Cancer Companion Diagnostics & Therapeutics: The Next Generation

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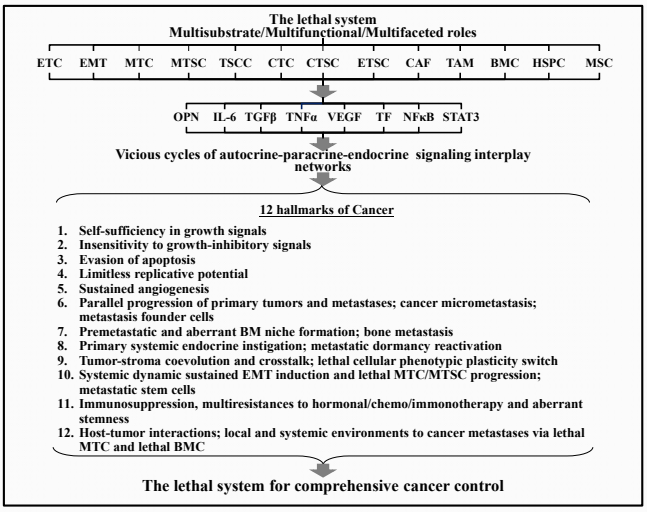
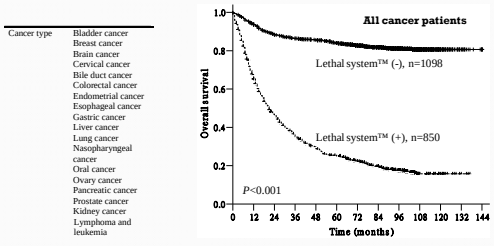
Rather than a single cell disease, cancer has been recognized as a systemic disease and systemic spread may represent an early event. Precise diagnosis is the key to successful personalized treatment on cancer patients (Roche, 2014). On the basis of molecular, cellular, animal, clinicopathological, epidemiological, psychosocial, and human studies combined and interplayed together, we have discovered common molecular, cellular and systemic origins collectively termed the lethal system of various types of cancers including cancer of bladder, breast, brain, bile duct, cervix, colorectum, endometrium, esophagus, stomach, liver, lung, nasopharyngus, oral cavity, ovary, pancreas, prostate and kidney, leukemia and lymphoma for comprehensive cancer control. The lethal system comprises vicious cycles of chronic stress, inflammation and aging-related molecular signaling network deregulation in bone marrow stem/progenitor cells, immune and stromal cells involved in aberrant wounding, chronic inflammation, systemic immune disorder, tissue fibrosis and related chronic systemic diseases such as generation and maintenance of cancer stem cells responsible for poor outcome cancers even after potentially curative treatment. The lethal system represents the molecular, cellular and systemic action mechanism governing simultaneous progression of primary tumor and micrometastasis and the following metastatic dormancy reactivation in very early stage I cancer patients with poor outcome tumors even after curative surgery. The core technology has been patented and issued in USA, Taiwan, Japan, Australia and mainland China and allowable in European Union (Yang, 2012, 2013, 2014).

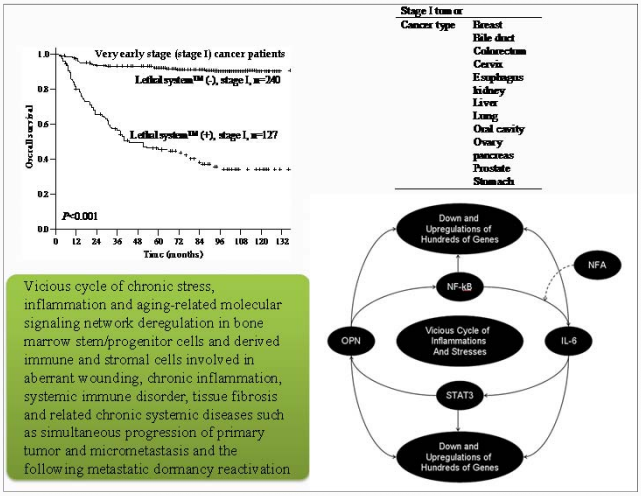


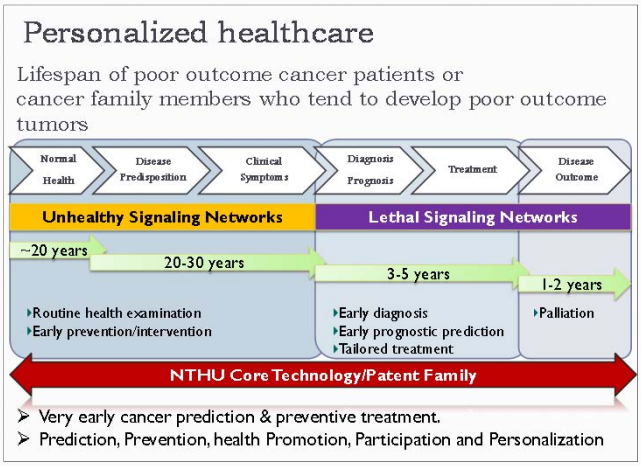
Unique Core Technology in NTHU

Three-dimensional (Tumor-Microenvironment-Host) Study on Molecular, Cell and Systemic Targeted Comprehensive Cancer Tissue/Blood Based Diagnostics Development



Common risk factors: vicious cycles of chronic stresses, inflammations and aging-related multifunctional/multifaceted biomarkers signaling networks in simultaneous progression of primary tumor and micrometastasis followed by metastatic dormancy reactivation.





While the global trend is shifting from cancer treatment medicine toward personalized preventive medicine due to incurable disease development, the multifunctional/multifaceted biomarkers signaling networks-based precise diagnosis is now recognized as the key to successful personalized prevention and early intervention on cancer patients and family members and normal human subjects for early health before symptom appears. Thus, the NTHU patented core technology can be applied to very early detection and preventive treatment of various types of cancer patients, cancer family and ostensibly healthy people to tip the delicate balance among a repertoire of recruited ostensibly normal cells for cancer outcome prediction, prevention, health promotion, patient participation and personalized healthcare for the best quality of life. Simultaneously, the NTHU patented core technology can be applied to pharmaceutical and insurance companies and government to reduce clinical trial cost and healthcare cost dramatically.

Table 1. Comparison between current diagnostics technology and NTHU unique core technology

	Current technology	NTHU technology
Technology	Conventional tumor markers, histology, molecular tumor diagnostics	Molecular, cellular and systemic integrated diagnostics
Target	Tumor cells and related product	Tissue homeostasis and chronic inflammation related bone marrow stem/progenitor cells
Subject	Cancer patients	Cancer patients, cancer family and normal individuals
Sensitivity	Consequences of diseases	Cause of diseases
Indicator type	Indicator for confirmation Prognosticator for confirmation	Indicator for prevention Prognosticator for prevention