PHOTONS, ATOMS, MOLECULES AND CELLS

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1 Hour

Description: Presentation will review how light effects atoms, molecules, enzymes, cells and biological systems and will describe a science-based model of how syntonics and other forms of light therapy work to normalize cellular processes to increase a patient’s energy and wellness.

Objectives:

1. Describe what happens when a photon hits an atom or molecule.
2. Show how light works to energize and key enzymes, cofactors and water molecules in living cells. Review how light works to help cells communicate, cooperate, and produce energy and balance.
3. Describe a model of how syntonics phototherapy can possibly work the feats of healing we see with our patients.

1. Introduction
2. Putting cellular dynamics into perspective.
	1. 100 trillion cells in humans
		1. Average size 10-6 Meter
	2. Must function and cooperate to environmental and internal
3. Description of cell structure
4. Description of dynamics of cell life.
5. Physicians don’t heal patients, cells do.
6. Photons
	1. Photons as particles and waves
		1. Einstein
		2. Newton
		3. Young
		4. Maxwell
	2. Light/matter interaction
	3. Energy and color (wavelength)
7. Photons, Electrons, Atoms, Molecules
	1. Electrons,
		1. Orbits
		2. Orbitals
		3. Photons
		4. Energy
	2. Pi electrons and triplets
	3. Florescence
	4. Phosphorescence
8. Photochemistry/biochemistry
	1. Chemistry - electron exchanges at highest partially occupied orbit
	2. Photons excite similar electron actions at highest occupied orbit
	3. Electron transfer chains
9. Cells “all diseases are ultimately cured by cells, doctors merely aid cells
	1. The cell as a conscious, intelligent being – it learns, senses, learns, acts and plans with goals and purpose
	2. Packed with molecules, organelles in constant, dynamic action
	3. Intracellular communication for optimal survival
	4. Extracellular communication for optimal survival
	5. Cell membrane
		1. Information filter
		2. Signal amplifier
	6. Light can directly energize intracellular enzyme systems and turn on and off membrane surface receptors
10. Mitochondria and ATP
	1. Mitochondria produce ATP
		1. Metabolizing O2 to H2O + CO2
	2. Cytochrome C Oxidase - light’s impact on an all-important enzyme
	3. Mitochondrial dysfunction in eye & brain degenerative diseases
	4. Role of ATP
11. Photobiomodulation therapy (syntonics): a model of how light heals.

References

 Spitler, H.R., 1940, *The Syntonic Principle, Publisher: The College of Syntonic Optometry*, www.collegeofsyntonicoptometry.com, p.148.

 Albrecht-Buehler, G., 1913, *Cell Intelligence and the Future of Medicine,* [http://www.basic.northwestern.edu/g-buehler/vision.htm#](http://www.basic.northwestern.edu/g-buehler/vision.htm).

 Quevli, N., 1916, "*Cell intelligence: The cause of growth, heredity and instinctive actions, illustrating that the cell is a conscious, intelligent being, and, by reason thereof, plans and builds all plants and animals in the same manner that man constructs houses, railroads and other structures*." The Colwell Press, Minneapolis, MN. (Search online for free download of the entire book.)

 Albrecht-Buehler, G. 1985. Is cytoplasm intelligent too? *Cell and Muscle Motility* . Jerry W. Shay, ed. V. 6 :1-21.

 Albrecht-Buehler, G., 1991, Surface Extensions of 3T3 Cells towards Distant Infrared Light Sources. *The Journal of Cell Biology*, Volume 114, (3), 1493-502.

 Albrecht-Buehler, G., 1991, Surface Extensions of 3T3 Cells towards Distant Infrared Light Sources. *The Journal of Cell Biology*, Volume 114, (3), 1493-502.

 Pross, A., 2008, How can a chemical system act purposefully? Bridging between life and non-life, *J. Phys. Org. Chem*., 21, p. 724–730. S*ee also* Twardowski, M., 2013, The Phenomenon of Life in the Eyes of a Chemist: Addy Pross, *Chemik*, 67, 12, p. 1163–1172.

 Smith, K.C., 2014, The Photobiological Basis of Low Level Laser Radiation Therapy.published online: <http://photobiology.info>; *Also* Smith, K.C., 1989, *The Science of Photobiology*, 2nd Ed. Plenum Pub Corp, 1989.

 Karu, T., 2000, Mechanisms of low-power laser light action on cellular level, *Lasers in Medicine and Dentistry,* Ed. Z. Zimunovic, Rijeka, Vitgraph, p. 97-125.

 Passarella, S., Karu, T., 2014, Absorption of monochromatic and narrow band radiation in the visible and near IR by both mitochondrial and non-mitochondrial photoacceptors results in photobiomodulation, *Journal of Photochemistry and Photobiology*, B: Biology, 140, p. 344-358.

11 Szent-Gyorgyi, A., 1956, Bioenergetics. *Science* 124 (3227), p. 873-875.