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Is quadrant biopsy adequate as first-line sampling scheme in men likely to have non-organ-confined prostate cancer: comparison to extended biopsy protocol

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Background. *While extensive prostate biopsy (PB) in the patients with early prostate cancer (PC) provides better sensitivity and more precise tumour staging, in the patients with advanced PC, it is virtually only a confirmation of malignancy. The purpose of our study was to find out whether the quadrant prostate biopsy (QPB) provides a sufficient first-line pathological evaluation in the patients likely to have advanced PC, and whether the reduction of core number impairs the competence of PB through missing quantitative histology information.*

Methods. *We studied 84 men who underwent PB and classified into groups »H« (highly-) and »L« (low likely to have advanced PC). Pathological results of 5-12 cores PB and simulated QPB were retrospectively compared, particularly for the presence of PC, tumour volume, Gleason score (GS), and the presence of high-grade prostatic intraepithelial neoplasia (HGPIN).*

Results. *The PC detection rate was not impaired in group H, but dropped significantly in group L, while the percentage of positive cores was insignificantly changed in group H (p=0.39), but significantly decreased in group L (p=0.04) due to the sampling scheme reduction. No HGPIN was missed with QBP in group H, while 2 HGPIN were missed in group L. Insignificant GS changes resulted in both groups as a consequence of the limitation to QPB.*

Conclusions. *QPB is an appropriate first-line scheme in the patients with advanced PC as the information lost due to the core number reduction is mainly not critical for patient management.*

Key words: prostatic neoplasms - pathology; biopsy, needle; prostate-specific antigen

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Introduction

Standard sextant prostate biopsy (PB) is proved to be of limited sensitivity in prostate cancer (PC) detection. An increase of the number of tissue cores per PB session improves the PC detection rate,[1-5] and contributes to a

better preoperative staging accuracy.[6-8] Recently, many urologists abandoned biopsying hypoechoic focal lesions, and focused on systematic sampling of the gland with as much cores as possible. Although even he extensive PB was proved to be relatively safe, discomfort and minor complications occur in many patients;[9-11] it is therefore sensible to avoid them if possible. In the *patients with presumed high tumour burden*, with regard to PSA level, suspicious digital rectal examination (DRE) or transrectal ultrasound (TRUS), and suspicion of metastases,[12-15] it does not seem reasonable to take large number of cores in initial PB because PC has very probably spread all over the gland volume, and exact assessment of intraprostatic tumour distribution is of minor importance. As these men are at high risk to have a non-organ-confined (NOC) PC, they are rarely candidates for radical prostatectomy (RP); hence only histological confirmation of the diagnosis of prostatic malignancy is virtually needed. There is scant literature[16] dealing with the possibility to reduce the PB protocols when an extensive sampling is not strictly necessary in order to spare the invasiveness of the procedure and its costs.

We hypothesized that the extensive first-line PB is redundant in the *patients with presumed high tumour burden*, and that the quadrant PB (QPB) can fulfil the task of preoperative pathological evaluation in the patients likely to have NOC PC. The purpose of the present study was to investigate whether the reduction of core number from 5-12 to 4 in the patients in whom PSA and/or clinical evaluation indicate high likelihood to have NOC PC, would impair the diagnostic competence of PB through missing clinically relevant information usually obtained by this procedure.

Patients and methods

Patients

We retrospectively studied 84 consecutive patients (mean age 71.8 years, range 50-89) in whom systematic PB was performed during one-year period. The men were previously untreated for PC and biopsied for the first time. The patients were classified into two study groups according to serum PSA, DRE and TRUS findings, the factors which can

Table 1. Selection criteria for stratifying the patients into two categories according to probability of the presence of advanced (non-organ confined) PC. Number of patients in each sub-category is given.

Likelihood for the presence of advanced PC	PSA[a] level	TRUS[b] and DRE[c] finding	Number of patients
Low	<4 ng/mL	TRUS suspect or DRE suspect	5
Low	4-10 ng/mL	TRUSP non-suspect and DRE non-suspect	24
High	<4 ng/mL	TRUSP suspect and DRE suspect	4
High	4-10 ng/mL	TRUSP suspect and/or DRE suspect	12
High	>10 ng/mL	Irrespective of TRUS and DRE-finding	39
Total			84

[a] PSA test (Elecsys 1010, Roche Diagnostics GmbH, Manheim, Germany) was done prior to any prostate manipulation, to avoid false positive findings; no patients in our series had acute prostatitis (possible cause of elevated PSA); mean prostate size was similar in groups H and L.

[b] TRUS was considered suspicious of malignancy if hypoechogenic sector or nodule in peripheral zone was detectable, if the prostate was inhomogeneous without zonal discrimination, or if unsharp prostate margins or infiltration of extraprostatic tissues was seen.

[c] DRE was considered suspicious of malignancy if considerable irregularity of the prostate surface, »rocky hard« induration/nodule or considerable asymmetry is detected on palpation.

Abbreviations: PC = prostate cancer, PSA = prostate-specific antigen, TRUS = transrectal ultrasound, DRE = digital rectal examination

predict the PC burden in a patient.[12-15] The group more likely to have NOC PC (*high* tumour burden) is assigned »H«, while other patients (with presumed *low* tumour burden) are classified in »group L«. The selection criteria for the groups are listed in Table 1.

Prostate biopsy protocol

We perform US-guided PB by transrectal approach, routinely taking 6-8 tissue cores from <50 cm^3 of prostate glands, and 8-12 cores from >50 cm^3 of glands at the first-line PB. Six cores are taken from the very lateral parts of peripheral zone at the base, mid-gland and apex bilaterally, followed by additional cores from the posterolateral parts of peripheral zone, similarly to protocols used in the studies.[17,18] The number of cores intended to be taken in a particular patient is dependent exclusively upon the prostatic size, irrespective of the parameters of suspicion for PC. However, we occasionally reduce the number of cores *ad hoc* if bleeding from haemorrhoids occurs, or on the patient's demand due to pain. We usually obviate more medial cores, as also those less expected to be positive.[1,2] As a consequence of such approach, the material in the present study consists of 5-12 cores per biopsy session.

Equipment and technique

HP ImagePoint ultrasound system (Hewlett-Packard Company, Andover, MA, USA) with 5.0-7.5 MHz sector endorectal probe and plastic biopsy needle guide was used to assist PB, performed with spring-loaded Bard Magnum device (Bard Urological Division, Covington, GA, USA) coupled with 18-G-needles. A new needle was taken for every 3 - 4 tissue cores. Biopsy cores from different sites of the prostate were submitted for analysis in individually labelled separate containers,[19] and core sites were charted on a dedicated form. Pathologist (G.S.) who analysed the specimens was unaware of the aims of this study.

Methods

Pathological report for the entire set of PB samples (5-12 cores) was available for each patient. We verified each individual tissue core whether it was positive for PC, and whether high-grade prostatic intraepithelial neoplasia (HGPIN) was present. Gleason score (GS) was determined on the basis of the complete 5-12 PB set. With the evidence of pathohistology of the complete set of biopsies (5-12 cores) for each patient, we simulated the situation as if only 4 biopsy cores would have been taken (quadrant PB, QPB). In the hypothetical biopsy scheme the apical and medial cores were eliminated. For each patient, we retrospectively compared the pathological results of the actual complete 5-12 PB with the presumed results of QBP. The two compared sampling schemes are shown in Figure 1. The following relevant pathologic parameters were considered in comparison of the two PB schemes: presence of PC in the prostate, presence of HGPIN and percentage of positive cores. Additionally, for the purpose of the study only, the same pathologist (G.S.), unaware of previously reported GS,

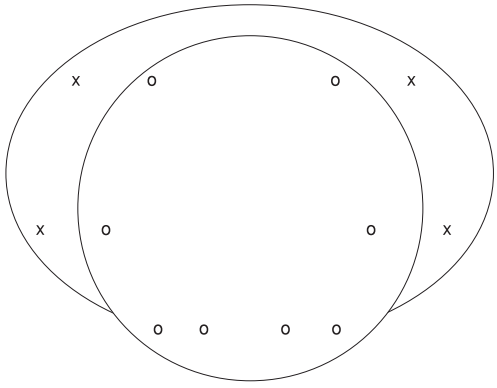

Figure 1. The distribution of biopsy sites in the two compared sampling schemes: o + x = 5-12 PB scheme, x = QPB scheme.

determined GS for each patient on the basis of the set of 4 cores, which matched the sites of QBP. GS was then compared with that determined from 5-12 PB. T-test was used in statistical analysis.

Oral and written *informed consent* was obtained from each patient before PB, and information on possible complications of systematic PB was given. Our study did not influence the patient management in any way, as QPB was only an imaginatively rather than really applied procedure. Local Medical Ethics Committee approved this investigation.

Results

The mean age of patients was 71.8 years (range, 50-89), and did not differ significantly between the groups H and L (71.2 vs. 72.9 years, p=0.86). The mean *PSA* for the whole series was 36.3 ng/mL (range, 0.03-346); significant difference (p=0.0002) was observed between group H (52.9 ng/mL, range 1-346) and group L (5.8 ng/mL, range 0.03-9). *Prostate volume* ranged 16-192 cm3, and did not differ significantly between the groups H and L (63.2 vs. 63.7 cm^3, p=0.19). *GS* determined from the 5-12 BP and QPB material are given in Table 2. Positive correlation between GS and PSA (c=0.39), and between GS and the percentage of positive cores (c=0.53) was shown in the 5-12 PB material. GS determined from the QPB material did not differ significantly from GS determined from the material of 5-12 PB, either for the whole series, or for each particular study groups H (p=0.13) and L (p=0.12), with a maximum individual difference of 2 points. In one L-patient, GS=4 was overgraded as GS=6 from the QPB material, while in one H-patient GS=8 was undergraded as GS=6 also from the QPB material. In 22/46 (47.8%) patients, GS defined by both PB sets was identical, while in 20/46 (43.5%), it was undergraded, and in 2/46 (4.4%) overgraded by 1 point by QPB. Overall results of 5-12 PB and QBP for groups H and L are shown in Tables 3 and 4. Total number of cores taken from 84 patients was 605. Median number of cores per PB was 8 (range 5-12). Of all cores, 54.5% were positive for PC: 69.3% in group H, and 14.1% in group L. The percentage of positive cores in the 5-12 PB and QPB material in both compared study groups are shown in Tables 5 and 6. In 19/84 (22.6%) patients, all cores in the 5-12 PB material were positive for malignancy (1 patient in group L, 18 patients in group H). The number of patients with PC detected in only one tissue core in both PB materials is shown in Tables 3 and 4. Pathological results allowing for the following parameters, presence of PC, presence of HGPIN, and percentage of positive cores for two different PB schemes are shown in Tables 5 and 6. The data, which

Table 2. Gleason scores determined from 5-12 PB and QPB material.

Gleason score	5-12 PB	QPB	Difference observed
Overall series	median 6	median 6	0
	mean 6.59	mean 6.32	p=0.13 (NS)
	range 3-9	range 3-9	
Group H	median 7	median 6	-1 point
	mean 6.79	mean 6.36	p=0.13 (NS)
	range 4-9	range 3-9	
Group L	median 4	median 5	+1 point
	mean 4.50	mean 5.50	p=0.12 (NS)
	range 3-5	range 4-6	

Abbreaviations: PB=prostate biopsy, QPB=quadrant prostate biopsy, NS=non-significant

would have been missed if only QPB were done, are given in the last column.

Discussion

The two fundamental shortages of systematic PB - its sampling error and invasiveness, lie in reciprocity: sampling extensiveness decreases sampling error at the cost of higher patient discomfort and postbiopsy morbidity. The recent tendency to increase the number of cores per one PB session is based on the evidence that an extensive sampling yields a higher PC detection rate and staging accuracy.[2-4,6-8,17,19,20] To balance the diagnostic yield and risk, the PB protocol needs to be individualized for each patient according to his PSA level, TRUS and DRE findings, prostate volume, age and life expectancy. In the present

Table 3. Overall results of 5-12 PB outcome: the number of patients in each study group with respect to the presence of PC and PIN

Patient group	5-12 PB positive for PC		5-12 PB negative for PC		Total
	>1 core positive	1 core positive	no PIN	HGPIN+LGPIN	
L	3	5	10	4+7	29
H	43	1	3	5+3	55
Total	46	6	13	9+10	84

Abbreviations: PB=prostate biopsy, PC=prostate cancer, LGPIN = low-grade prostatic intraepithelial neoplasia, HGPIN = high-grade prostatic intraepithelial neoplasia

Table 4. Overall results of QPB outcome: the number of patients in each study group with respect to the presence of PC and PIN

Patient group	QPB positive for PC		QPB negative for PC		Total
	>1 core positive	1 core positive	no PIN	HGPIN+LGPIN	
L	1	4	15	2+5	27
H	42	2	6	5+2	57
Total	43	6	21	7+7	84

Abbreviations: PB=prostate biopsy, PC=prostate cancer, LGPIN = low-grade prostatic intraepithelial neoplasia, HGPIN = high-grade prostatic intraepithelial neoplasia

Table 5. Comparative results of different PB schemes in group H

Parameter analysed	5-12 PB	QPB	Missed with QPB
Presence of PC	44	44	0
Presence of PIN	5 HGPIN	5 HGPIN	0
	3 LGPIN	2 LGPIN	1 LGPIN
Percentage of positive cores	69.3%	63.1%	6.2%, p=0.39 (NS)

Abbreviations: PB=prostate biopsy, QPB=quadrant prostate biopsy, HGPIN=high-grade prostatic intraepithelial neoplasia, LGPIN=low-grade prostatic intraepithelial neoplasia, NS=non-significant

Table 6. Comparative results of different PB schemes in group L

Parameter analysed	5-12 PB	QPB	Missed with QBP
presence of PC	8	5	3
presence of PIN	4 HGPIN	2 HGPIN	2 HGPIN
	7 LGPIN	5 LGPIN	2 LGPIN
percentage of positive cores	14.1%	9.8%	4.3%, p=0.04

Abbreviations: PB=prostate biopsy, QPB=quadrant prostate biopsy, HGPIN=high-grade prostatic intraepithelial neoplasia, LGPIN=low-grade prostatic intraepithelial neoplasia, NS=non-significant

study, we focused our attention to the patients with high laboratory and clinical suspicion of advanced PC. Despite the presumptive diagnosis of PC, most of these men have to undergo PB to obtain the tissue diagnosis before treatment with androgen ablation. A very accurate staging is mostly not critical for the therapy, which is rarely radical. Extensive sampling protocols do not seem to be reasonable in the first-line BP in such patients, because the confirmation of prostate malignancy and orientation on tumour biology could be reached even with few biopsy cores, and unnecessary discomfort, risks and costs may be avoided by such an approach.

Cancer detection rate (sensitivity) can decrease due to PB scheme reduction for two reasons: overall sampling density reduction and eliminating the gland areas, in which PC is frequently located, from sampling. The impact of sampling density on the sensitivity of PB is well known.[2-5,17,20] It is particularly expressed in the patients with negative DRE and TRUS, and PSA<10 ng/mL,[3,4] corresponding to patient population similar to our group L. Thus, the strategy of reducing PB protocol does not seem convenient *for* the *men with presumed low tumour burden* because only the extensive sampling provides a proper sensitivity for the early detection of a potentially curable malignancy.[4] This is concordant to our results: using QBP in group L, 3 of 8 PC would have remained undetected, which is a considerable drop of sensitivity. However, in the *men with presumed high tumour burden*, the risk that PC will remain undetected with limited number of cores is little because their tumour is probably not small, and cancer-free areas in prostate are less likely to exist. Moreover, as many PC are predominantly infiltrating rather than only expansive, even the finding of cancer-free cores does not warrant that this part of the prostate is not involved. Our results reassured these assumptions: QPB would detect malignancy in all 44 men with PC detected with 5-12 PB protocol in group H, with neither significant nor insignificant PC missed due to sampling scheme reduction. Other authors similarly showed that PC detection rate is less affected by the core number increase in the patients with PSA>10 ng/mL, while significantly improved in those with PSA<10 ng/mL.[1,3,20] Aus *et al.* showed that the reduction of sextant PB protocol to QPB resulted in the decrease of sensitivity for PC by only 4% in the patients with elevated PSA and positive DRE and/or TRUS.1 Damiano *et al* have recently demonstrated that the reduction of 14- to 8-cores regimen resulted in only 3.1% lower PC detection rate, and concluded that 8-cores PB may be appropriate as initial PB for general male population.[16]

A question arises whether, in the series larger than our, some H-patients positive for PC on 5-12 PB would have appeared negative on QPB. As a rule, any patient with *high suspicion of PC* and negative initial PB have to be rebiopsied, and rebiopsy need to be more extensive than the first-line PB.[2] In such a way, a part of false-negative H-patients on QPB will be correctly detected as positive. Thus, adhering to QPB as the first-line BP in H-patients, we spare discomfort and costs in at least 98% of positives on initial QBP, paying the price of rebiopsy in <2.2% (theoretically 1 of ≥45) false negatives on QPB. This »price« is considerably lower than unnecessary extensive sampling in every H-patient, which yields no clinically relevant information for these patients.

Excluding different prostate areas from sampling will yield in the same sensitivity decrease because the likelihood to be an origin of PC varies. We eliminated medial biopsies in our reduced PB because the medial cores are less frequently positive for PC than the lateral ones,[1,2,4,17] and the lateral parts of peripheral zone can be sampled by transrectal approach more efficiently than the medial parts. As the biopsy needle passes more orthogonally across the posteromedial periph-

eral zone and more longitudinally through the lateral parts of peripheral zone, the lateral tissue cores almost completely include peripheral zone, while the medial cores usually include also a considerable part of transitional zone. Finally, it is our impression that medial passes cause bleeding more frequently than lateral ones and that they are more painful. It seems harder to argument apical biopsies elimination from the first-line PB protocol. Quite a lot of PC are localized near the midline at the prostate apex,[2,17] which may remain undetected after the exclusion of apical biopsies from the first-line PB. Two apical biopsies added to 2 middle lobar lateral biopsies increase the sensitivity by 13%,[1] and most tumours missed on the initial BP were located just in apico-dorsal region.[2] Nevertheless, the apex-directed PB have superior sensitivity compared with the sextant PB in the patients with PSA<10 (comparable to our group L), but the sensitivity was lower than in the sextant PB in the patients with PSA>10 (comparable to our group H).[21] This may indicate that the sampling of the apex is unavoidable only for the detection of early stage PC, while less critical when an advanced PC is more probable. Therefore, when searching for PC in general population or population similar to our group L, it would not be advisable to obviate apical cores. In H-patients, however, even if originated in the apex, PC would probably have infiltrated into the majority of the gland, with positive basal and mid-gland cores, and would possibly be NOC. Obviating the apical cores in such patients would consequently not be critical for PC detection rate, as we have confirmed in our results.

»One-core« prostate tumours. In men with limited life expectancy, it is important to determine whether T1c PC is clinically significant and needs treatment at all. As tumour significance is related to its volume (>0.5 mL), hence to the number of cores that contain neoplastic tissue,[22] PC detected as only one positive core may be insignificant. A dilemma arises of how many biopsies should be performed to increase the overall PC detection rate without over-diagnosing clinically insignificant neoplasms,[5,22] and whether a less extensive sampling decreases that risk.

In our group L, 5 of 8 tumours were detected as »one-core tumours« on 5-12 PB. On QPB, 1 of 5 »one core CP« would have been missed. In low range PSA patients, many PCs are detected by chance, being not responsible for patient's clinical presentation, and missing such an insignificant PC is not detrimental, particularly if PC tumour is of low aggressiveness. However, in group L, 2 of 3 significant CP would have also been missed on QPB - a considerable drop of overall PC detection rate.

In group H, the number of »one-core PC« increased from 1 to 2. One PC with GS=8, which was detected in 2 adjacent cores on 5-12 PB, would have become »one-core PC« on QPB. This patient would have been managed similarly, irrespective of the number of positive cores, due to its high GS. Even if some insignificant PC would remain undetected on QPB in group H (if our series were larger), this would not be a serious shortcoming as such small PC is not likely to be responsible for clinical and laboratory presentation, which, indeed, prompted PB in group H. Such a small PC could be detected in many H-patients on an extensive rebiopsy, and its significance would be estimated from the complete set of cores.

Organ confinement of the tumour. The ability of pre-treatment variables to identify the patients with organ-confined PC (OCPC) is a challenging issue. The presence of extraprostatic extension (EPE) is a feature of T3-stage, unfavouring radical treatment. The tumour volume is an important independent predicting parameter of the margin status and disease progression after RP, and underestimation of tumour volume may result in overindication of RP. Number, percentage and bilaterality of positive cores in PB are valuable

predictors of tumour volume, EPE and prognosis.[5-8,19] Ipsilateral EPE is more likely, as the number of positive biopsies on that side increases, while the patients with >3 and bilaterally positive cores had greater likelihood of EPE.[8] It was demonstrated that such quantitative histology data are especially valuable in the *men with presumed low tumour burden* (similar to our group L), thus better predicting the final pathological stage.[19] Therefore, the information on the percentage of positive cores in PB must not be sacrificed in any reduced sampling scheme, particularly in group L in which RP is often considered as a treatment option.

In only one patient in group H, PC was detected with one instead of ≥2 positive cores, and in only one patient with 2 instead of 3 positive cores, as a consequence of scheme reduction to QPB. This does not preclude the use of QPB as the first-line PB scheme in H-patients.

Grossklaus et al. compared <6 vs. >6 cores PB and concluded that the reduction of core number could impair the PC detection rate, but not other information, particularly the percentage of positive cores and bilaterality of PC.[5] In our study, the percentage of positive cores decreased significantly (14.1% to 9.8%, p=0,04) in group L, but insignificantly in the whole series (54.5% to 45.1%, p=0.17), and in group H (69.3% to 63.1%, p=0.39), due to the limitation to QPB. Maximum individual differences in the percentage were 20% and 25% in two H-patients, respectively. Therefore, considering the parameter »percentage of positive cores«, the use of QPB as the first-line PB scheme is not appropriate in group L, while acceptable in group H. Although the conclusions by Grossklaus *et al*[5] and ours are similar for the overall series, the patient populations are not quite comparable as Grossklaus *et al* studied two different groups of men with different sampling schemes, while we compared two PB schemes on the same bioptic material.

The association of *high-grade prostatic intraepithelial neoplasia (HGPIN)* on PB specimen with concurrent invasive PC next to it or elsewhere in the gland is evident,[23] and a significant proportion of patients with HGPIN detected on initial PB will be found to have PC on repeat PB.[24,25] Thus, the identification of HGPIN on PB is an imperative as it may prompt further search for coexistent or subsequent invasive PC in the patient.[23] The number of cores with HGPIN was an independent predictor of the risk for PC.[25] It was shown that the extensive »five-region PB« detected significantly more HGPIN compared to the sextant BP.[24] Thus, the reduction of core number in PB can decrease the HGPIN detection sensitivity, which can in consequence decrease the CP detection rate. The detection of HGPIN on the first-line PB is an imperative, particularly in L-patients, in whom the finding of HGPIN may be decisive for rebiopsy; had this information been missed, a number of rebiopsies would not have been ordered and early PCs could have remained undetected. QPB would miss 2 HGPIN lesions in 21 PC negative L-patients (9.5%); thus, QPB is not appropriate as the first-line PB regimen in L-patients. On the contrary, none HGPIN was missed with QPB in group H. In larger H-population, some HGPIN theoretically could have been missed, but this lack would not have been critical, as every PC-negative H-patient has to be rebiopsied also for reasons other than HGPIN, mainly for persistent clinical and biochemical suspicion.

Proper estimation of *Gleason score (GS)* from PB specimens is essential in making treatment decision as high GS precludes radical treatment even when CP seems to be organ-confined.[26] GS determined from a PB specimen may be discordant to that determined from a surgical specimen.[27-30] GS assigned to PB material were identical to RP specimen in 51-67% of cases, greater in 4-15%, and lower in 22-54%. The magnitude of

discrepancy was directly related to the quantity of tissue in PB specimen, being greater among specimens with GS<7 than among those with higher GS.[27,28] GS defined by 18-cores BP speciment exactly matched that of surgical specimen in 37-57% of cases,[27,29] being within the interval of +1 point in 93% of cases.[29] Undergrading is particularly precarious as it may lead the clinician to underestimate falsely the true biological potential of PC and to proceed to RP in the patient with great likelihood to have NOC PC; of most concern are the patients with GS>6 detected as GS<6 on QPB. As predisposing factors for errors in histological grading by needle PB were limited core length and *limited number of biopsy cores*.[30] PB is to be repeated when low-grade PC was initially diagnosed on only limited quantities of neoplastic tissue to reduce the risk of underestimation the GS. In our study, GS of group H was not significantly influenced by the core number limitation to 4, but the accuracy was decreased in group L (more low grade PC-higher grading error according to).[28] In group H, in which less patients may be <T2 (RP candidates), GS inaccuracy is not critical. In our series, undergrading was ranging predominantly from GS=7 to GS=6 (10 patients in group H), and less often from 8 to 7. As these scores are classified as »high-risk«, their influence on the treatment choice is similar. When QPB indicated low GS in an L-patient, more extensive repeat PB should be done. If GS were higher on a more extensive PB material, this finding may influence the management decision.

Multiple-core PB is an *invasive and uncomfortable procedure*. Minor complications were reported in up to 78% patients.[9,10] Although the rate of macrohaematuria, pyrexia, and need for hospitalisation after 10-core PB did not excess significantly in comparison to these rate after sextant-PB,[11] the rate of haematospermia and rectal bleeding was higher after extensive sampling.[11] PB is associated with certain pain and discomfort, which is present in up to a half of patients.[9,10] We were often faced with the dilemma whether the risk of complications, and increasing anxiety and pain experienced by patients can be justified by real diagnostic needs, and whether an extensive PB must be routinely and non-selectively applied to all patients suspicious of PC. We think that, in some patients, we do not need to take all 12 or more cores in one PB session, if it does not significantly improve the quality of their preoperative diagnostic work-up.

In our experience, some patients do have low pain tolerance. In that case, we interrupted the procedure or, in some instances, reduce the number of samples on the patient's demand. The reduction of extensive PB protocols may be favourable also in elderly patients on chronic anticoagulation therapy and those with severe comorbidities. Moreover, some authors think that PB is completely unnecessary in the patients in whom PSA>50 ng/mL indicates PC with a positive prediction value of 98.5%.[12] Another advantages of reduced PB are higher safety for performance on an out-patient basis, less patients' anxiety for future PB, lower time consumption and workload to pathologists, lower costs (one needle per patient), and lower risk of seeding tumour cells.

Our study may have limitations. Although PSA level and DRE finding may, to some extent, indicate statistical risk of PC in a defined population,2-14 our study groups H and L were defined arbitrarily, with the aim of sorting out patients with significantly different likelihood to have PC. We can estimate that the likelihood of L- and H-patients to have PC is <30% and >60%, respectively.[13] These rates are, however, only for orientation, as our classification does not match strictly the criteria.[13,14] Thus, H- vs. L- classification is a provisional tool for rapid estimation of the likelihood for the presence of PC and tumour burden, but not an attempt to

stage the tumour or give a prognosis. It is aimed only to serve for identifying the patients who might benefit from PB reduction.

We conclude that in the patients with high likelihood to have NOC PC, the reduction of the number of cores does not impair the overall sensitivity, and minimally changes the staging accuracy. In the patients likely to have an early PC, the reduction of the number of cores significantly impairs the overall sensitivity. QPB can be an appropriate first-line sampling scheme in H-patients, as the information lost due to the core number reduction is mainly not critical for the patient management; a more extensive PB is necessary for other patients, for proper sensitivity and staging accuracy.

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