National Cancer Institute

Stress-mediated Effects on Cancer Biology:
A Primer on Cancer Biology and Plausible Mechanisms

68th Annual Scientific Meeting of the American Psychosomatic Society

NCI Preconference Workshop

Wednesday, March 10, 2010

Portland, OR

9:00 AM – 4:30 PM

STRESS-MEDIATED EFFECTS ON CANCER BIOLOGY:
A PRIMER ON CANCER BIOLOGY AND PLAUSIBLE MECHANISMS

DRAFT AGENDA

9:00 – 9:30 AM **INTRODUCTION & WELCOME (McDonald)**

9:30 – 10:15 AM **INITIATION AND THE SIX HALLMARKS OF CANCER (Sloan)**

- What is cancer?
- How cancer begins
- Initiation and promotion
- Genes and cancer
- Hallmarks of cancer

10:15 – 10:30 AM **BREAK**

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10:30 – 11:15 AM **ANGIOGENESIS, INVASION, METASTASES (Sood)**

- Tumor microenvironment and cell signaling
- Angiogenesis and steps in the metastatic cascade
- Invasion and the extra cellular matrix
- Metastasis

11:15 – 12:00 PM **INFLAMMATION AND THE IMMUNE RESPONSE (Nelson)**

- Inflammation
- The immune response and cancer

12:00 – 12:15 PM **SYNTHESIS OF CANCER BIOLOGY FUNDAMENTALS (TBD)**

12:15 – 1:30 PM **LUNCH (on your own)**

- Small discussion groups with workshop faculty

1:30 – 2:15 PM **SYSTEMIC REGULATION OF TUMOR PROGRESSION I: HYPOTHALAMIC-PITUITARY ADRENAL AXIS (Conzen)**

- Hypothalamic-pituitary-adrenal (HPA) axis - emphasis on direct effects on tumor growth
- Interactions of stress/hypothalamic-pituitary-gonadal (HPG) axis and cancer pathways (e.g., estrogen and estrogen receptor)
- HPA axis and chronic stress effects on fatty acid metabolism, causing insulin resistance, metabolic syndrome and potential changes in the biology of fat depots

2:15 – 2:45 PM **SYSTEMIC REGULATION OF TUMOR PROGRESSION II: SYMPATHETIC NERVOUS SYSTEM (Sood)**

- Sympathetic nervous system pathways affecting tumor growth

2:45 – 3:00 PM **BREAK**

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3:00 – 3:30 PM **SYSTEMIC REGULATION OF TUMOR PROGRESSION III: CLINICAL MODELS (Lutgendorf)**

- Human stress studies with links to tumor progression
- Systemic inflammation and fatigue
- Appropriate clinical models
- Social environment and regulation of tumor gene expression—signal transduction models

3:30 – 4:15 PM **TRANSLATIONAL APPLICATIONS, WRAP UP AND SUMMARY: PANEL DISCUSSION (Faculty)**

4:15 – 4:30 PM **CONCLUDING REMARKS**

4:30 PM **ADJOURNMENT**

SUGGESTED READINGS

Antoni, M.H., Lutgendorf, S.K., Cole, S.W., Dhabhar, F.S., Sephton, S.E., McDonald, P.G., Stefanek, M., Sood, A.K. (2006). The influence of biobehavioral factors on tumor biology: pathways and mechanisms. Nat Rev Cancer, 6, 240-248.

Chida Y, Hamer M, Wardle J and Steptoe A. (2008). Do stress-related psychosocial factors contribute to cancer incidence and survival? Nature Clinical Practice Oncology, 5, 466-475

Clark, D.P. (2005). Molecular Biology Made Simple and Fun, 3rd edition. Cache River Press.

Cole, S.W. (2009). Social Regulation of Gene Expression. Current Directions in Psychological Science,18, 132-137.

Hannan, D., Weinberg, R.A. (2000). The Hallmarks of Cancer: Review, Cell, 100, 57-70.

Hermes GL, Delgado B, Tretiakova M, Cavigelli SA, Krausz T, Conzen SD, McClintock MK. (2009). Social isolation dysregulates endocrine and behavioral stress while increasing malignant burden of spontaneous mammary tumors. Proc Natl Acad Sci USA, Epub ahead of print. PMC2799783

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Lutgendorf, S.K., DeGeest, K., Sung, C.Y., Arevalo, J.M.G., Penedo, F., Lucci, J.A. III, Goodheart, M., Lubaroff, D., Farley, D.M., Sood, A.K., Cole, S.W. (2009). Depression, Social Support, and Beta-Adrenergic Transcription Control in Human Ovarian Cancer . Brain, Behavior, and Immunity, 23(2), 176-183.

Lutgendorf, S.K., Lamkin, D.M., Jennings, N.B., Arevalo, J.M.G., Penedo, F., DeGeest, K., Langley, R.R., Lucci, J.A. III, Cole, S.W., Lubaroff, D.M., Sood, A.K. (2008). Biobehavioral Influences on Matrix Metalloproteinase Expression in Ovarian Carcinoma. Clinical Cancer Research, 14, 6839-46.

Michael YL Bowen DJ , Ritenbaugh C. (2009). Influence of stressors on breast cancer incidence in the Women's Health Initiative. Health Psychology, 28 (2),137-46.

Williams JB, Pang D, Delgado B, Kocherginsky M, Tretiakova M, Krausz T, Pan D, He J, McClintock MK, Conzen SD. (2009). A model of gene-environment interaction reveals altered mammary gland gene expression and increased tumor growth following social isolation. Cancer Prev Res (Phila Pa) 2, 850-861.

WORKSHOP DESIGN

This workshop is comprised of lectures and interactive audience participation to encourage the intellectual exchange of ideas between faculty and participants. Lectures will incorporate media and other innovative tools to facilitate learning.

EDUCTIONAL OBJECTIVES

The goal of this workshop is to stimulate interest in stress regulation of cancer biology as a fertile research field for intellectual investment. State-of-the science presentations delivered by prominent cancer and biobehavioral researchers will be used to:

1. Review the fundamentals of cancer biology;
2. Outline the principle components of stress biology that are most relevant to our understanding of stress regulation of cancer biology;
3. Highlight the most relevant tumor types and cancer biology processes that are vulnerable to stress regulation; and
4. Delineate the molecular mechanisms and pathways of stress-mediated effects on cancer biology.

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TARGET AUDIENCE

The target audience is established and young scientists trained to conduct mechanistically focused biobehavioral and health psychology research.

COURSE EVALUATION

A course evaluation form will provide attendees with the opportunity to evaluate the modules and faculty and to identify future educational and professional development needs.

OUTCOMES MEASUREMENT SURVEY

The Basic and Biobehavioral Research Branch at the National Cancer Institute is committed to increasing the number of scientists conducting research that elucidates the biological and behavioral mechanisms that undergird the interaction of mind, brain, body, and social context and contribute to the pathogenesis, course, and treatment of cancer. One year after the workshop, a survey will be sent to participants to help us determine whether the workshop had an influence on research interests, scholarly activities, or professional development.

WORKSHOP CO-CHAIRS

Paige Green McDonald, PhD, MPH, National Cancer Institute
Susan Lutgendorf, PhD, University of Iowa

WORKSHOP FACULTY

Suzanne Conzen, MD, University of Chicago
Susan Lutgendorf, PhD, University of Iowa
Edward L. Nelson, MD, University of California, Irvine
Anil Sood, MD, MD Anderson Cancer Center
Erica Sloan, PhD, University of California, Los Angeles

WORKSHOP PLANNING COMMITTEE

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