

FieldStrength

Publication for the
Philips MRI Community

ISSUE 49 – 2013 / 2

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This article is part of
FieldStrength issue 49 - 2013/2

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Chris G. Goumas, MD

"We have chosen to shorten our MSK exams by decreasing the acquisition times."

Need to decrease exam time leads to shorter MSK scans while maintaining high resolution

[Palo Alto Medical Foundation](#) has developed MSK protocols for [Ingenia 3.0T](#) that save several minutes per scan

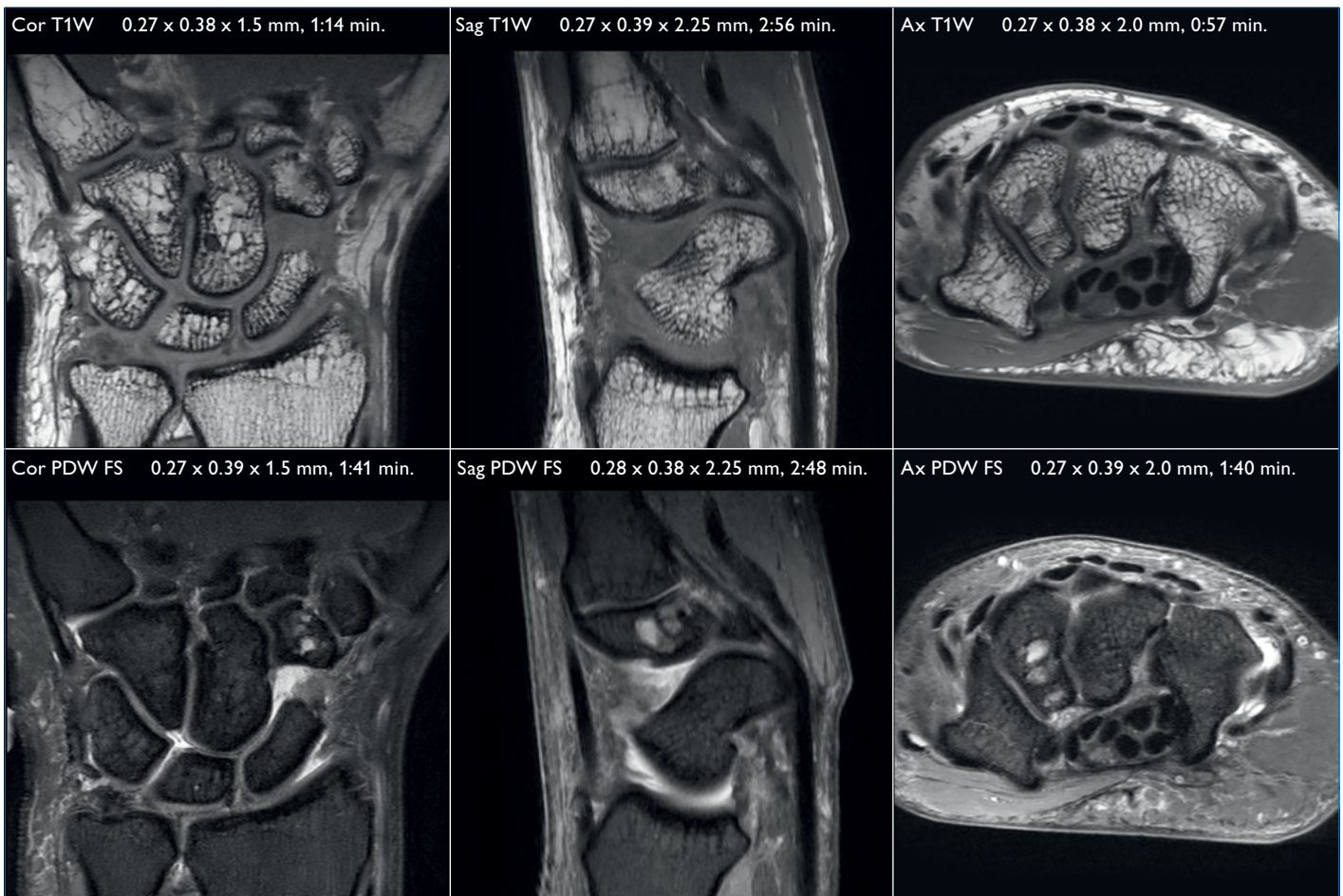
In response to an anticipated influx of patients due to U.S. healthcare reforms next year Palo Alto Medical Foundation (PAMF, Palo Alto, California, USA) needed to find a way to increase throughput in the MRI department. Since it had already expanded its hours to the limit, the only option was to shorten its examination times. PAMF looked to its Ingenia 3.0T system to help them shorten examination time slots to about 20 minutes while maintaining a high level of quality.

The USA sees pressure on reimbursements and the upcoming healthcare reforms in 2014. "We think the healthcare reforms will increase the number of patients seeking healthcare who have never really had access to healthcare in the past. This made us decide to make our musculoskeletal MRI faster," says radiologist Chris G. Goumas, MD. "We have chosen to decrease the length of our MSK exams by decreasing the acquisition times of each series to about 3 minutes, whereas in the past we focused on very high resolution acquisition in about 5 minutes. We usually run 5-6 acquisitions for a full study, so we're saving 10-15 minutes of time per study, so about 40% overall." "Because of the high SNR on Ingenia 3.0T, the shortened MSK scans are still exceeding the resolution of our 1.5T exams, and those are

5-minute acquisitions," explains Dr. Goumas. "So, I'm confident that we're still doing excellent work, while exceeding 1.5T capabilities. In a sense, we're just making Ingenia a much more cost-efficient unit. A 3.0T system may cost more up front, but if you have higher throughput over the typical lifespan of the system, the long-term economic benefit is quite favorable."

High resolution and fast scans: how it's done

The challenge, of course, was being able to maintain high resolution within a time limit of approximately 3 minutes per sequence. "It was a matter of trial and error, just seeing how much time we could save and still do better than we can on our 1.5T; that was our mark. We found



Tears in TFCC ligaments

69-year-old female fell with outstretched arms, landing on both wrists. Triquetral fracture was immediately diagnosed, but 6-8 weeks later she has continued pain on the ulnar side of the wrist. She underwent MRI on Ingenia 3.0T with 8-channel dS Wrist coil. The coronal sequences demonstrate tears in the scapholunate and triangular fibrocartilage complex (TFCC) ligaments. The axial fat suppressed proton density images also show intraosseous cysts in the trapezoid.

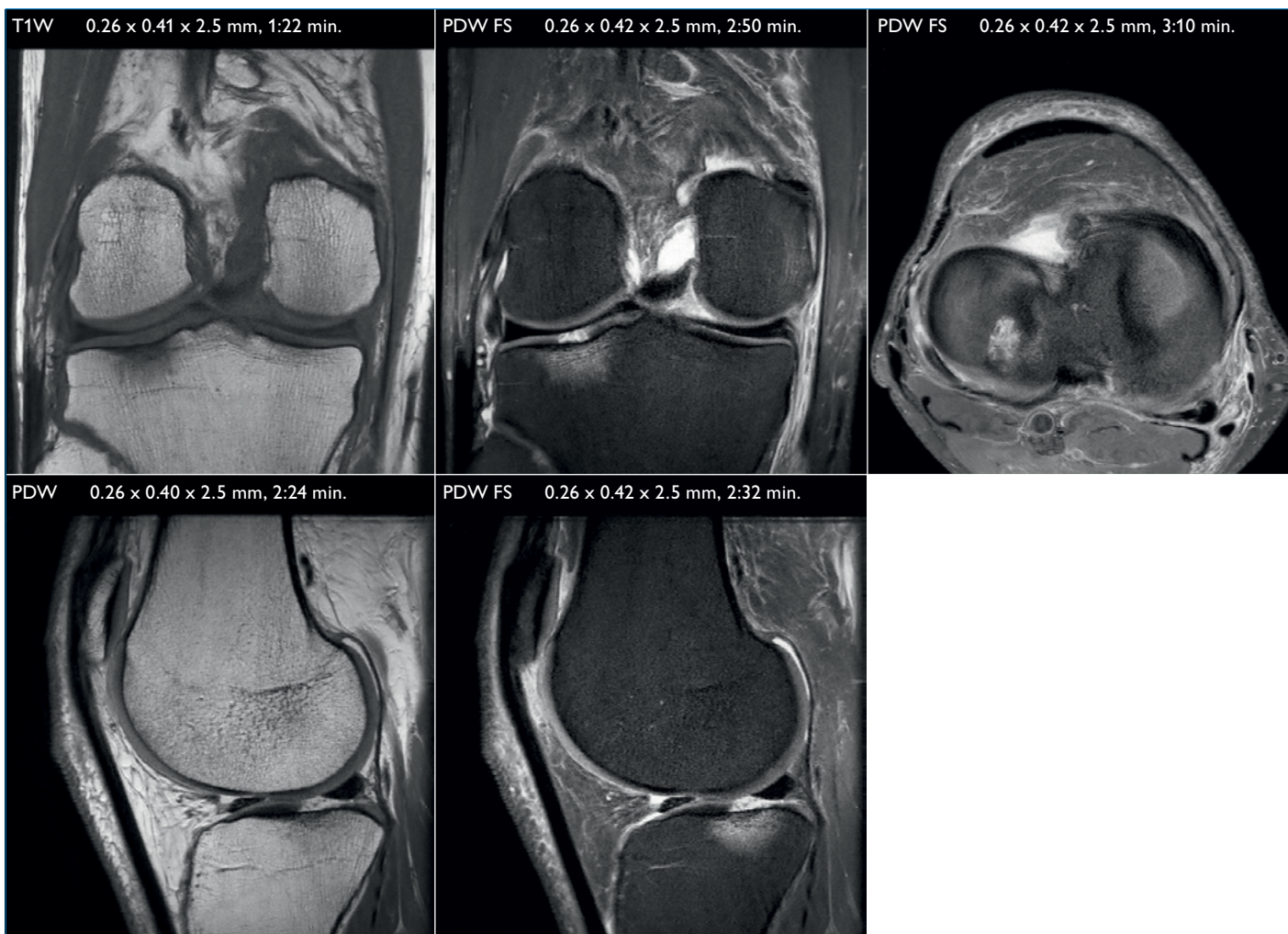
“The 3-minutes Ingenia 3.0T scans are still exceeding the resolution of our 5-minutes 1.5T exams.”

that we were able to increase the voxel size of our images slightly, but then decrease the number of signal acquisitions by one; that’s basically how we achieved the time savings.”

“What’s changed,” he adds, “is that the slice thickness went up a bit so we can get coverage through the joint. We’re essentially back to doing our Achieva 3.0T protocols, but we’re doing them faster. We’re doing this in both our MSK and neuro exams. Our knee ExamCards used to take about 25 minutes – now they’re down to 11 minutes. But we still want to keep a very high level of quality, particularly in our local market, where we have academic centers and other very competitive groups surrounding us. It’s a difficult balance.”

Ingenia helps achieve the balance

The high SNR and excellent homogeneity of Ingenia 3.0T with dStream, Xtend FOV, and MultiTransmit have been essential in achieving this balance. “When we first got the Ingenia system we immediately noticed about a 30% increase in SNR compared to our Achieva 3.0T. In a collaborative effort with Philips MR specialist Dave Hitt, we really pushed the resolution. We were able to further decrease the voxel size by about 30% on the same patient, on the same knee, with similar SNR. However, we’ve now dialed it back a bit in order to get still outstanding images that are equivalent to our Achieva images; these take 5 minutes on Achieva, and we’re doing it on Ingenia in 3 minutes.”

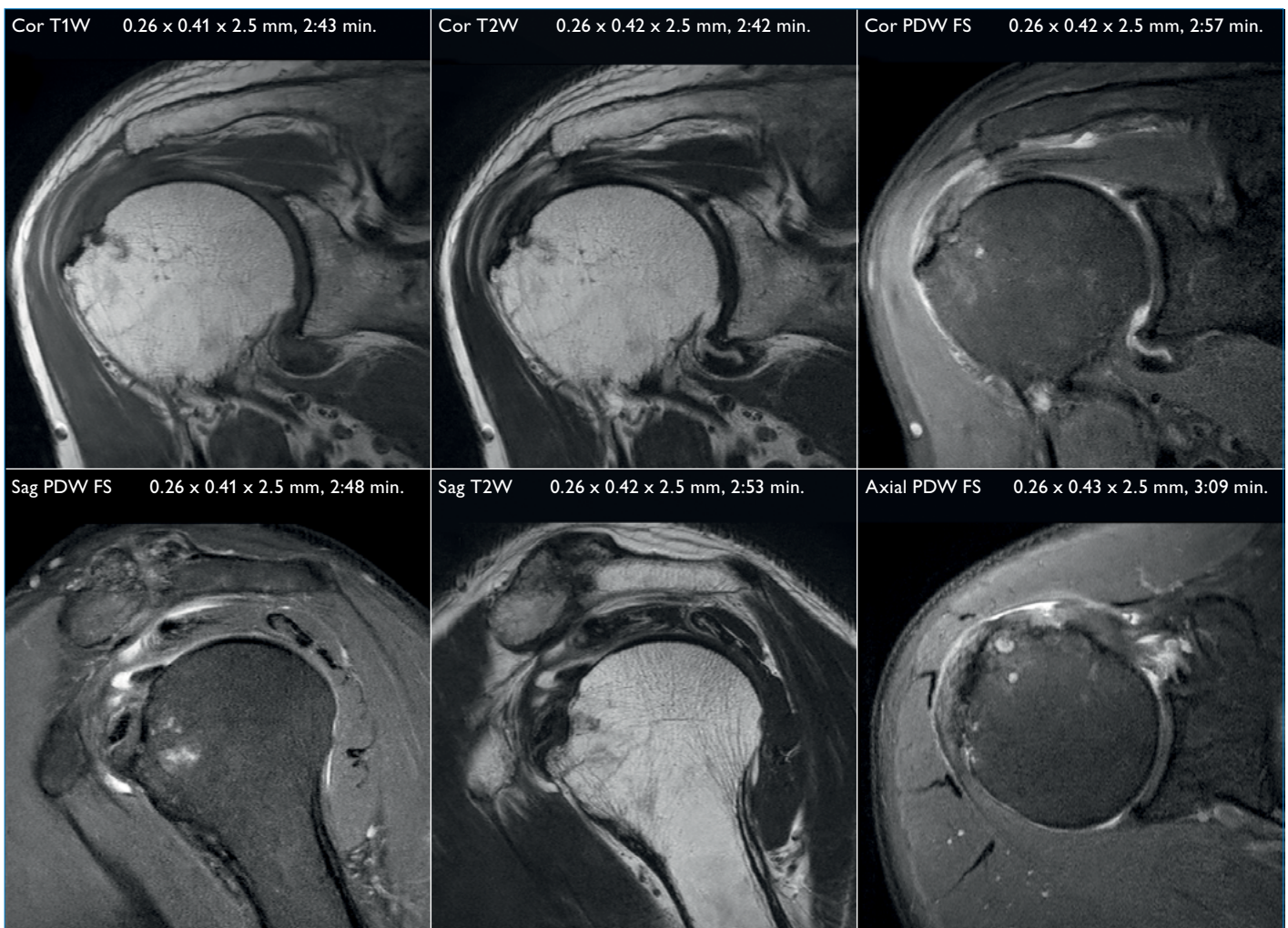


Cartilage defect and ruptured Baker's cyst

52-year-old female with anterior knee pain underwent MRI on Ingenia 3.0T with 16-channel dS Knee coil. This examination demonstrates cartilaginous defect lateral tibial plateau with subchondral sclerosis and marrow edema. Edema/hyperemia is also seen in the superior aspect of the fat pad abutting the inferior margin of the patella. On the axial proton density fat suppressed image, a ruptured Baker's cyst is visualized posteromedially.

“Our knee exams used to take about 25 minutes – now they’re down to 11 minutes.”

Scan times and voxel size	Ingenia 3.0T fast	Ingenia 3.0T high resolution	Achieva 3.0T high resolution
Knee	12:01 min. 0.26 x 0.42 x 2.5 mm	26:50 min. 0.23 x 0.34 x 2.0 mm	24:58 min. 0.28 x 0.37 x 2.5 mm
Shoulder	17:12 min. 0.26 x 0.42 x 2.5 mm	30:50 min. 0.22 x 0.36 x 1.75 mm	32:14 min. 0.27 x 0.39 x 3.0 mm
Ankle	17:50 min. 0.29 x 0.43 x 2.0 mm	32:02 min. 0.25 x 0.36 x 1.75 mm	30:32 min. 0.27 x 0.35 x 3.5 mm
Wrist	11:16 min. 0.27 x 0.39 x 2.25 mm	31:14 min. 0.23 x 0.33 x 1.1 mm	29:19 min. 0.23 x 0.33 x 1.25 mm



Shoulder sprain

58-year-old male with chronic shoulder pain underwent MRI on Ingenia 3.0T with 8-channel dS Shoulder coil.

The study demonstrates tendinosis of the supraspinatus tendon with calcific tendonitis. Associated degenerative cysts are seen in the humeral head. Minimal fluid is seen in the subacromial subdeltoid bursa. Advanced degenerative changes are seen in the acromioclavicular joint.

“Ingenia gives us the flexibility needed in today’s demanding healthcare environment. The way Philips has designed its hardware and software allows us to go for extreme resolution or extreme speed, and every balance in between,” says Dr. Goumas. “If we have a very critical case where we need a second look, or a professional athlete where it’s important to be highly diagnostic, then we can adjust to that. Ingenia gives us the ability to adjust not only to our local environment but also to the overall healthcare environment as it changes over time.” ■

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