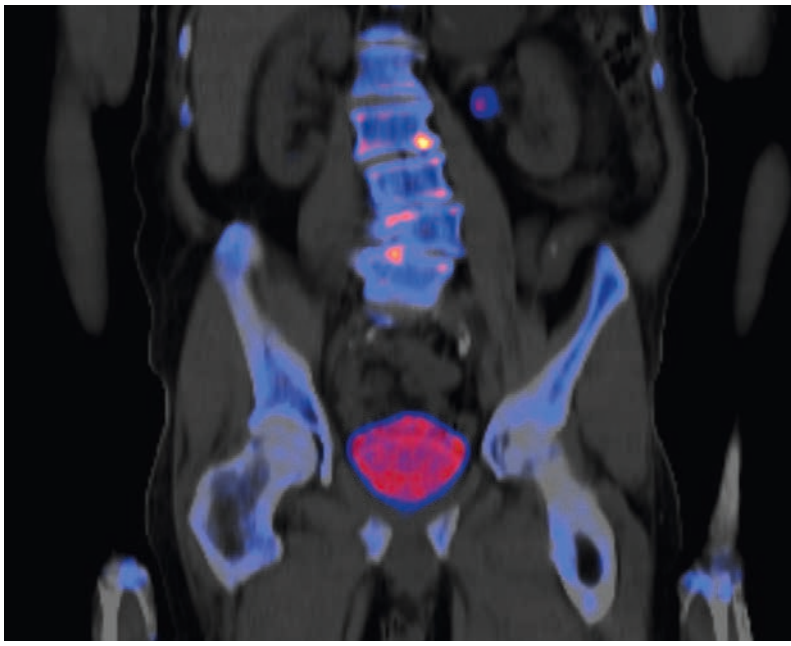
- Siemens offers simultaneous acquisition of whole-body MR anatomical as well as functional data and PET metabolic information in a single image.
- This unique modality helps to accurately identify and localize tumor relapse, involved lymph nodes, or distant metastases.
- With already more than 30 installed systems worldwide, Biograph molecular MR (mMR) has become part of clinical routine.

Computed Tomography (CT)

- Used for tumor staging, e.g. searching for metastases, and evaluation of advanced disease or in high-risk patients.
- Used for radiotherapeutical treatment planning (external beam therapy or brachytherapy).

^{18}F-NaF PET·CT showing precise delineation of bone metastases resulting from prostate cancer.

Data courtesy of Northern California PET Imaging Center, Sacramento, CA, USA



Laboratory Diagnostic & Tumor Biology

How can I improve early detection and patient management?

A comprehensive portfolio of PSA assays.

More choices for prostate cancer patient management

Improving early detection of cancer is driving the demand for both innovations in oncology testing as well as a greater frequency of oncology testing.

New oncology assays provide physicians with more choices and information for improved clinical decision-making across the care continuum. In addition to the DRE clinical examination, the Siemens portfolio of PSA assays can provide clinicians with the information they need to optimize patient assessment and care strategies.

Taking you closer to personalized healthcare

In the diagnosis and management of cancer patients, physicians require additional testing parameters alongside classical tumor markers. To improve the detection of clinically significant cancers, Siemens offers different types of PSA tests, which can be used to guide decision-making at different stages of the disease.

PSA (tPSA)

- PSA is the classic method used for both as an aid in detecting prostate cancer (with DRE in men 50 years or older) as well as for monitoring it.

Free PSA test (fPSA)

- fPSA assay helps guide decision-making in men 50 years or older who have DRE findings that are not suspicious for cancer but that are in the diagnostic gray zone (4.0–10 ng/mL total serum PSA).
- Used in conjunction with PSA, the percent fPSA helps to differentiate cancer from benign prostatic hyperplasia, and may help reduce unnecessary prostate biopsies.

Third Generation PSA

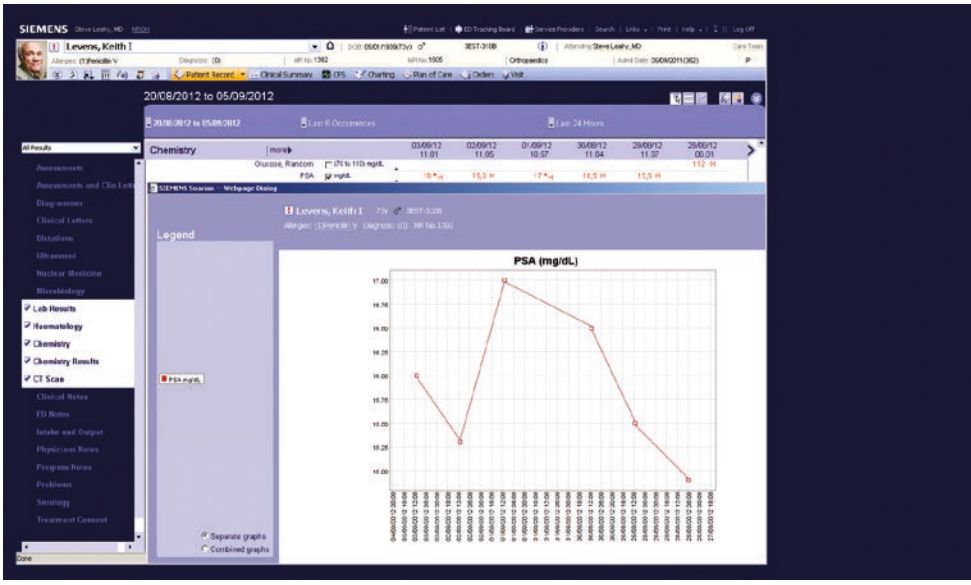
- Third Generation PSA assay is used as an adjunctive test to aid in the management of prostate cancer patients, by providing information on possible and early indication of disease status after treatment in conjunction with other clinical information.

Complexed PSA (cPSA)

- Siemens' proprietary cPSA is an alternative to traditional PSA testing, recommended by the NCCN and NACB as an aid in frontline detection. Complexed PSA (cPSA) can be more specific than PSA to aid in the detection of cancer.

Our tumor markers offer clinically acceptable sensitivity and specificity, and allow laboratories of any size to consolidate most or all of their oncology testing on our ADVIA Centaur®, IMMULITE®, Dimension®, and Dimension Vista® systems.

Soarian Clinicals: PSA progression of patient at a glance. Multiple progression curves can be displayed.



Enabling high-quality treatment decisions.

Leveraging IT to support optimum clinical practice

Complex hospital processes, various treatments – both in- and out-patient – and specified clinical process protocols require extensive data management and administrative processes.

Information technology plays a crucial role in the optimization of workflows, data management security and interdisciplinary communication. A safe, stable network, easy usability and access to information at your fingertips during treatment are critical for its success.

Workflow efficiency and improved patient outcomes

Siemens has extensive experience of helping healthcare organizations improve the delivery of clinical services. Our hospital information systems (HIS) are products that present clinical information and provide reports to clinicians to enable more informed decisions at every point of care.

Soarian Clinicals

Soarian® Clinicals is an efficient, interoperable hospital information system with a wide range of functions. It offers a workflow-driven design that addresses the dynamic nature of patient care.

- With Soarian Clinicals, clinicians can follow disease specific treatment workflows in standard procedures for prostate cancer therapy.
- For example, in the case of surgical therapy for prostate cancer, pre-defined and configurable processes can support both pre- and intraoperative courses, as well as post-operative follow-up.

Soarian Clinicals allows for the management of process and clinical data across departments, disciplines, and care settings to improve operational efficiency.

To support a complete overview of essential data required for therapy, Soarian Clinicals provides a quick and easy access to the patient record, including laboratory and radiological findings.

- If the patient's case is presented in a tumor board, a pre-defined software functionality supports the quick display of data and documentation pertaining to prior treatment decisions.

Soarian Integrated Care

- Soarian® Integrated Care (IC) is a web-based eHealth solution for enhanced communication among connected medical stakeholders (e.g. tumor board partners).
- It provides controlled and common access to documents, document cross-references, administrative case data, case-related and non-case-related clinical data and documents.
- Soarian IC supports the smooth flow of information and integrates communications media into existing treatment workflows and systems across all sectors, for both regional healthcare networks and national healthcare programs.

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