

From: Stephen M Pauley MD FACS  
Subj: Connecting light pollution to human breast cancer  
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Research studies linking human eye exposure to light at night, melatonin suppression, and breast cancer.

1) Epidemiologists, including Dr Richard Stevens, whose hypothesis originally suggested that light at night (LAN) could be linked as a cause of breast cancer, correlated the light brightness over 147 communities in Israel to breast cancer rates in those towns and cities.

There was a direct correlation. The brighter the lights as measured by the US Defense Meteorological Satellite Program (DMSP) satellites, the higher the incidence of breast cancer. There was NO correlation with female lung cancer rates. The authors did their very best to control for several variables (1).

Results: When the brightest communities were compared to the darkest communities, the cities with the brightest lights had a 73% higher rate of breast cancer.

This is the first large scale population study to link light pollution with breast cancer. It is a landmark study, and similar studies should follow.

2) Epidemiological studies by Schernhammer and others (2,3,) showed that night shift workers have higher incidences of breast and colorectal cancers. The evidence for LAN (light pollution) as a public health issue becomes very convincing (4,8).

3) Rat lab studies by Blask, et al (5) confirm that low melatonin blood taken from nurses exposed to LAN, and injected into rats with implanted human breast cancer cells, causes the cancer cells to grow faster than high melatonin blood taken from nurses allowed to sleep in the dark. Melatonin is an anti-cancer (oncostatic) hormone, and we need the darkness at night for melatonin to be produced by the pineal gland.

### **The World Health Organization**

Europe has already acted. In Dec., '07, The World Health Organization, through the International Agency for Research on Cancer (IARC), listed shift work under Group 2A - as a "probable carcinogen." (6, 7).

<http://monographs.iarc.fr/ENG/Classification/crthallist.php>

### **The American Medical Association**

At its 2009 annual meeting, the American Medical Association passed a resolution that recognized light pollution as an energy waste, a safety issue, and a human health issue. It calls for the use of fully shielded outdoor lighting. (9)

### **Comment**

Safeguarding public health should become the most compelling reason to control the splay of bad outdoor lighting, and should be priority-one for all civic leaders.

The USA is woefully behind in coming to grips with the LAN- cancer connection. One must assume that the lighting industry wishes it had never heard of these findings. The

breast cancer research community has also failed to take these data seriously. It appears they have missed a major environmental cause for breast cancer. We need to do better.  
/SMP

Refs:

1. *Light At Night Co-Distributes With Incident Breast But Not Lung Cancer In The Female Population Of Israel*; Kloog I, Haim A, Stevens RG, Barchana M, Portnov BA; *Chronobiology International*; 25 (1): 65-81; (2008)
2. *Night shift work and risk of colorectal cancer in the Nurses' Health Study*; Schernhammer ES, Laden F, Speizer FE, Willett WC, Hunter DJ Kawachi I, et al; *J Natl Cancer Inst*; 93:1563-8 (2001)
3. *Night-shift work, light at night, and risk of breast cancer*; Davis S, Mirick DK, Stevens RG; *J Natl Cancer Inst*; 93:1557-62 (2001)
4. *Lighting for the human circadian clock: recent research indicates that lighting has become a public health issue*. Pauley, SM *Medical Hypotheses*; 63: 558-596 (2004)
5. *Melatonin-depleted blood from premenopausal women exposed to light at night stimulates growth of human breast cancer xenografts in nude rats*; Blask DE, Brainard GC, Dauchy RT, Hanifin JP, Davidson LK, Krause JA, Sauer LA, River-Bermudez MA, et al; *Cancer Res*. 65:11174-11184 (2005)
6. *Carcinogenicity of shift-work, painting, and fire-fighting*; Straif K, Baan R, Grosse Y, Secretan BE, Ghissassi FE, et al; WHO International Agency for Research on Cancer Monograph Working Group; *Lancet Oncol*; 8:1065-1066 (2007) Ref ID: 4704
7. *Overall Evaluations of Carcinogenicity to Humans; List of all agents evaluated to date*; IARC Monographs; Vol 1-98 <http://monographs.iarc.fr/ENG/Classification/crthallist.php>
8. *Light at Night, Chronodisruption, Melatonin Suppression, and Cancer Risk: A Review*; Russel J. Reiter, Dun-Xian Tan, Ahmet Korkmaz Thomas C. Erren, et al *Critical Reviews in Oncogenesis*, 13(4):303-328 (2007)
9. American Medical Association House of Delegates; Resolution: New England 1; A 09; 2009 <http://docs.darksky.org/Docs/AMA%20Light%20pollution.pdf>

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