

# syngo TimCT – Increasing Clinical Throughput and Efficacy

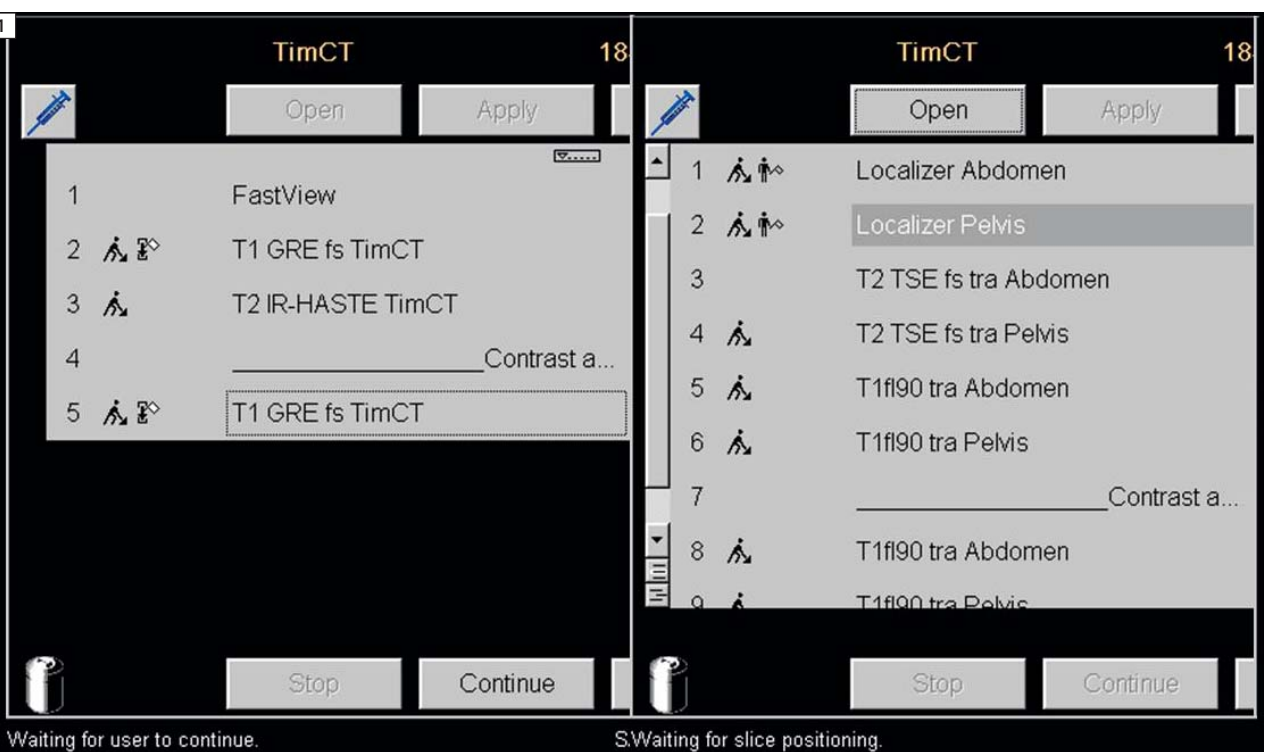
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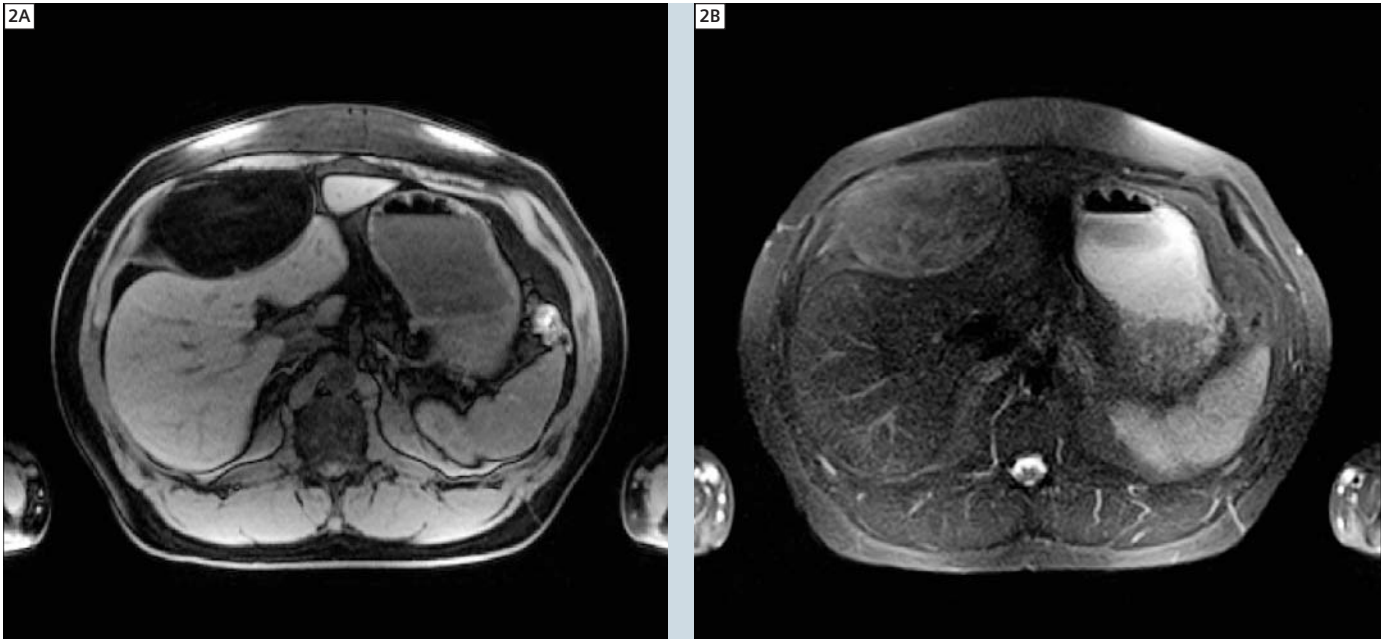
The University Medical Center Mannheim is a large 1300-bed hospital with currently four clinical MR-units installed (MAGNETOM Trio, A Tim System, 2 x MAGNETOM Avanto, MAGNETOM Sonata). The MAGNETOM Trio, A Tim System and the MAGNETOM Avanto are fully equipped with 32 independent receiver channels and the *syngo* TimCT-Oncology and *syngo* TimCT-MRA suites. The TimCT-Oncology suite has been clinically evaluated as a standard imaging technique in abdominal and whole-body

exams at the University Medical Center for approximately one year. There are several disadvantages of traditional large z-axis field-of-view (FOV) imaging: Firstly, technologists have to plan every sequence separately stack-by-stack to cover a large z-axis FOV. This planning procedure is error-prone and time-consuming. This stack-wise procedure applies not only to the initial localizers but to every single weighting (T1 and T2) before and after contrast media application. Secondly, imaging with sep-

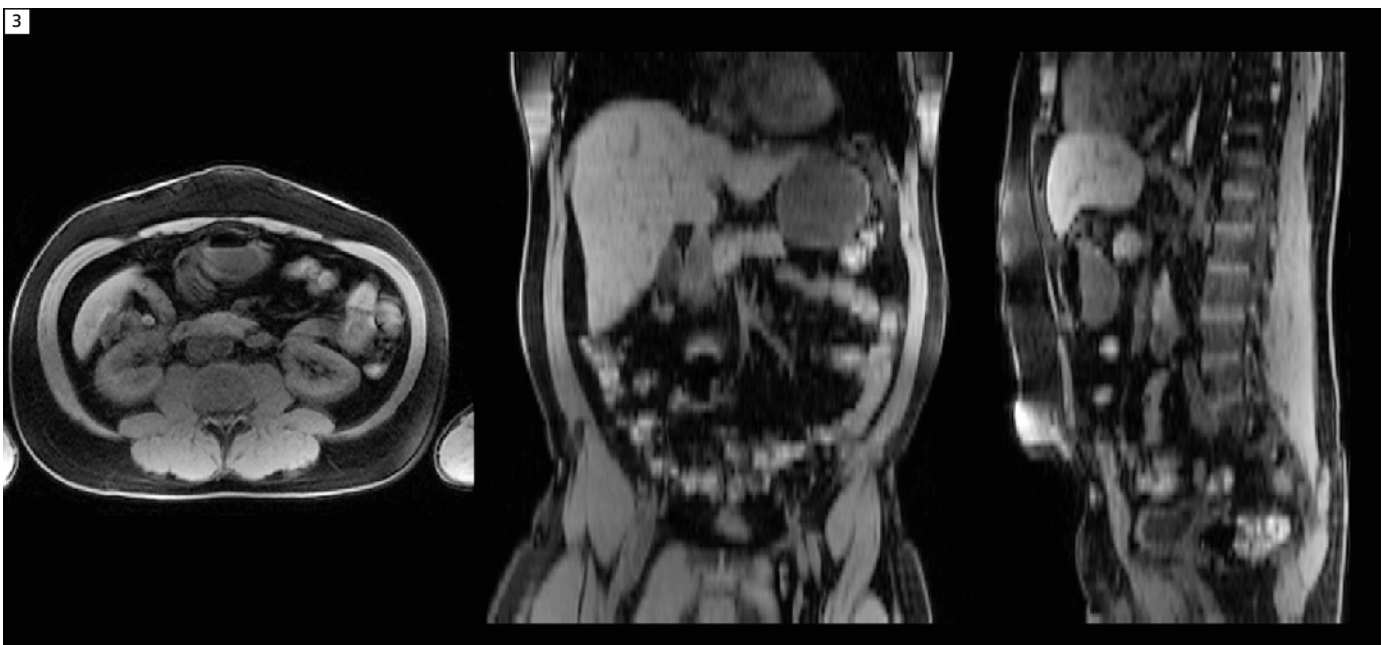
arate stacks increases the time needed for adjustment and shimming as this has to be done before every single sequence. Thus, the time efficiency of planning and scan time needs to be improved to enable the technologists to take care of administrative work such as billing or patient preparation. *syngo* TimCT is a new approach of MRI imaging with continuous table movement with a continuous z-axis FOV of up to 1200 mm. Conventional imaging is limited to a single FOV of 400 to 500



**1** Comparison between the planning of *syngo* TimCT-sequences (left) vs. traditional planning (right).



**2** Transversal T1 and T2-weighted images of a patient with liposarcoma within the transverse abdominal muscles.



**3** Reformatted syngo TimCT T1-weighted series in orthogonal 3D-viewer, the coronary and sagittal reformation show only minor stairstep artifacts.

mm depending on the equipment used. Moreover, with *syngo* TimCT enables, for example, imaging of the abdomen and pelvis with only three sequences, compared to up to 6 sequences in traditional imaging (Fig. 1). Thus the time needed for planning of sequences or shimming is much shorter, resulting in a substantial improvement in workflow.

In our institution, the main indications for *syngo* TimCT are abdominal exams requiring a large field-of-view – for example, tumor staging or screening for malignant lymph nodes. While these exams seem to be typical Computed Tomography (CT)-indications, the increasing awareness of the potential harm of ionizing radiation particularly in young adults has led to a shift towards Magnetic Resonance Imaging (MRI). Typical clinical requests include follow-up of patients with lymphoma, Hodgkin's disease, testicular cancer or with abdominal discomfort of unknown origin. Many of these patients require follow-up exams on a regular basis, which makes the application of MRI even more favorable. Scanning these patients with the *syngo* TimCT technique yielded consistently good image quality (Fig. 2).

The protocol is very simple and includes a transversal fat-saturated T1w-GRE sequence before and after contrast administration (TR/TE 131 ms / 4.76 ms, spatial resolution 1.6 x 1.6 x 6 mm<sup>2</sup>) and a transversal inversion-recovery T2w *syngo* BLADE sequence (TR/TE 6790 ms / 127 ms, spatial resolution 1.3 x 1.3 x 6 mm<sup>2</sup>).

Dedicated exams of the liver or of the adrenal glands which require dedicated sequences including in- and opposed phase imaging as well as multiphase dynamic imaging after contrast media application do not include *syngo* TimCT sequences at this time.

With the new *syngo* TimCT technique it is possible to acquire one set of data for the entire scan region which then can be reformatted within a 3D-viewer (Figs. 3 and 4). Depending on the sequence parameters chosen, the overall acquisition time can be reduced by 20–30% in abdominal studies and by up to 50% for whole-body examinations in patients



4 Reformatted coronary view (T1w, slice thickness 6 mm) with multiple renal and hepatic cysts.

with multiple myelomas, according to initial results. While the spatial resolution of *syngo* TimCT is currently slightly inferior to that of dedicated step-by-step whole-body programs our initial results suggest that the number of reported lesions is equal for both approaches. This reduction of overall acquisition time has led to a higher clinical throughput, as up to four additional patients\* can now be examined each day. Overall, *syngo* TimCT-Oncology is a further substantial improvement in body MRI. It enables us, to cover a large z-axis FOV with a single slab and is hence very easily planned as well as very time-efficient. Good clinical indications for *syngo* TimCT-Oncology in the abdomen are staging of lymphomas and oncologic follow-up exams in young patients.

In the future, further improvements of the technique are expected to allow for true three-dimensional imaging and further automatization of the acquisition.

\*Results may vary. Data on file.

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