

Opinion Manuscript

## Why Should we Start Biomarker Study in Urine?

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### Why should we start biomarker study in urine?

Firstly, urine has more changes.

It is cruel that winner takes all. It happens in lots of games. It may happen in biomarker field too. It may not happen yet, because it has been hard to find any significant changes in blood, which can be used as candidate biomarkers. In urine it is not difficult to find changes, even though not all the changes are associated with the targeted pathophysiological condition. If we introduce a change into the blood, the homeostatic mechanisms will try hard to remove it from the blood. The change can then go to urine, breath, sweat and bile. Those are all greater places to find biomarker than blood. Urine is free from contamination, it is the ideal place to find biomarkers [1,2].

Secondly, urine is easier and cheaper to acquire than blood especially in large quantity from lots of patients.

Of course, potential biomarkers need to be validated in clinical samples. Biomarker study is not cheap, especially if the study starts with clinical samples which cannot be obtained completely harmless to the patients such as blood. It is much easier to receive permission to take urine samples than blood samples from patients. It is hard to take a lot of blood from a patient. But the quantity of urine you can take is almost unlimited with no harm as long as you can wait.

Thirdly, urine is easier to store than blood.

Urine is easier to be stored now. It used to be hard to store before it takes much bigger space in the freezer. And proteins and nucleic acids in urine are not completely stable in aqueous solution no matter how cold you freeze it. But when the urinary proteins [3] and microRNA [4] can be adsorbed onto membranes and dried and kept dried in a vacuum bag, they are very stable even at room temperature.

Fourthly, there is still risk that biomarker in blood can be overtaken by ones in urine.

There are simply too many changes in urine as candidates for biomarkers. Even if you can find a potential biomarker in blood, there is still risk that a urine biomarker being discovered to overtake [5]. Once there are lots of changes, or say potential biomarkers for the same condition, especially if there is one good biomarker in terms of specificity, sensitivity, non-

invasiveness and cost, the second best may not be able to take even 10% of the market share.

Overall, we should start the biomarker study in an ideal place with less risk to be overtaken, better potential usability, and in a cheaper and more ethical way. But for the last decades, most of the money and effort were used in blood. It has been proved that blood is not as fruitful as we thought. It is time to shift to a new promising field.

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