Herbert Y. Kressel, MD  Hi. This is Herb Kressel and welcome to the September Radiology podcast. Today I'm joined by Olivio Donati of the University Hospital in Zurich. Dr. Donati is on the attending staff there and he with co-authors at Ghent University Hospital Clinic of Barcelona and Memorial Sloan-Kettering authored a very thought provoking study on the diagnostic performance of a short dual-pulse sequence prostate MR protocol compared to the standard multiparametric MRI for the detecting prostate cancer. Welcome Dr. Donati.

Olivio F. Donati, MD  Thank you. Good morning.

H.Y.K.  It's very nice to have you here. So as we begin can you tell us a little bit about prostate cancer MR imaging at your institution. How many MR exams are done for prostate cancer detection and how many of them for staging and treatment planning would you estimate?

O.D.  At our institution I would assume we do about 15 to 20 MRs a week so that means about 600 to 800 a year. Most of them are for detection of prostate cancer, however patients come with a suspicion of prostate cancer and usually we provide also that staging information.

H.Y.K.  Okay. Good. With that as the background tell us about the rationale for doing this study comparing a shortened version to the more conventional multiparametric MRI?

O.D.  Well there are several ideas behind it. First was that we had to shorten our MR slot at our institution. We still have a very comfortable length of MR slots of 35 minutes, but we were thinking of how if we have to down even further could we shorten the MP MRI the most reasonably. Second, we saw an increase in exams of prostate MR over the past one or two years and so of course in the background is also what if a screening situation might appear where MR would function as an initial test, how could we reasonably shorten the protocol without losing too much diagnostic performance?

H.Y.K.  I see.

O.D.  That was one of them.

H.Y.K.  Tell us actually about what you did in your study. What was the basic method that you use? I know you had multiple readers from different institutions which is quite interesting, so tell us a bit about sort of what you actually did in the study.

O.D.  We included patients, again about 63 patients that were included, who had clinical suspicion of prostate cancer and who had standardized template biopsy within 6 months or 6 months after that MP MRI. We then had several readers as you mentioned in different parts of the world who looked at the MRIs. First they were provided with only two sequences, the T2 transverse or axial and sequence of the axial diffusion weighted images and they scored their suspicion for prostate cancer often based on a scale from 1 to 5 on a Likert scale. Then later, a month later, they received the rest of the exam or the complete exam consisting of all the sequences in a standard MRI including the T1 the T2 and 3 and directions the diffusion and to the DCE and they scored again on the same scale and their suspicion for prostate cancer.

H.Y.K.  And so and then you compared the traditional diagnostic performance standards: sensitivity, specificity, etc. So a couple of questions on the methods, I noticed that for diffusion weighted imaging you calculated a simulated b=1400 msec image and why did you do that rather than obtaining one of the longer b value images? If I remember correctly the images were done at 3 tesla and you should have had quite a bit of signal to noise.

O.D.  Exactly, we would have, it would certainly be possible to go higher than 1400 or to 3000. What we regularly do when we look at the images is that we have a software tool where we can calculate the b value very quick on the spot and so it makes it very comfortable. There were papers showing that there was no real difference in diagnostic accuracy whether it’s acquired or calculated and I personally tried it. I don’t—it doesn’t give me too much of a benefit to acquire it and it still costs a couple minutes.

H.Y.K.  I see. And the other thing that sort of was a little different than in some other studies, you decided to use two different definitions of “clinically significant”
prostate cancer. Can you tell us a little about the two definitions that you choose and why you decided to look at both of them?

**O.D.** Well yes, with the definition of clinically significant prostate cancer as there is no different definitions and you also want to show what happens if you take different definitions. So we first we took on one hand the standard PI-RADS definition of any Gleason treatment score of above the tumor as clinically significant and based on one study for example by Dr. Vargas at Memorial Sloan-Kettering group that showed that very small tumors even with the Gleason 4 component are difficult to see on MR, we choose a size for volume based criteria as the other definition. Also because we had a template biopsy as the gold standard or standard of reference so we were not sure how much of the tumor was sampled in that cohort. So we wanted to show both of those definitions and what happens.

**H.Y.K.** Got it. So tell us what were your key findings?

**O.D.** What we found is that in detecting clinically significant prostate cancer by either definition there are no substantial differences between the short protocol or the whole protocol the accuracies performance was comparable. The inter reader agreement was comparable so we didn’t see any inferiority of the short protocol regarding diagnostic performance. That was the key findings.

**H.Y.K.** I’m sure a lot of people will be very interested in that. It might make lives easier both for the radiologist and for the patients. But I did note that with both of the definitions of clinically significant prostate cancer, there was a substantial false-positive rate and for most of the readers it was around 50%. What are the clinical implications of this? Would all of these patients need to be biopsied?

**O.D.** Well so we get the patients mainly before biopsy anyway and almost all of the patients get biopsied afterwards. Even if you have a false-positive it will see it and they’ll get biopsied anyway, but of course many of us were sensitive to not miss any cancers. That was one reason that might have caused a false/positive rate and also the gold standard maybe the tumor was actually bigger on MR than what was caught in the template biopsy. So that would make it of course a false-positive even though it might have been a bigger tumor that was not shown on biopsy. So that might be a reason for that high amount of false positives.

**H.Y.K.** Let me flip this around a little bit. If most of the patients are getting biopsied anyway, what do you think the value of the MR is?

**O.D.** I think it’s very helpful to know where the lesion lies now that you have many targeted biopsies that is certainly of help. For (inaudible) tumors, I think it can be of great help to have the localization within the prostate gland.

**H.Y.K.** Good. Now to kind of continue along this train of thought, in many centers prostate MRI is performed in patients who’ve already had negative biopsies, but for one reason or another there is a high clinical suspicion of prostate cancer. Would the detection of cancer and the differentiation from post-biopsy change such as hemorrhage would that be a problem if you just used the shortened two pulse sequence protocol that you tested?

**O.D.** Well since it doesn’t include any T1 be that designated T1 or be that the DCE the negative phases of the DCE, it is possible that this would hamper the diagnosis in this stage. As I said in our patient cohort it didn’t really matter because they were all biopsy naïve or had biopsy a long time ago. But for sure in other centers for other patient cohorts you might want to do a T1 before to see hemorrhage.

**H.Y.K.** And then what about staging and treatment planning? Would patients need to return for a second MRI exam or are these actively supervised so that if you saw something very suspicious you would just extend the protocol at the time?

**O.D.** I think for this for staging reasons it is very helpful and has been shown in the literature to have 3 planes of T2 imaging. Now of course if you have a very big tumor that you see already in a transverse plane there is no need to return in my opinion. If it would really make a difference or if it were important for the treating physician to know exactly if there’s high suspicion of extracapillary extension or (inaudible) yes then we could discuss to take a patient back for 2 and more planes. Also another thing that might be interesting in this topic is that we heard from the readers that it was sometimes hard and only one T2 sequence to have the zonal depiction is in the peripheral zone, it’s in the transition zone, and also for this it would certainly help to have at least one other plane.

**H.Y.K.** I see. And sort of thanks; this is very, very helpful. What is sort of the next steps after completing this study? Are you doing further research or have you made any changes? Are the slots for prostate MRI shorter now than they were?

**O.D.** They are a bit shorter now. I don’t know if was a consequence of this study, but my interest is also in having – since for me and also most of the readers who do prostate MR as diffusion is the key sequence, we try to always optimize our diffusion sequence within a certain range. So this is a big study interest of mine and of course also for example evaluating a work flow where you would first start with a T2 and a diffusion and in my case
the diffusion is artifacts or is not adequate to only then add a DCE for example. So a patient tailored protocol, this is our key interests.

**H.Y.K.** Well great. Dr. Donati I want to thank you and your colleagues for a very interesting study and for joining us for the podcast.

**O.D.** Thank you Dr. Kressel.

**H.Y.K.** It was a pleasure speaking to you.