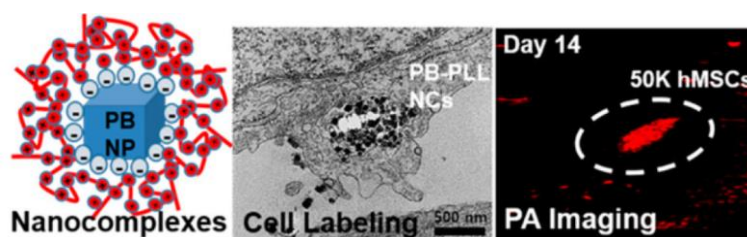


Photoacoustic Imaging of Human Mesenchymal Stem Cells Labeled with Prussian Blue–Poly(L-lysine) Nanocomplexes

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Abstract

Stem cells are being researched broadly in biomedical treatment. However, stem cells can not be traced *in vivo* without any instrument. This may cause the problem of proving the feasibility of cell therapy. Through photoacoustic imaging, scientists can monitor stem cells and also implant cells to the accurate position. Prussian blue nanoparticles (PBNPs) are a favorable photoacoustic contrast agent due to strong optical absorption in near-infrared area (NIR). Furthermore, near-infrared laser has a deeper depth of penetration in human tissue. This can support the probability of photoacoustic imaging with PBNPs in human mesenchymal stem cells (hMSCs). In the study, researchers utilized serial approaches to label PBNPs with poly-L-lysine (PB-PLL nanocomplexes) in stem cells and imaged them with photoacoustic imaging. First, they synthesized PBNPs by the reaction of FeCl_3 and $\text{K}_4[\text{Fe}(\text{CN})_6]$, and then complexed it with PLL. This step made nanocomplexes label in hMSCs successfully. Second, they analyzed cell viability and differentiations of labeled hMSCs. They found no difference between unlabeled and labeled hMSCs. Finally, they imaged labeled hMSCs *in vitro/ in vivo*, and demonstrated quantitative of cell labeling and the long-term of visualization for 14 days.



References

1. Gu, E.; Chen, W. Y.; Gu, J.; Burridge, P.; Wu, J. C. Molecular Imaging of Stem Cells: Tracking Survival, Biodistribution, Tumorigenicity, and Immunogenicity. *Theranostics* **2012**, *2*, 335–345.
2. Liang, X. L.; Deng, Z. J.; Jing, L. J.; Li, X. D.; Dai, Z. F.; Li, C. H.; Huang, M. M. Prussian Blue Nanoparticles Operate as a Contrast Agent for Enhanced Photoacoustic Imaging. *Chem. Commun.* **2013**, *49*, 11029–11031.
3. Jokerst, J. V.; Thangaraj, M.; Kempen, P. J.; Sinclair, R.; Gambhir, S. S. Photoacoustic Imaging of Mesenchymal Stem Cells in Living Mice via Silica-Coated Gold Nanorods. *ACS Nano* **2012**, *6*, 5920–5930.