

Comparison between different types of analytical measurements of a cancer biomarker

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AroCell



Overview

- Listed NASDAQ First North Stockholm (AROC)
- Market Cap MSEK 110
- Over 2500 shareholders
- Founder still in the company
- Based in Uppsala, Sweden

Highlights

- Several ongoing studies to support AroCell TK 210 ELISA
- Global out license agreement with Roche 2018
- AroCell TK 210 ELISA CE mark in EU
- Major markets covered by distributors
- Strong patent portfolio

AroCell – Precision monitoring





In vitro diagnostics



Efficient treatment for cancer patients

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15 largest cancer diseases In total >200 cancer types - several are rare diseases

Est. incidence and mortality in men Est. incidence and mortality in women (ASR per 100.000) (ASR per 100.000) Lip, oral cavity Lip, oral cavity Corpus uteri Corpus uteri Pancreas Pancreas Kidney Kidney Leukemia Leukemia Non-Hodgkin lymphoma Non-Hodgkin lymphoma Bladder Bladder Oesophagus Oesophagus Cervix uteri Cervix uteri Liver Liver Stomach Stomach Prostate Prostate Colorectum Colorectum Breast Breast Lung Lung 0 10 20 40 10 20 40 30 0 30 50 Incidence Mortality Incidence Mortalilty

Source: WHO, World Cancer Report, International Agency for Research on Cancer, 2014. ASR = Average Survival Rate.



Local Treatment



Existing diagnosis are insufficient



- 70-80 % non responders in cytotoxic treatment of Breast cancer
- AroCell's assay enable early confirmation of treatment response



• More efficient treatment

Biomarkers in the cancer patient journey



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Source: Fitch, 2003. From: Healthcare Quarterly, 8(3) May 2005.doi:10.12927/hcq.2005.17194

Different blood based biomarkers for breast cancer

Table 1. Main type of circulating biomarkers in breast cancer, together with their main uses/potential uses, advantages, and disadvantages.

Type of biomarker	Example	Key uses/potential uses	Advantages	Disadvantages
Protein	CA 15-3, CEA, TPA, TPS, sHER2	Surveillance, therapy monitoring, and prognosis	Easy and cheap to measure, automated assays available	Lack sensitivity and specificity
ctDNA	ESRI, PIK3CA, TP53	Identification of therapy resistance mechanism, and monitoring therapy	High specificity for malignancy, only non-invasive way to identify mechanism of therapy resistance	Expensive, assays not widely available, and labor intensive
СТС		Prognosis and monitoring therapy	Allow measurement of biomarkers at DNA, mRNA, and protein levels	Expensive, not widely available, and labor intensive

TPA: tissue polypeptide antigen; TPS: tissue polypeptide-specific antigen; sHER2: soluble HER2; ctDNA: circulating tumor DNA; CTC: circulating tumor cells.

Diagnostics Biomarker market



Breast cancer, prostate cancer and colorectal cancer are considered the most prevalent cancer types, globally.

Indications	Incidence s ('000)	3-y Preval. ('000)	5-y Preval. ('000)	Market size (MUSD)	Biomarker Market size (Vol)	Est. CAGR ((2017-2025
Lung Cancer	1 824	1 450	1 893	1 651	728 300	13%
Breast Cancer	1 670	4 020	6 232	2 020	653 000	12%
Colorectal cancer	1 360	2 409	3 543	1 345	536 500	12%
Prostate cancer	1 094	2 581	3 857	1 000	525 800	11%
Hematological Cancers	844	1 203	1 751	1 601	190 500	12%
Cervical cancer	524	1 041	1 547	706	478 200	11%
Sarcoma	260	N/A	630	259	113 900	11%



Global Cancer Incidence; number of new cases per year (2012) Source: Global Cancer Biomarkers Market 2018-2015

Most commanly used serum protein **arocell** biomarkers

- CA 15-3 (Cancer antigen 15-3)
- CA 27.29 (Cancer antigen 27.29)
- CEA (Carcinoembryonic antigen)
- sHER2 (Soluble HER2)

Clinical utility of CA 15-3 & CA 27.29

Screening/ Diagnosis

CA 15-3 and CA 27.29 are NOT recommended for screening/diagnosis of breast cancer

Therapy Monitoring CA 15-3 and CA 27.29 are used to monitor patients with metastatic breast cancer during chemotherapy in conjunction with diagnostic imaging, history and physical examination.

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Surveillance

CA 15-3 is recommended to monitor the patients with recurrence after primary breast cancer therapy



Thymidine kinase 1 (TK1)...

...a proliferation biomarker that has been used for prognosis and monitoring therapy response of different tumor types

The logic behind TK1 A strong signaling enzyme



- TK1 is a key enzyme in DNA precursor synthesis, that upregulates intracellularly prior to cell division (phase –S) and down regulates at cell division
- Increased levels of TK1 in the blood can indicate an abnormal cell turnover. Decreased levels can indicate the opposite, a slowdown of abnormal cell turnover.
- TK1 is a **biomarker** for early detection of disruption of dividing cells
- TK1 can be measured in several cancer indications



Increased sensitivity when combining **arccell** with other Tumor Biomarkers



TK 210 ELISA and CA15-3 in Breast Cancer (T2) Patients

After Kumar et al. Tumor Biology 2016

Early treatment response in Breast cancer

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- Patients treated with cytotoxins (Epirubicin and Docetaxel) before surgery were followed by their thymidine kinase (TK1) levels in blood to directly observe treatment response.
- The results show that a TK1-based cell-loss metric after two cycles of therapy predicted the status at the operation after six cycles of chemotherapy.
- > The metric predicted **early** on whether or not the chemotherapy works.



sTK1(ng/ml) before and 48h after Treatment 2, and 48 hours later. Mean Values $\pm\,$ SE



arccell Comparison of Abcam TK1 ELISA and AroCell TK 210 ELISA



ABCAM TK1-ELISA

AroCell TK 210 ELISA

- Total Assay run time: 1.30 h
- Stability = 1 year
- Minimal Detectable dose= 35.9 pg/mL
- All the blood donor sera are below MDD and not detectable TK1 in 60% of sera.
- Compactly packed kit

- Total Assay run time: 4.45h
- Stability = 10 months
- Minimum Detectable dose=0.12 ng/mL
- Most of the BD are above MDD and all have detectable TK1 protein.
- Well designed

TK1 protein levels in Hematological Malignancies



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TK1 protein levels in Solid Tumors







AroCell TK 210 ELISA

In cancer, time is everything

- AroCell TK210 ELISA measure concentration of Thymidine Kinase 1 in blood
- Superior to all other methods for measurement of TK1
- Unique pre-treatment buffer reduces the size of the TK1 serum complexes and exposes the TK210 antigen sites
- Standardized method ELISA sandwich assay
- Protected by a broad and deep patent portfolio
- CE-marked in EU





Thank you!