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Paired analysis of blood plasma and urine reveals complementary information in prostate cancer

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Recently, liquid biopsy using blood, plasma, urine, saliva, and various other bodily fluids has shown utility to detect, diagnose, and monitor many types of cancers. So far, blood has been studied most, but recently cfDNA in urine has been extensively investigated. In particular, in urological cancers, ucfDNA might improve the sensitivity of liquid biopsy by proximal sampling, i.e., analysis of biofluids collected proximal to the tumor site. While evidence suggests that ctDNA in urine can be informative in renal and bladder cancer, less is known about ucfDNA in prostate cancer patients. Here, we aimed to determine the presence, levels, and potential clinical applications of ctDNA in plasma and urine of metastasized prostate cancer patients. To this end, we analyzed matching urine and plasma samples from 82 metastatic prostate cancer patients using a shallow whole genome sequencing approach. The tumor fraction and somatic copy number alterations (SCNA) were assessed using the ichorCNA algorithm. Our data shows that even though the tumor fractions do not significantly differ in plasma and urine, there is a great variability at patient level. SCNAs were detected with a high concordance in plasma and urine in 12% of patients, while in 26% and 17% of patients SCNAs were detected in plasma or urine only, respectively. In addition, in a subset of patients (n=26) longitudinal sampling was performed for monitoring purposes. ctDNA detection was slightly more likely in samples who coincided with clinical progression. Our data indicate that the presence of tumor-derived DNA in urine provides complementary information about the tumor that the sole analysis of plasma may miss. Since urine represents a desirable proposition given the quantities that can be collected at great ease, ucfDNA holds promise in the clinical management of prostate cancer.