



pharmacOLOGIC

The logic behind using drugs.....



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DEPARTMENT OF PHARMACOLOGY

NEWS LETTER

Volume 7

Issue 2

February 2018



ADICHUNCHANAGIRI
INSTITUTE OF MEDICAL SCIENCES

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From the Editor's Desk

Greetings! Best wishes from Pharmacology department. It gives me immense happiness to present this newsletter.

Scientists who have contributed to the development of Pharmacology as a speciality have been mentioned in the articles "Pioneers of Pharmacology" and "Nobel Laureates in Pharmacology along with their contributions". An article on "Photopharmacology" is also there in this newsletter.

The academic activities of the faculty have also been listed here. Happy reading!!!



PIONEERS OF PHARMACOLOGY

DR MANU. G, ASSISTANT PROFESSOR

1. **Hippocrates:** Father of Modern Medicine
2. **Paracelsus:** Grandfather of Pharmacology
3. **Claude Bernaud:** Father of Modern Experimental Pharmacology
4. **Oswald Schmiedberg:** Father of Modern Pharmacology
5. **Otto Loewi:** Father of Neuroscience
6. **Paul Ehrlich:** Father of Modern Chemotherapy
7. **John Jacob Abel:** Father of American Pharmacology
8. **Colonel Ram Nath Chopra:** Father of Indian Pharmacology
9. **Louis Lasagna:** Father of Clinical Pharmacology
10. **L Mayer Jones:** Father of Modern Veterinary Pharmacology

NOBEL LAUREATES IN PHARMACOLOGY

DR MANU. G, ASSISTANT PROFESSOR

1. **1908: Elie Metchnikoff, Paul Ehrlich:** first antimicrobial drugs (magic bullet)
2. **1923: Frederick Banting, John Macleod:** isolation and discovery of Insulin and its application in the treatment of diabetes
3. **1936: Sir Henry Dale, Otto Loewi:** chemical transmission of nerve impulses
4. **1945: Ernst Chain, Sir Alexander Fleming, Sir Howard Florey:** discovery of penicillin and its curative effect in various infectious diseases
5. **1950: Edward Kendall, Tadeus Reichstein, Philip S. Hench:** Hormones of the adrenal cortex, their structure and biological effects
6. **1957: Daniel Bovet:** Antagonists that block biologically active amines, including the first antihistaminic
7. **1970: Julius Axelrod, Sir Bernard Katz, Ulf von Euler:** Transmitters in the nerve terminals and the mechanism for storage, release and inactivation.
8. **1971: Earl Sutherland Jr.:** Mechanisms of the action of hormones with regard to inhibition & stimulation of cAMP
9. **1982: Sune Bergstrom, Bengt Samuelsson, John R. Vane:** Discovery of prostaglandins & the mechanism of action of aspirin which inhibits prostaglandin synthesis
10. **1988: Sir James W. Black, Gertrude B. Elion, George H. Hitchings:** Development of the first beta blocker propranolol & anticancer agents that block nucleic acid synthesis
11. **1994: Alfred Gilman, Martin Rodbell:** Discovery of G proteins and the role of these proteins in signal transduction in cells
12. **1998: Robert Furchgott, Louis Ignarro, Ferid Murad:** Role of NO as a signalling molecule in the Cardiovascular system

13. **2000: Arvid Carlsson, Paul Greengard, Eric Kandel:** Role of dopamine in schizophrenia and signal transduction in the nervous system leading to long term potentiation.
14. **2004: Richard Axel, Linda B Buck:** Discovery of odorant receptors and the organization of the olfactory system.
15. **2005: Barry J Marshall, J Robin Warren:** Discovery of H pylori and its role in peptic ulcers disease.
16. **2013: James E Rothman, Randy W Schekman Thomas C Sudhof:** Discovery of machinery regulating vesicle traffic, a major transport system in our cells.

PHOTOPHARMACOLOGY

-DR.PADMANABHA TS, ASSISTANT PROFESSOR.

We all know that drug action is mainly based on the target selectivity; but many other sites/tissues/organs also express the same ligand sites for the drug action which may lead to unwanted side effects.

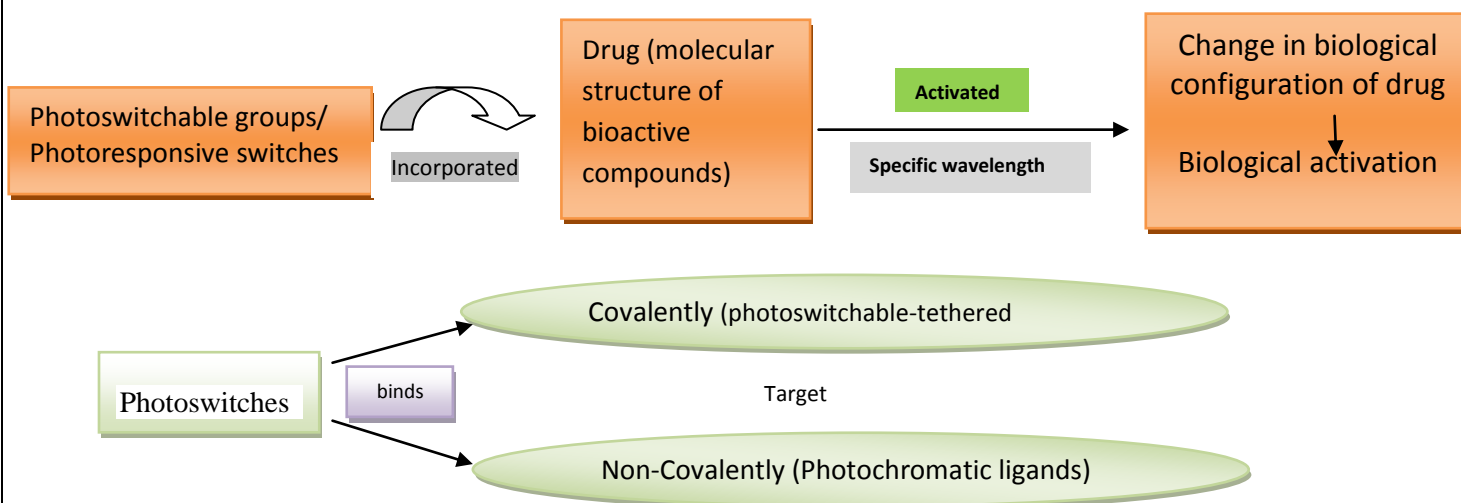
So one of the methods to increase the drug selectivity to target site is by Photopharmacology.

Photopharmacology provides an *external photoswitch* to control off-target site drug activity, thereby attaining both *selective action* and *removing the off-target toxicity* and resultant side effects.

Thus the ‘Light’ is used locally and temporally to activate a drug, avoiding systemic side effects and development of resistance.

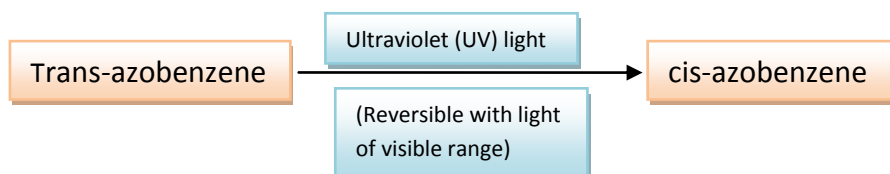
Landmark in Photopharmacology. Niels Finnsen treated lupus with controlled exposure to sunlight (heliotherapy). Later he designed an artificial light source for the *treatment of psoriasis*. Which eventually lead to the *birth of modern phototherapy* for which he was awarded the *Nobel Prize in 1903*

Photopharmaceutical agents:



Examples for photoswitches:

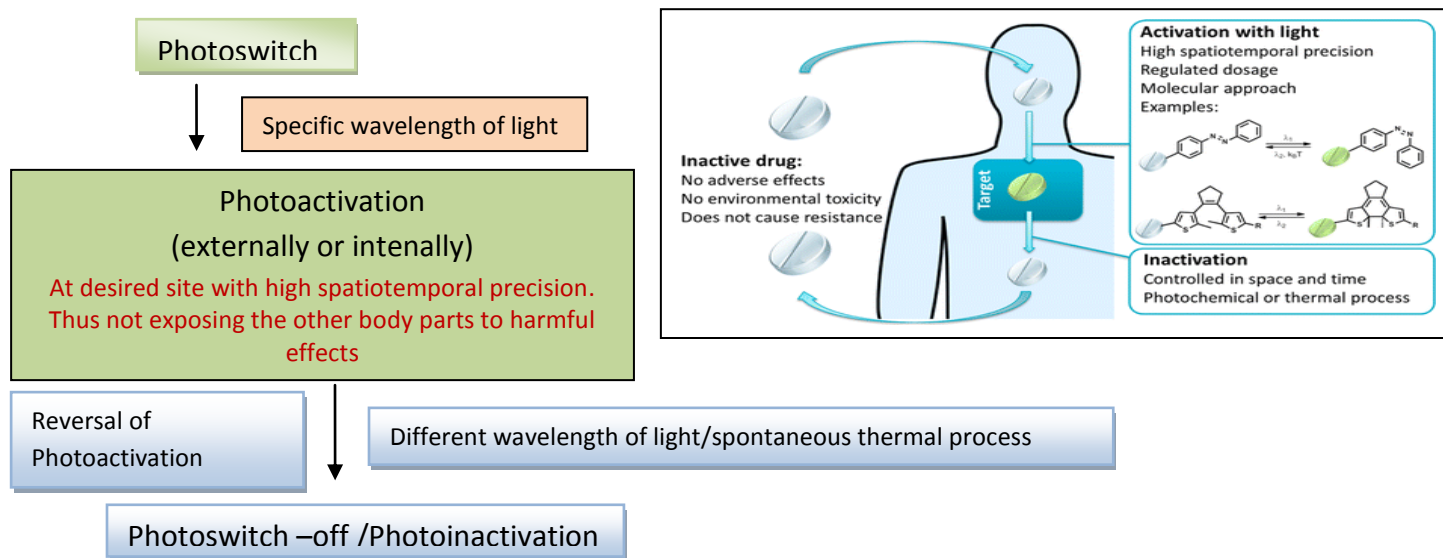
Azobenzene(*relatively small*) is one of the important photoswitches



Other azobenzenes are: Hecht's o-fluoroazobenzenes or Fuchter's arylazopyrazoles.

Photoactivation may be achieved externally or internally.

(Light as an external controlling factor to modulate drug activity)



Photodynamic therapy:

Light-mediated generation of *singlet oxygen* (free radical are short lived & reversible) is used for *ablating tissue*. Other modalities include optogenetics, photoactivated molecules (psoralens).

Challenges in front are:

Absorption of low energy photons (UV/visible range) by endogenous chromophores in the tissue, severely limits the light penetrability leading to UV light toxicity by causing photodamage to the cell.

Photopharmacology as been explored in following areas:

1. Antimicrobials (*ciprofloxacin-photoswitch conjugates*)
2. Photoswitchable amidohydrolase inhibitors.
3. **Diabetes** (Optical Control of Insulin Secretion Using an *Incretin Switch*)
4. *Fourth-generation photoswitchable sulfonylurea* JB253
5. **Anticancer** (*photoswitchable histone deacetylase inhibitors*)
6. Red light-activated ruthenium-caged nicotinamide phosphoribosyl transferase inhibitor
7. Azobenzene-containing *photoswitchable proteasome inhibitors*.

Therefore photopharmacology is a newer and promising avenue emerging towards better spatiotemporal precision, safety & efficacy of photopharmaceutical agents.

References:

- Sarma P, Medhi B. Photopharmacology. Indian J Pharmacol 2017;49:221-2.
- Willem A. Velema, Wiktor Szymanski, and Ben L. Feringa. Photopharmacology: Beyond Proof of Principle. *J. Am. Chem. Soc.*, 2014, *136* (6), pp 2178–2191.

ACADEMIC ACHIEVEMENTS

LIST OF PUBLICATIONS:

- ❑ **Padmanabha T S, Manu G.** Knowledge & awareness of disposal of unused and expired medications among medical undergraduates of a tertiary care teaching hospital at B G Nagar: A cross sectional observational study. Natl J Physiol Pharm Pharmacol 2017; 7(11): 1268-1273.
- ❑ **Rajashekar Y R, Padmanabha T S, Chandrakantha T.** Variable anti-edema & anti-granuloma effects of liraglutide & teneligliptin in experimental wister albino rat inflammatory models. Natl J Physiol Pharm Pharmacol 2018; 8(1): 51-55.
- ❑ **Padmanabha T S, Rajashekar Y R.** Emerging causes for antibiotic resistance: Second year medical undergraduates perspective: A cross-sectional study. Natl J Physiol Pharm Pharmacol 2018; 8(2): 187-191.

WORKSHOP'S/CME'S ATTENDED:

- ❑ **Dr Ravi Shankar M & Dr Madhav K Savkar,** participated as resource persons in Interdepartmental Symposium organized by Department of Psychiatry, AIMS on “Placebo-Basis, Practice & research” held on 20th July 2017.
- ❑ **Dr Madhav K Savkar, Dr Rajashekar Y R, Dr Manu G, Dr Padmanabha T S & Dr Chandrakantha T,** participated in the CME on “Pharmacology Current Trends” conducted by Department of Pharmacology, Sathagiri Institute of Medical Sciences & Research Centre, Bengaluru on 24th November 2017.
- ❑ **Dr Ravi Shankar M,** participated as a resource person in the inter-departmental vertical teaching programme on “Human Immunodeficiency virus” for undergraduate medical students.
- ❑ **Dr Ravi Shankar M,** participated as a resource person in the expert panel for “WHO Medical Ethics” sensitization for undergraduate medical students.

- ❑ **Dr Manu G**, participated in the CME on “An insight into current challenges of antimicrobial therapy”, conducted by Department of Pharmacology, ESI Medical college, Hyderabad on 9th December 2017.
- ❑ **Dr Madhav K Savkar**, participated as resource person in CME on “ICMR Guidelines 2017 updates” organized by Department of Pharmacology, Sri Siddhartha Medical College, Tumkur on 21st December 2017.

OTHER ACTIVITIES:

- ❑ **Dr Manu G, Dr Padmanabha T S & Dr Chandrakantha T** with other Department faculties participated in cultural activities held on the event of Teacher’s day on 20th September 2017.



Dr Manu G with other department faculties judged the cultural programme on the event of Ganesha utsav in August 2017.

FUTURE PLANS:

PHARMACOLOGY QUIZ for undergraduates (from 6th term to interns) on topic “**DRUGS ACTING ON CARDIOVASCULAR SYSTEM**”. Preliminary round will be conducted on 8th March 2018. Top eight students will be selected for final round which will be held on 5th April 2018. Winners will be awarded with cash price.