

# Competence in Computer-Aided Detection

Computer-Aided Detection (CAD) assists users by drawing attention to regions of interest that may require further review. Thus, it serves as a 'second reader' in the process of image interpretation. As the demands on clinicians grow, the need for CAD products in the radiology market, as in other medical markets, is likely to grow significantly.

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Over the next couple of years, the innovative area of Computer-Aided Detection (CAD) is likely to expand dramatically – both in terms of new applications and the benefits provided. CAD assists users by drawing attention to regions of interest that may require further review. Thus, it serves as a 'second reader' in the process of image interpretation. As the demands on clinicians grow, the need for CAD products in the radiology market, as in other medical markets, is likely to increase significantly.

As a company in the forefront of innovation, Siemens is working on the development of clinically relevant CAD tools to complement its portfolio of market-leading applications in a number of fields. Close collaboration with leading academic medical centers throughout the world and a strong technology base are cornerstones of the program. In keeping with a culture of visionary thinking, Siemens seized the opportunity to strengthen its CAD competence when it recently acquired

CADVision Medical Technologies. As specialists in the analysis of mammography images, CADVision has developed a unique CAD system for detection and analysis of breast lesions based on proprietary software algorithms<sup>1</sup>. The synergy between CADVision and Siemens product lines will strengthen Siemens position as technology leader in mammography. Currently, Siemens has three key areas of focus for CAD solutions: detection of lesions in the lung, colon and breast. Siemens has several studies underway to demonstrate the added value of CAD. However, some technologies are already available for clinical use.

*syngo* LungCARE NEV<sup>2</sup> (Nodule-Enhanced Viewing) is an innovative second reader designed for identification of lesions in the lung. NEV is an optional add-on to *syngo* LungCARE, a dedicated post-processing application for identification and diagnosis of lesions in the lung using data acquired by computed tomography (CT). NEV is designed to enhance

<sup>1</sup> Works in progress. Currently not available for clinical use.

<sup>2</sup> *syngo* LungCARE NEV is not classified as a CAD product.

# Three Tell the Benefits of Computer-Aided Detection

Dr. Buchbinder, Dr. Wormanns and Dr. Baker talk about the benefit of Computer-Aided Detection in mammography, chest CT examinations and CT colonography.



## **Computer-Aided Detection and classification in mammography examinations**

"In my opinion mammography CAD has proven its clinical value and the future is about more robust and sophisticated tools that can, in addition to detection, help in the analysis of lesions. Innovative technologies can provide valuable information to support lesion classification. In mammography, for example, patients with BI-RADS category 3 lesions represent a particularly challenging patient population. These lesions have a very small likelihood of malignancy. However, a small percentage of lesions will be malignant and therefore we do short-term follow-up over several intervals. In a recently published study, we show that computer-aided classification could help to upgrade malignant lesions, initially assigned to BI-RADS category 3, and thus potentially expedite the accurate diagnosis. We have also shown that some lesions could be downgraded, which would reduce the amount of patients with uncertain diagnosis."

Shalom S. Buchbinder, M.D., FACR, Chairman, Department of Radiology, Staten Island University Hospital, and Clinical Associate Professor of Radiology, Obstetrics, Gynecology and Women's Health, Albert-Einstein College of Medicine of Yeshiva University, New York, U.S.A.



## **Acceptance of Computer-Aided Detection in chest CT examinations**

"In my opinion reliable detection of early stages of lung cancer is a difficult but crucial task. There is no question that reading screening or diagnostic CT studies is susceptible to detection errors due to the huge amount of imaging data that has to be reviewed. In a recently published study, we demonstrated that the use of 'second reader' technology considerably increases the radiologist's sensitivity for detection of pulmonary nodules. Therefore, to ensure the highest possible sensitivity for detection of early-stage lung cancer in the screening process I am strongly in favor of double-checking the images with a CAD system. Preliminary results suggest that application of CAD might even be time-efficient. Finally, CAD is not only valuable in lung cancer screening, but also improves detection of lung metastases when staging or restaging oncology patients."

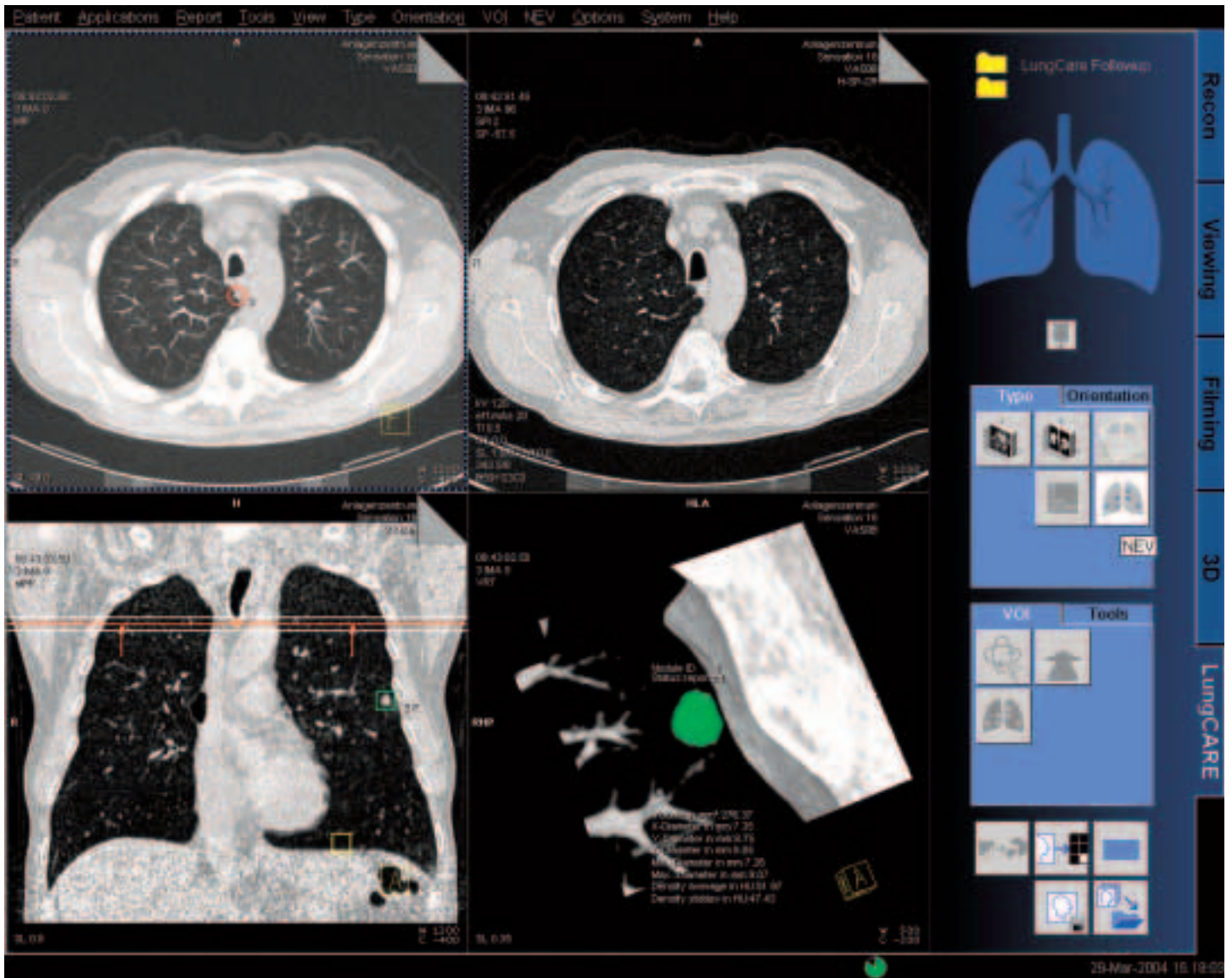
Dag Wormanns, M.D., Department of Diagnostic Radiology, University Clinic Muenster, Muenster, Germany



## **The acceptance of Computer-Aided Detection in CT colonoscopy examinations**

"Computer-Aided Detection (CAD) has been very successful in mammography and is being used for early detection of lung cancer. In my opinion, if CAD could accurately detect colon polyps in CT colonography (CTC), with a relatively low false positive rate, it might become another very important clinical application. Currently, most of the radiologists who are experienced in CTC would not want to interpret more than 3–5 studies per day. Reading CTC is a demanding, meticulous process, requiring focused and extremely attentive concentration. Given the fact that there are not enough radiologists to interpret the growing number of CT scans performed in the United States, any assistance in interpreting CTC will be embraced enthusiastically by radiologists."

Mark Baker, M.D., Section of Abdominal Imaging, Division of Radiology, The Cleveland Clinic Foundation, Cleveland, Ohio, U.S.A.



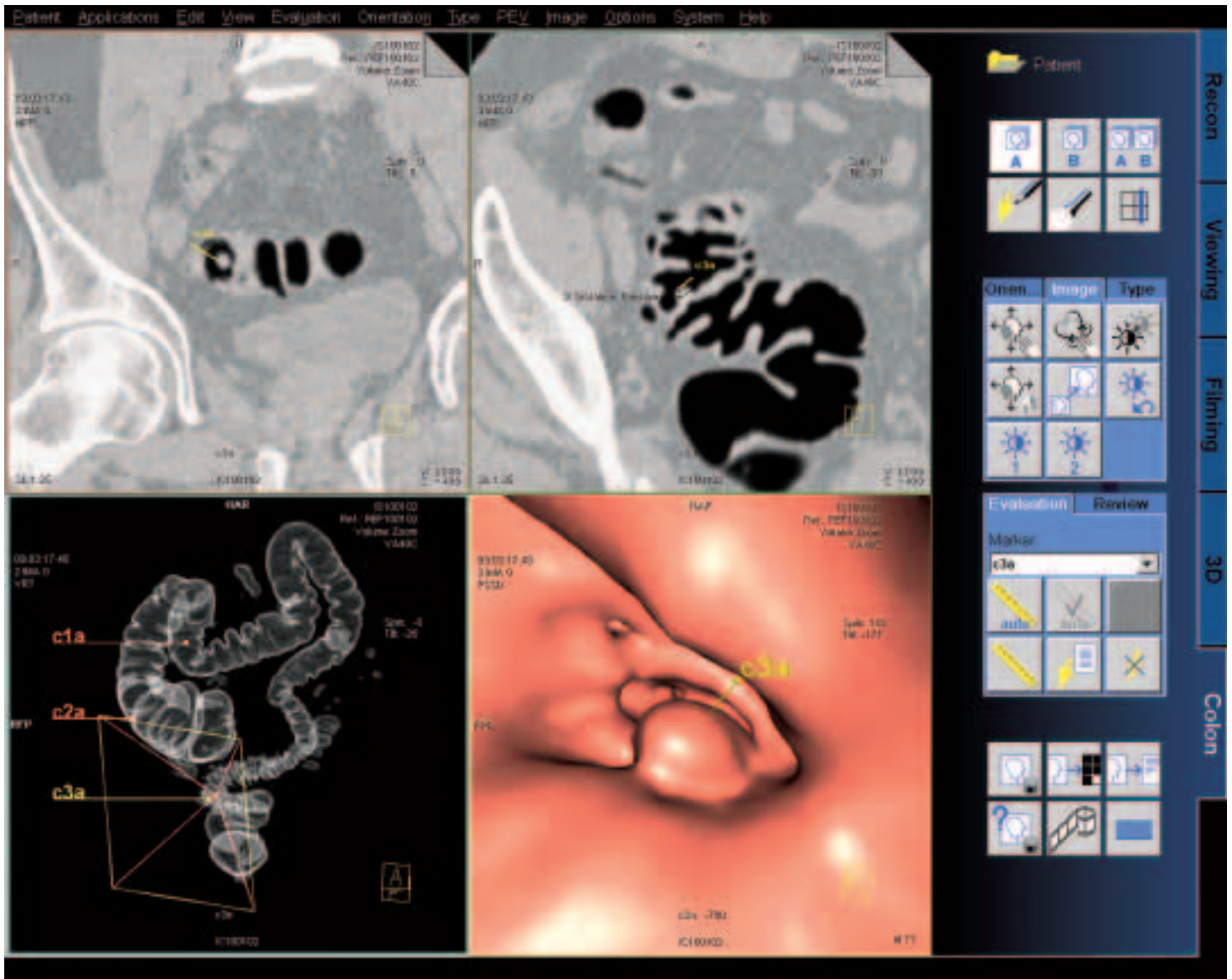
SYNGO LUNG CARE NEV – identification of nodules in the lung.

diagnostic confidence, presenting the radiologist with a set of potential lesions which can be evaluated in conjunction with the other tools provided by syngo LungCARE CT in order to confirm the presence or absence of lung lesions (e.g., nodules). NEV has received regulatory clearance in several markets and is well received by clinical experts, especially in combination with the automatic follow-up tools available with syngo LungCARE. Currently over 100 centers worldwide are using syngo LungCARE NEV.

syngo Colonography PEV<sup>3</sup> (Polyp-Enhanced-Viewing) is designed as a second reader for identification of lesions in

<sup>3</sup>syngo Colonography PEV is not classified as a CAD product.

the colon using data sets acquired by CT. PEV is an optional add-on to syngo Colonography, a dedicated post-processing application for identification and diagnosis of lesions in the colon. PEV, like the NEV product, is aimed at boosting diagnostic confidence by providing the radiologist with a set of potential lesions which can be evaluated with the advanced visualization tools provided by syngo Colonography. These tools are designed to help the user differentiate potential lesions from polyp look-alikes. In addition, automated measurement tools provide support in establishing the size of a lesion. Clinical validation of PEV is currently ongoing



SYNGO COLONOGRAPHY PEV – identification of lesions in the colon.

with an extensive network of clinical collaborators worldwide. PEV is expected to make its market debut in 2005. The development of Siemens mammography CAD products is also well underway and the launch of the analog and digital mammography CAD products is planned for 2005. The CAD software for digital mammography allows processing of images from full-field digital mammography systems, such as MAMMOMAT Novation<sup>DR</sup>, and will be offered as an optional add-on to the dedicated mammography workstation MammoReport<sup>plus</sup>. In addition, Siemens is working on computer-aided classification technologies to support the

user in the analysis of breast lesions. All of these products will be presented at this year's RSNA in Chicago. At the Siemens booth, radiologists will be able to see firsthand what these technologies can do. In the scientific sessions, there will be a number of presentations on the results of clinical validation studies, including the areas of computer-aided classification for breast lesions and the detection of colon polyps in virtual colonoscopy.