What is cell stiffness and why is it important in the diagnosis and treatment of breast cancer?

An SABCS24 follow-up



February 11, 2025

Deck overview

- What is cell stiffness and why is it important?
- Predicting aggressiveness
- Treatment optimization
- How we measure cell stiffness
- ARTIDIS clinical program



What is Cell Stiffness and Why is it Important?

Complex structural remodeling of tumor cells and tumor microenvironment (TME) leads to biomechanical alterations at subcellular, cellular, and extracellular levels





3

Mechanics of cancer progression

- Cancer initiation & early progression
 - Stiff and dense cancer cells in primary tumor
 - TME slowly being built around

Cancer Progression & Aggressiveness

- Some of the stiff cancer cells acquire soft phenotype, mainly due to hypoxia¹
- In contrast, TME is becoming more denser and mechanically heterogenous

Advanced & Treatment Resistant Cancer

- Tumor becomes heterogenous: stiff cancer cells stay packed while softer, deformable cells start to migrate towards outside leading to immune evasion and metastasis
- TME becomes very heterogenous and acts as a barrier



What is Cell Stiffness and Why is it Important?

Mechanical changes of tumor cells and their microenvironment during cancer progression and treatment give rise to unique nanomechanical signatures



4

Predicting Aggressiveness

Tissue Stiffness Nanomechanical Signature (NS)

ARTIDIS NS provides information on likelihood of imminent aggressiveness

Why cancers' physical characteristics matter



In metastasis, some **cancer cells break away** from where they first formed.

ARTIDIS Nanomechanical Signature (NS) determines Imminent Aggressiveness of soft cells which can deform and squeeze and travel through the blood or lymph system and form new tumors in other parts of the body.





5

Treatment Optimization Neoadjuvant therapy (NAT) does not work for majority of patients today

Unmet Clinical Need

Neoadjuvant Therapy (NAT), administered before surgery occurs, is a treatment modality aimed to shrink the tumor and more importantly, to control its micro- metastasis potential.

Unfortunately, **NAT fails in 60%** of **breast cancer and 80% of lung cancer patients** today because clinicians lack an objective and reliable **tool to predict response to NAT in order guide their decision- making**.



Same unmet need for NAT response extends to pancreas, liver and all solid tumors

1. National Breast Cancer Foundation; 2 ESMO Oncology Pro Valentina Guarneri (2020), 3. CDO - data brief Incidence rate and survival rate of common cancers, 4. Prat A, Fan C, Fernandez A et al, BMC Medicine vol 13: 303 (2015), 5. Lung Cancer - Non-Small Cell: Statistics | Cancer.Net 6. Leal T,A., Ramalingam S.S., Cell Rep Med. 2022 Jul 19; 3(7), 7. Jiang J, Wang Y et al. Transl Lung Cancer Res 2022;11(2):277-294, 8. Cacer.net NSCLC statistics

Restricted

Taxanes can promote metastasis in tumors with dissipative cells (aggressive), therefore alternatives should be used instead



Cross-linking DNA strands and inhibiting DNA synthesis and replication, inducing arrest of the cell cycle and DNA damage response



of action:

by binding to microtubules

O. Ganier, et al., The EMBO Journal, vol. 37, no. 9, p. e98576, May 2018, doi: 10.15252/embj.201798576.

How Do We Measure Cell Stiffness?





Enrolling 4,000 patients in a global clinical validation program for 5 solid cancer types



