

## I Meet the Marker - OCT 3/4

## Meet the Marker - OCT 3/4

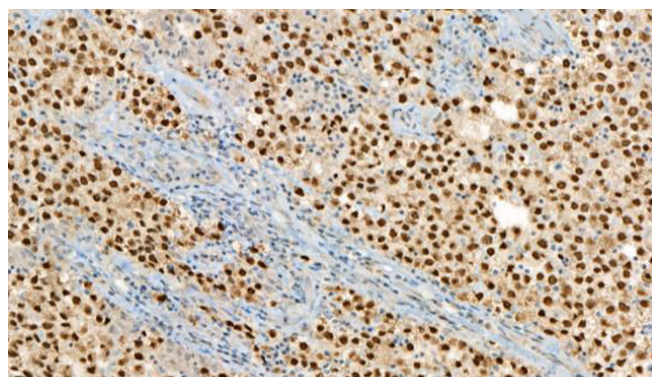
OCT 3/4 (Octamer-binding transcription factor 3/4, also known as OCT3, OCT4, or POU5F1) is a unique transcription factor that is critical for pluripotency in embryonic stem cells and germ cells.<sup>3</sup> Researchers believe that OCT 3/4 may also play a role in cellular proliferation and differentiation in somatic cells.<sup>1</sup> These functions have implicated OCT 3/4 in the tumorigenesis of a range of cancers, which has made it a marker of interest in both cancer diagnostics, as well as a target of interest in cancer therapy research.<sup>1</sup>

Expression of OCT 3/4 is one of the controllers in the development of mammalian embryos, maintaining pluripotentiality and regulating the differentiation of the embryo into other germ layers.<sup>1</sup> Since OCT 3/4 is key to maintaining pluripotency, this makes it a useful marker for germ cell tumors that can exhibit pluripotentiality, including seminoma, dysgerminoma, germinoma, and embryonal carcinoma.<sup>2</sup> Similar to OCT 3/4, other stem cell-associated transcription factors have also been implicated in tumorigenesis, including SOX2, NANOG, and KLF4.<sup>1</sup>

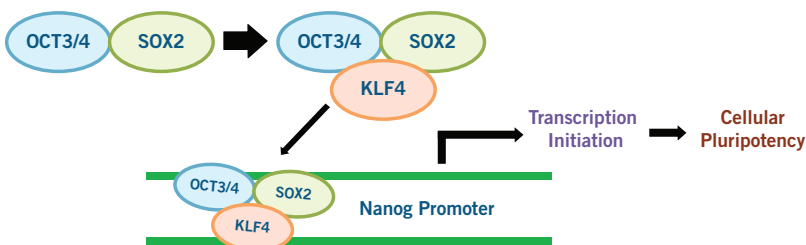
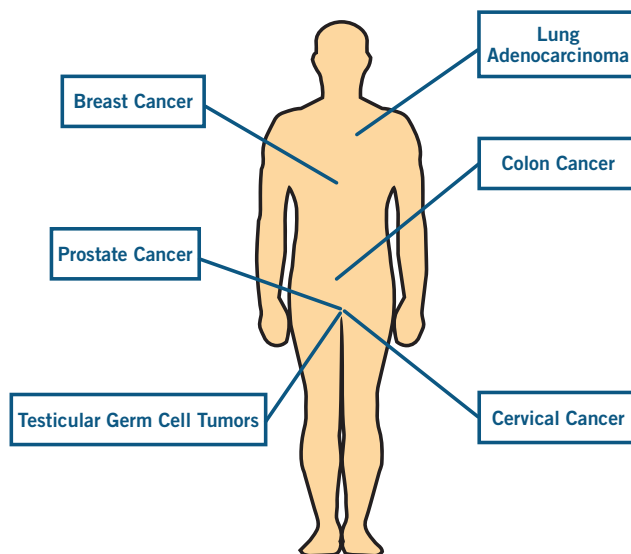
Overexpression of OCT 3/4 has been detected in several cancers. This abnormally elevated expression has been observed in cervical cancer cells, colon cancer, and lung adenocarcinoma.<sup>1</sup> For reasons that are still being studied, overexpression of OCT 3/4 in breast cancer has been correlated with an increased survival rate.<sup>1</sup>

Testicular germ cell tumors have been found to exhibit stem cell characteristics and show OCT 3/4 expression, and OCT 3/4 upregulation has been seen in prostate cancer cell lines.<sup>1</sup> In prostate cancer, this upregulation also seems to be associated with drug resistance.<sup>1</sup> This has made OCT 3/4 a subject of interest in research into cancer gene therapy treatments, and in recent years, studies into this potential application have been conducted using mouse models. In research studies involving mice, knocking out the OCT 3/4 gene inhibited tumorigenesis and metastasis as well as improved survival in tumor cell-transplanted mice.<sup>1</sup> These results have generated interest in OCT 3/4 as a future therapeutic target in clinical applications as well.

### OCT 3/4 Stains and Illustrations



Seminoma stained with OCT 3/4 [N1NK] antibody.



To learn more about Biocare Medical's product offerings for OCT 3/4, please visit our website at [www.biocare.net](http://www.biocare.net) or call our Technical Support line for more information at 1-800-799-9499, Option 3.

1. Baek, K. H., Choi, J., & Pei, C. Z. (2020). Cellular Functions of OCT-3/4 Regulated by Ubiquitination in Proliferating Cells. *Cancers*, 12(3), 663. <https://doi.org/10.3390/cancers12030663>

2. Cheng, L., Sung, M. T., Cossu-Rocca, P., Jones, T. D., MacLennan, G. T., De Jong, J., Lopez-Beltran, A., Montironi, R., & Looijenga, L. H. (2007). OCT4: biological functions and clinical applications as a marker of germ cell neoplasia. *The Journal of pathology*, 211(1), 1–9. <https://doi.org/10.1002/path.2105>

3. Zangrossi, S., Marabese, M., Broggin, M., Giordano, R., D'Erasmio, M., Montelatici, E., Intini, D., Neri, A., Pesce, M., Rebulla, P., & Lazzari, L. (2007). Oct-4 expression in adult human differentiated cells challenges its role as a pure stem cell marker. *Stem cells* (Dayton, Ohio), 25(7), 1675–1680. <https://doi.org/10.1634/stemcells.2006-0611>