To Pee, or Not to Pee, for Stem Cell Researchers, That is Not a Question
By Sylvain Barthe

Dr. Yuanyuan Zhang's research team from the Wake Forest Baptist Medical Center's Institute of Regenerative Medicine discovered a new subpopulation of stem cells in urine. They used those urine stem cells (USCs) to produce cell populations capable of generating bladder tissues [1].

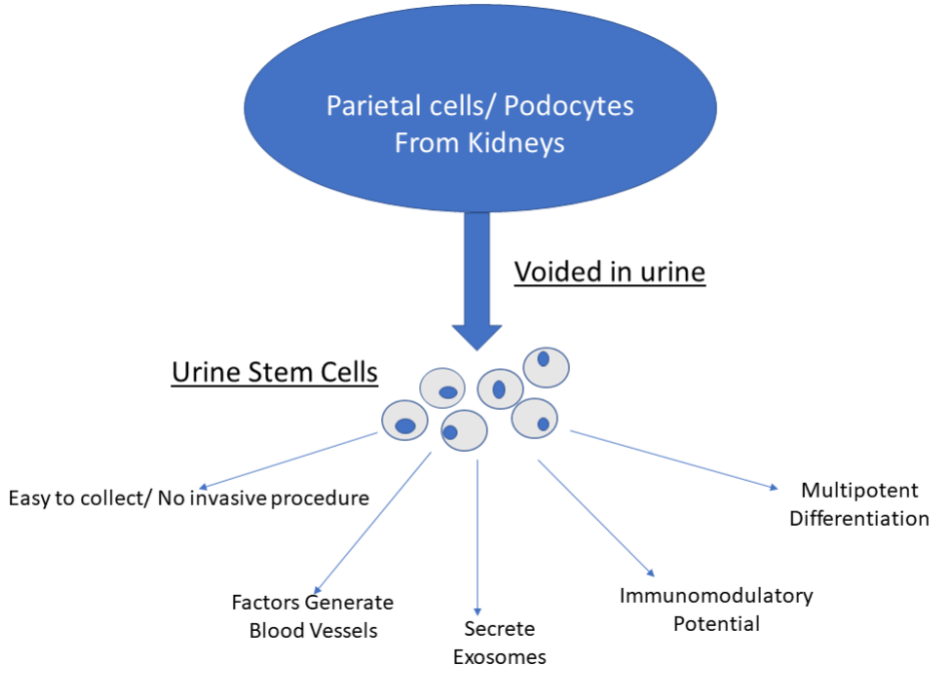
USCs have numerous advantages. First, they can be easily harvested from tissues without performing complicated and invasive techniques [1]. This new population represents an abundant reservoir of cells that can easily be collected from human waste. They can be isolated using simple methods that do not require enzymatic activities to extract the cells from a specific tissue. The second major advantage is that they represent a good alternative for countless autologous therapies [1]. USCs can be isolated from patients' urine, and then be used to create a number of different cell types that could be transplanted back into the same patient without triggering immune response or rejection (which often occurs if non-genetically matched tissue is transplanted into an individual). In an interview given to ScienceDaily, Dr. Zhang explained that USCs have the potential to treat urology-related conditions, as well as a number of other dysfunctions without the implementation of complicated and lengthy procedures [1].

USCs have intrigued the research community. Indeed, the human organism does not usually get rid of essential elements, such as functioning stem cells. So, how and why do they end up in waste? Where do they come from? What is their potency?

People tend to view human waste as useless and believe that urine only carries components unwanted by the organism. However, it is quite common for kidney cells to eventually slough off and be carried away in urine. The latest studies on the origin of USCs have provided solid pieces of evidence suggesting that this stem cell population comes from the upper urinary tract [2]. The answer about the origin of USCs was confirmed in an astonishing and unusual study performed on women who received their transplanted kidneys from male donors. Not only did the urinary cells collected from those female individuals contain a Y chromosome, they also expressed marker proteins that are only found in kidney cells [2]. Studies of the morphological features as well as the growth pattern of those cells allowed scientists to shed light on the origin of this unconventional stem cell population.

Most importantly, USCs have characteristics and potentials that rival other stem cell populations. For instance, they have external attributes and functions similar to the stem cells found in adult tissues. They have the potential to differentiate into different cell types, regulate the immune system and secrete factors capable of generating blood vessels [3]. All these advantages make USCs an incredible source for developing efficient stem cell-based therapies as well as to contribute to the field of regenerative medicine.

USCs fit well to the way stem cell research is performed today. Like most cells, they naturally produce vesicles that allow them to exchange packaged molecules and communicate with neighboring cells. Those



secreted vesicles are called "exosomes." USC exosomes can be used for the development of long-term therapies. For instance, in 2018, a study reported that USC exosomes carry powerful factors capable to speed up wound healing and boost the formation of blood vessel in diabetic mice [4]. Therefore, USCs' exosomes can become a good alternative to develop lasting therapies and contribute to the rise of new efficient regenerative cures.

In sum, USCs bring an additional population of cells that can easily be collected and used to advance stem cell research. They may not come from the most glamorous source, but they have the potential to bring more opportunities to develop suitable cures for many diseases.

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