CA-62: A Novel Screening Biomarker for Early Cancer Detection

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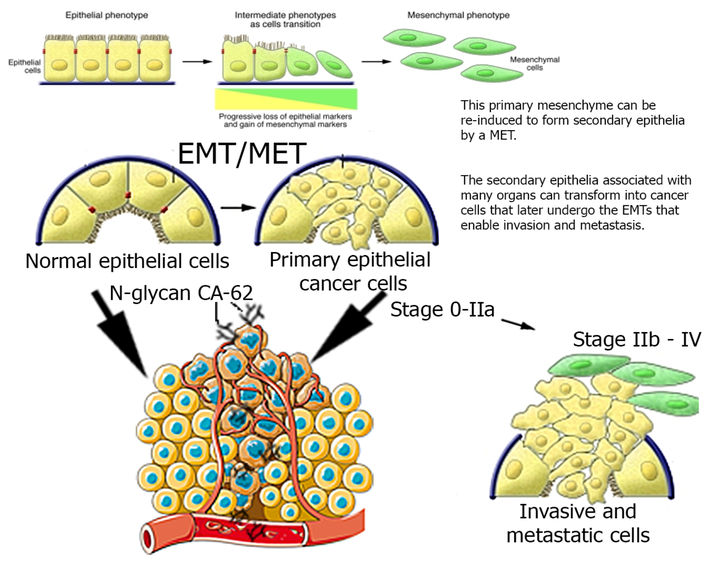
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Background: It is generally accepted that early detection of cancer plays a crucial role in improving patient outcomes and survival rates. Cancer antigen 62 (CA-62) is a promising N-glycoprotein biomarker that can be detected in the serum of patients with epithelial cell cancers as early as stage I. CA-62 can be quantitated using a specific monoclonal antibody directed against the N-glycan part of the molecule, using a competitive chemiluminescent immunoassay. CA-62 biomarker is N-glycoprotein that exhibits an elevated expression pattern in various types of epithelial carcinomas. Our own research has shown that the elevated serum levels of CA-62 in patients with cancer are related to the epithelial–mesenchymal transition of undifferentiated cells, an important factor in tumor progression. [1]

Method: CA-62 results were obtained from a double-blind study with 600 clinically verified serum samples from patients with histologically confirmed breast cancer, non-small cell lung cancer (NSCLC), colorectal cancer (CRC), prostate cancer, or kidney cancer, and 200 control serum samples from healthy volunteers or patients with clinically verified benign neoplasia. These studies have consistently shown dramatic results, with CA-62 exhibiting high sensitivity and specificity for distinguishing cancer patients from healthy individuals.

Results: Unlike other tumor markers, which increase proportionally with the tumor burden, CA-62 demonstrated its greatest sensitivity in detection of early stage (I-II) breast cancer (92%), prostate cancer (94%), NSCLC (90%), kidney cancer (94%) and CRC (86%), all at 97% specificity. Other tumor markers such as CA 15-3, CEA, CA-125, PSA, CA 19-9, CYFRA 21-1 and squamous cell cancer antigen (SCC) do not show sufficient sensitivity and specificity to be useful in screening for cancer in its asymptomatic and early-stages.

Figure 1. EMT and CA-62



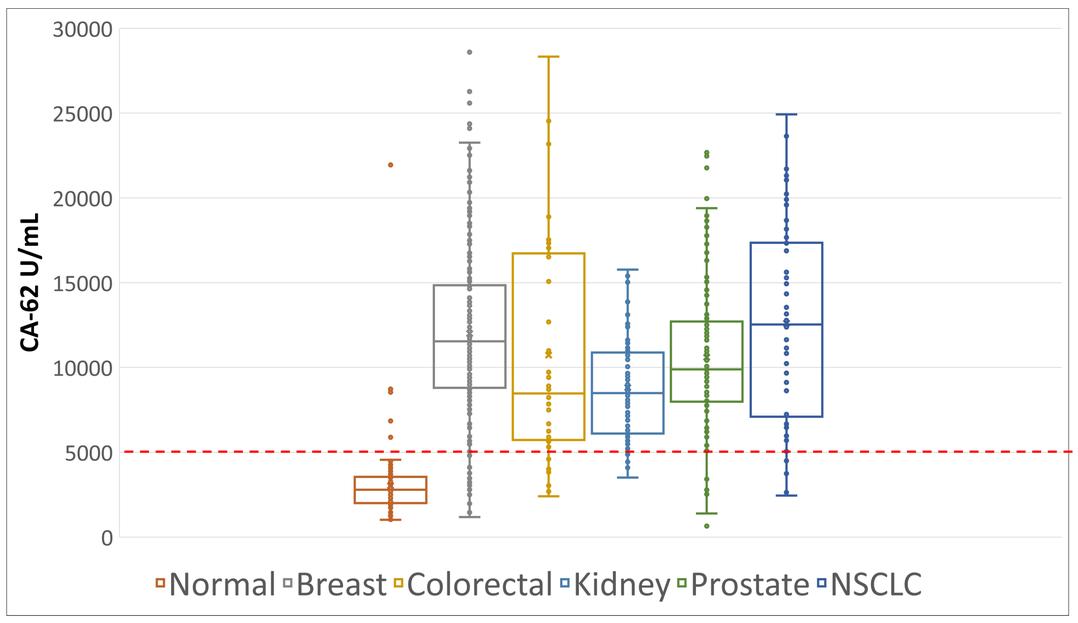


Figure 2. Summary of clinical samples distribution by cancer type. The highlighted boxes represent the medians, the lower and upper quarters, and the confidence interval around the median value.

Table 1. CA-62 Sensitivity vs. other Common Biomarkers for Stages I & II of Various Cancer Types.

Cancer type	Biomarker	Sensitivity (95% Specificity)
Breast Cancer	**CA-62**	**92%**
	CA 15.3	38.5%
	BRCA1/2	55-72% for BRCA1 45-69% for BRCA2
	Galleri (Grail) test ctDNA	3.5% (I); 43% (II)
Lung Cancer	**CA-62**	**90 %**
	CEA	39%
	CYFRA	15%
	SCC	1%
	Galleri (Grail) test ctDNA	18% (I); 76% (II)
Prostate Cancer	**CA-62**	**94 %**
	PSA	20 %
	CA-62 + PSA (2.5 – 10 ng/ml)	92 %
Colorectal Cancer	**CA-62**	**87 %**
	CEA	49 %
	Guardant 360 TissueNext cfDNA	55.6% (I); 67% (II)
Kidney Cancer	**CA-62**	**94 %**

Table 2. Ca-62 sensitivity and specificity in dependence of threshold levels for various cancer.

Cancer type	Number of samples (Stages I & II)	Threshold level CA-62, U/mL	Sensitivity, %	Specificity, %
Breast Cancer	201	5 000	92	95
		7 000	84	97
Lung Cancer	58	5 000	90	95
		7 000	76	97
Prostate Cancer	94	5 000	94	95
		7 000	79	97
Colorectal Cancer	62	5 000	86	97
		7 000	62	95
Kidney Cancer	68	5 000	94	95
		7 000	68	97

Conclusions: The results obtained in our double-blind clinical studies with CA-62 have demonstrated its potential use, alone or in combination with other diagnostic cancer markers, as a universal marker for multi cancer early detection (MCED) [6] and monitoring of epithelial cancers. As an example, using CA-62 in conjunction with suspicious mammograms or CT scans can improve the specificity of breast cancer detection at its earliest stages, perhaps negating the need for invasive biopsy. Prospectively, adding the CA-62 test to a panel containing other known cancer markers such as CEA, CYFRA 21-1, CA 15-3 and/or PSA as a screening tool for cancer, can significantly increase the detection sensitivity and concomitantly reduce the number of false positive results.

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