

**Home****Editorial Board****Publication Ethics and  
Publication Malpractice  
Statements****For Authors****Submission****Advance Online  
Publications****Current Issue****Archive****Contact Information****Search****Sections beyond Oncology****Gerotarget/Aging****Pathology beyond  
oncology****Immunology and  
Microbiology****Autophagy and Cell  
Death****Chromosome****Employment opportunities****Senior Editor Position**

Oncotarget is looking for a Senior Editor Position to run daily editorial activities at Oncotarget.

**Read more and apply  
now**


**Subscribe to TOC Alerts**


Email Address

Subscribe

**Article Tools**

 [Download Citation](#)

 [Email this article](#) (Login required)

 [Email the author](#) (Login required)

**Research Papers:*****Beta protein 1* homeoprotein induces cell growth and estrogen-independent tumorigenesis by binding to the estrogen receptor in breast cancer**

[PDF](#) | [HTML](#)

DOI: 10.18632/oncotarget.10633

Metrics: [HTML 2 views](#) ?

Sidney W. Fu<sup>1,\*</sup>, Saurabh P. Kirolikar<sup>2,\*</sup>, Erika Ginsburg<sup>3</sup>, Xiaohui Tan<sup>1</sup>, Arnold Schwartz<sup>4</sup>, Samuel J. Simmens<sup>5</sup>, Yan-gao Man<sup>6</sup>, Joseph J. Pinzone<sup>7</sup>, Christine Teal<sup>8</sup>, Sanket Awate<sup>2</sup>, Barbara K. Vonderhaar<sup>3</sup>, Patricia E. Berg<sup>2</sup>

<sup>1</sup>Department of Medicine (Division of Genomic Medicine), George Washington University, Washington, DC 20037, USA

<sup>2</sup>Department of Biochemistry and Molecular Medicine, George Washington University, Washington, DC 20037, USA

<sup>3</sup>Mammary Biology and Tumorigenesis Laboratory, National Cancer Institute, National Institutes of Health, Bethesda, MD 20892, USA

<sup>4</sup>Department of Pathology, George Washington University Medical Center, Washington, DC 20037, USA

<sup>5</sup>Department of Epidemiology and Biostatistics, School of Public Health and Health Services, George Washington University, Washington, DC 20037, USA

<sup>6</sup>Department of Gynecologic and Breast Pathology, Armed Forces Institute of Pathology, Washington, DC 20306, USA

<sup>7</sup>David Geffen School of Medicine, UCLA, Los Angeles, CA 90095, USA

<sup>8</sup>Department of Surgery, George Washington University, Washington, DC 20037, USA

\*These authors contributed equally to this work

**Correspondence to:**


Patricia E. Berg, email: [peb@gwu.edu](mailto:peb@gwu.edu)

**Keywords:** *homeobox gene, BP1, estrogen receptor, tamoxifen resistance, tumorigenesis*

**Received:** January 18, 2016 **Accepted:** July 06, 2016 **Published:** July 16, 2016

**ABSTRACT**

Expression of *Beta Protein 1 (BP1)*, a homeotic transcription factor, increases during breast cancer progression and may be associated with tumor aggressiveness. In our present work, we investigate the influence of *BP1* on breast tumor formation and size *in vitro* and *in vivo*. Cells overexpressing *BP1* showed higher viability when grown in the absence of serum ( $p < 0.05$ ), greater invasive potential ( $p < 0.05$ ) and formed larger colonies ( $p < 0.004$ ) compared with the controls. To determine the influence of *BP1* overexpression on tumor characteristics, MCF-7 cells transfected with either empty vector (V1) or overexpressor plasmids (O2 and O4) were injected into the fat pads of athymic nude mice. Tumors grew larger in mice receiving O2 or O4 cells than in mice receiving V1 cells. Moreover, *BP1* mRNA expression levels were positively correlated with tumor size in patients ( $p = 0.01$ ). Interestingly, 20% of mice injected with O2 or O4 cells developed tumors in the absence of estrogen, while no mice receiving V1 cells developed tumors. Several mechanisms of estrogen independent tumor formation related to *BP1* were established. These data are consistent with the fact that expression of breast cancer anti-estrogen resistance 1 (*BCAR1*) was increased in O2 compared to V1 cells ( $p < 0.01$ ). Importantly, O2 cells exhibited increased proliferation when treated with tamoxifen, while V1 cells showed growth inhibition. Overall, *BP1* overexpression in MCF-7 breast cancer cells leads to increased cell growth, estrogen-independent tumor formation, and increased proliferation. These findings suggest that *BP1* may be an important biomarker and therapeutic target in *ER* positive breast cancer.

 All site content, except where otherwise noted, is licensed under a [Creative Commons Attribution 3.0 License](#).  
 PII: 10633

Copyright © 2016 Impact Journals, LLC

Impact Journals is a registered trademark of Impact Journals, LLC