

The Quantitation of Thioredoxin 1 from Serum Is a Novel Means to Detect Breast Cancer

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Background

- Enormous effort has been conducted without success to develop a means to detect breast cancer (BC) using the blood.
- We have reported that the level of thioredoxin 1 (Trx1) in serum could be a novel standard to evaluate the risk of BC.
- Therefore, we have investigated the clinical utility of Trx1 as a biomarker to detect BC by testing sera from normal women, women with BC, and women with five other types of cancer.
- A study comparing the results of Trx1 testing with those of mammography also has been done.

Methods

- We have developed an ELISA kit that uses specific antibodies to quantitate Trx1 in sera.
- The level of Trx1 was determined in sera from normal healthy Korean women (n=114), as well as patients with BC (n=106), cervical cancer (n=17), lung cancer (n=14), colorectal cancer (n=14), stomach cancer (n=9), and thyroid cancer (n=4).
- The effect of various conditions of breast cancer on Trx1 level was examined.
- The Trx1 level of each patients' serum was compared to the results of that patients mammography.

Results

Table 1. Clinical Information of BC Patients

	Number	%		Number	%		Number	%
Total No.	106		Mean Age	49.97		Ki67		
Stage			Histological Grade			<25%	60	56.60
0	2	1.89	1	24	22.64	≥25%	46	43.40
1	37	34.91	2	51	48.11	Type		
2	50	47.17	3	31	29.25	DCIS	2	1.89
3	15	14.15	ER			IDC	92	86.79
4	2	1.89	-	23	21.70	ILC	5	4.72
T Stage			+	83	78.30	Mucinous carcinoma	5	4.72
≤1	45	42.45	PR			Invasive micropapillary carcinoma	1	0.94
≥2	61	57.55	-	32	30.19	Invasive tubular carcinoma	1	0.94
N Stage			+	74	69.81			
0	66	62.26	HER2					
1	26	24.53	0	24	22.64			
≥2	14	13.21	1	54	50.94			
M Stage			2	4	3.77			
0	104	98.11	3	24	22.64			
1	2	1.89						



The blood level of Trx1 was an effective and accurate novel means to detect breast cancer.

The blood level of Trx1 could mitigate the current limitations of mammography.



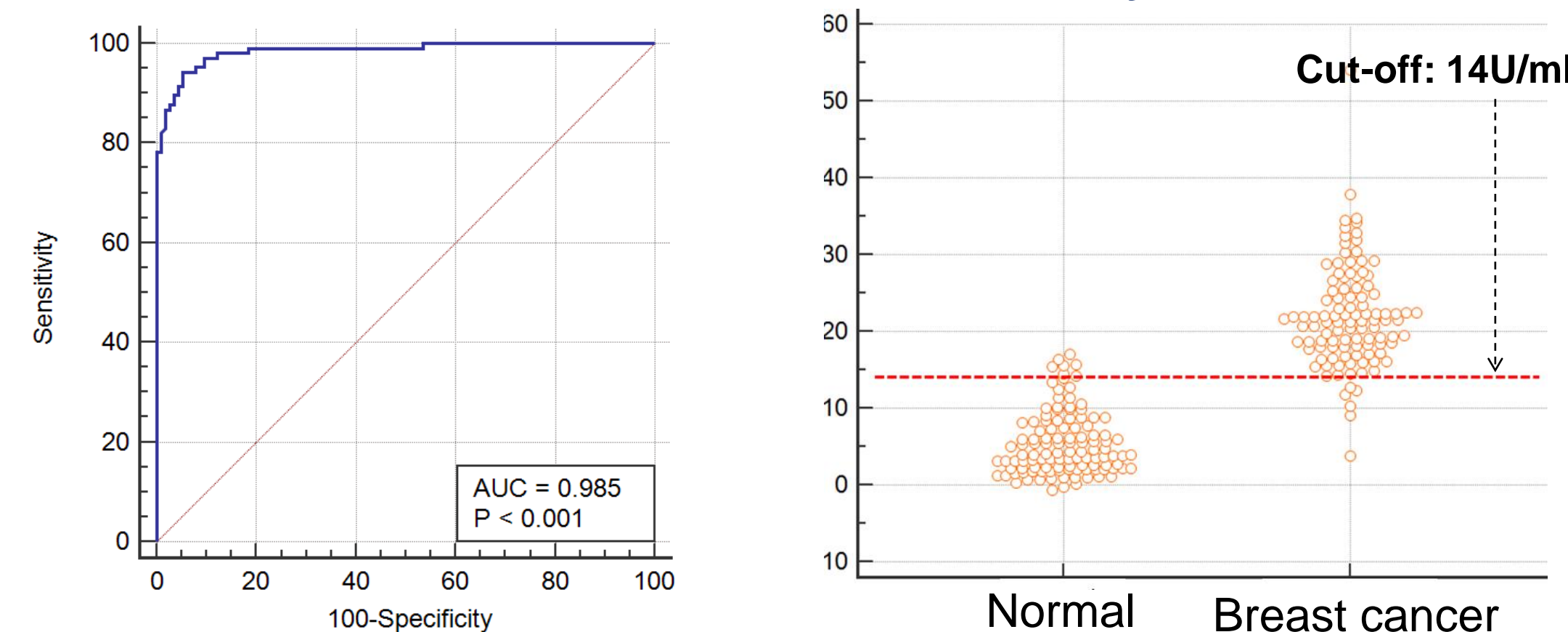
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Fig. 1. Trx1 Level of Serum Could Be a Criterion to Differentiate BC Patients from Normal Healthy Women



• The Trx1 level was effective to distinguish BC sera from healthy sera with a sensitivity of 94.3% and specificity of 93.9% (AUC 0.985, $p < 0.001$).

Fig. 2. Trx1 Level Could Help Detect BC Regardless of Its Type, Age, TNM Stage, Hormone Receptor Profile and Proliferation Activity

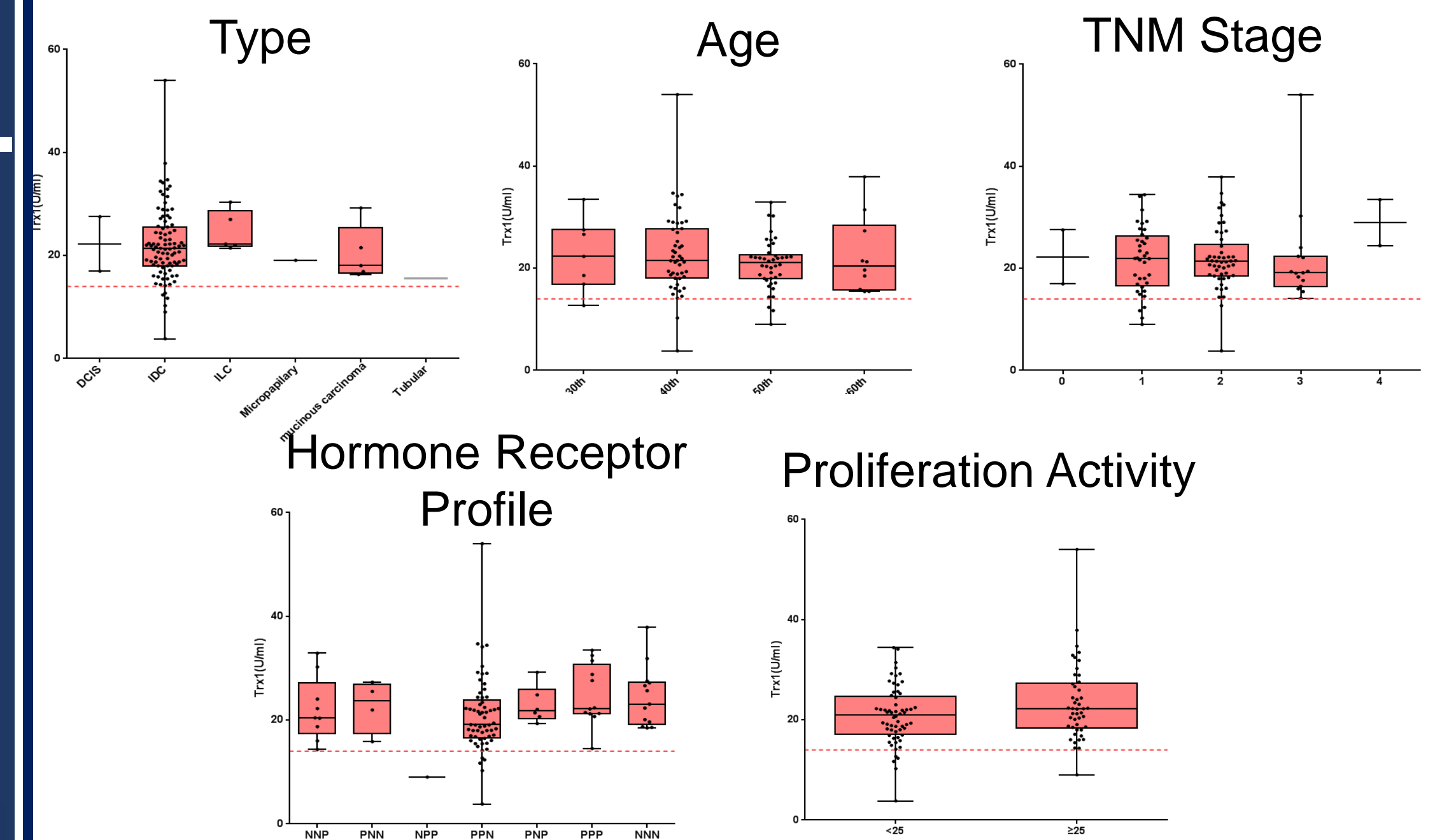


Fig. 3. Trx1 Level Could Be a Criterion to Differentiate BC from Other Cancers

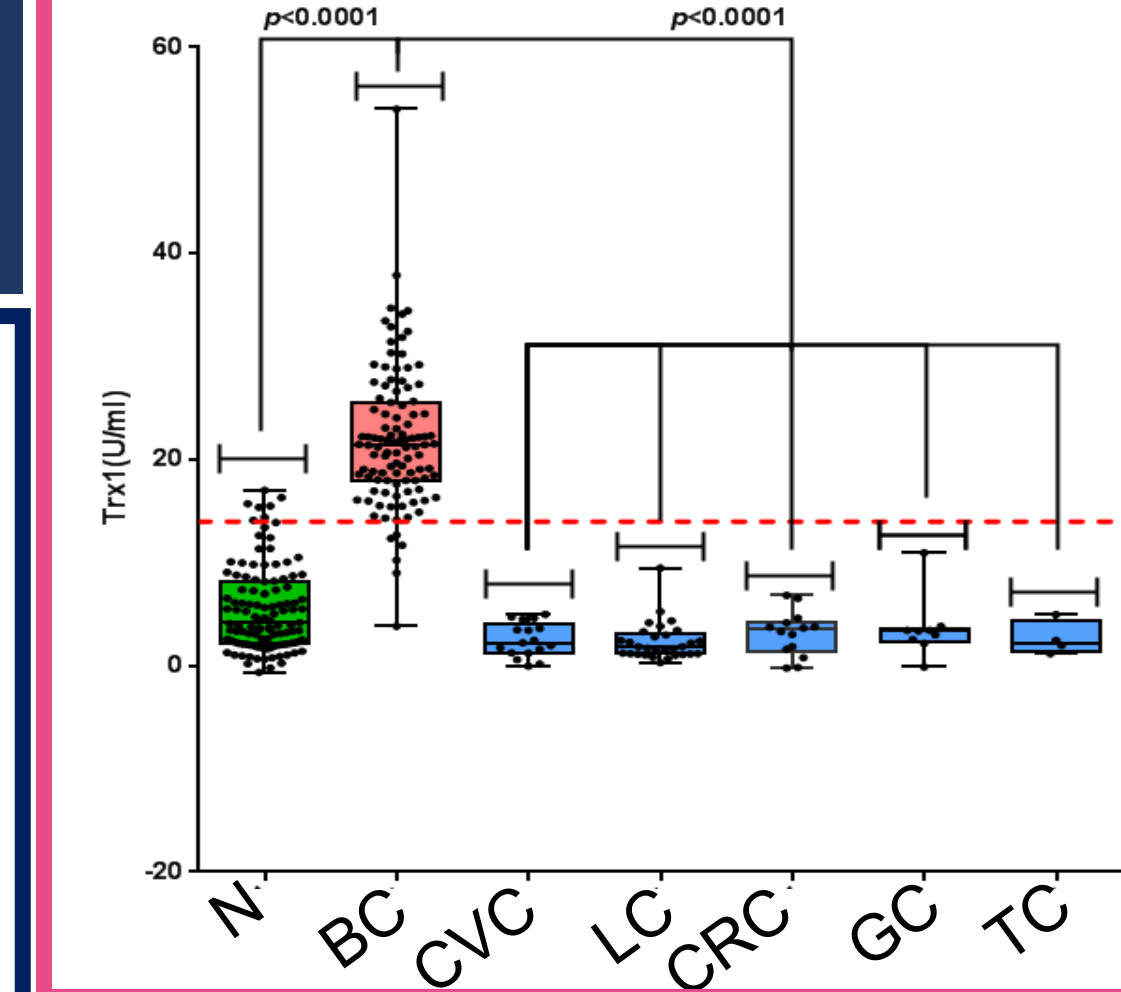
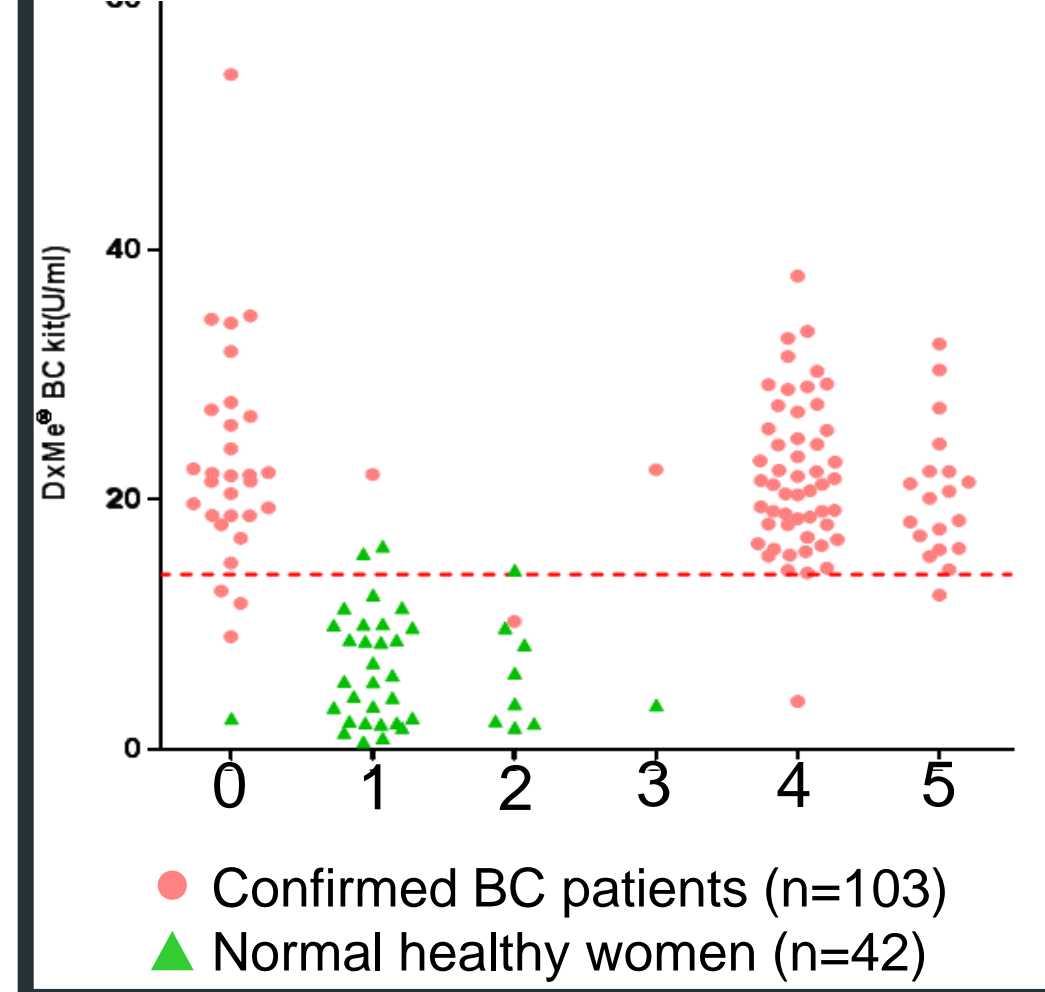


Fig. 4. Trx1 Level Could Correct the Limitation of Mammography



Future Directions for Research

- Further verification of Trx1 by large size of clinical trial
- A study of correlation between Trx1 level and mammography of dense and/or calcification breasts
- Possible caring tool for women bearing BRCA mutations