

**LECTURE SUMMARY OF AKTU SPONSORED FDP ON “DEVELOPMENT OF PERSONALIZED MEDICINES – A NOVEL APPROACH IN CUSTOMIZED DRUG DELIVERY SYSTEMS”
HELD ON 7TH – 11THMAY, 2018**

EVENT	SPEAKER	TOPIC
INAUGURAL SESSION		
Inaugural Speeches (1 hour)	Dr. Avijit Mazumder , Director, NIET Pharmacy Institute	<p>Challenges of personalized medicines: Dr. S H Ansari, Ex-Dean of Jamia Hamdard and Chief Guest of the program advocated the faculty members to be updated with the recent advancements of the healthcare sector by participating in these FDPs at regular interval. He suggested that various life style diseases like diabetes and cancer can be controlled by customized drug delivery system. Dr Avijit Mazumder suggested the current approaches of customized drug delivery systems and way to tackle the challenges coming upfront. Dr Rupa Mazumder delivered the vote of thanks and motivated the faculty members to update their knowledge to teach PCI Syllabus in the coming days.</p>
	Prof. (Dr.) S. H. Ansari , Ex-Dean & Ex-HOD, Dept. of Pharmacognosy, SPER, Jamia Hamdard University, New Delhi	
	Dr. Rupa Mazumder , Professor and Dean (R & D) Pharmacy, NIET Pharmacy Institute, Greater Noida	
TECHNICAL SESSION - I		
Lecture 1 (2 hours)	Dr. Jagannath Sahoo Principal, KIET School of Pharmacy, Ghaziabad	<p>Bio Electronic Medicines and Devices- A Revolutionary Perspective</p> <p>Personalized medicine is a medical procedure that separates patients into different groups with medical decisions, practices, interventions and products being tailored to the individual patient based on their predicted response or risk of disease. It is a form of medicine that uses information about a person's genes, proteins, and environment to prevent, diagnose, and treat disease. It provides a basic biomedical knowledge about:</p> <ul style="list-style-type: none"> • More accurate diagnostics. • Reduce the therapeutic side effect. • Detect disease at an earlier stage. • Predict the outcome of a disease stage with the treatment of choice. <p>In this context, the talks also included the concept of bioelectronic medicine, CYBORGS, nanorobots,</p>

implanted devices, biofuel cells, i.e., the application of electronic devices to living organisms for clinical testing, diagnosis and therapy will change the way we treat diseases, injuries and conditions such as rheumatoid arthritis, diabetes, paralysis, bleeding and even cancer.

TECHNICAL SESSION - II

<p>Lecture 2 (1 hour)</p>	<p>Dr. Manish Kumar Gupta Assoc. Fellow, TERI-Deakin Nano-Biotechnology Centre, Gurgaon</p>	<p>The Art and Science of CNS Drug Delivery Approaches Human brain is one of the most vital organ controlling the function of all biological systems. It is the most sensitive organ of the body and therefore it restricts the entry of various chemicals including nutrients, neurotransmitters and drugs via specific mechanisms to safeguard the integrity of the brain. Here, Blood Brain Barrier (BBB) is a major obstacle to the passage of molecules from the blood compartment to the brain. Under normal conditions the BBB acts as a barrier to toxic agents and polar drugs. Therefore, unique chemical approaches have been discovered to deliver the drug molecules in to the brain for the treatment of neurological disorders. The present discussion describes the novel chemical approaches for brain targeting of drug molecules.</p>
<p>Lecture 3 (2 hours)</p>	<p>Dr. Zeenat Iqbal Assoc. Professor, Dept. of Pharmaceutics, SPER, Jamia Hamdard University, New Delhi</p>	<p>Nanobased Personalized Cancer Therapy: Bench to Bedside Cancer has emerged as a disease conundrum and for decades has put up myriad treatment challenges for the researchers as well as physicians. It accounts for causing a million deaths globally and the treatment modalities currently in place are not able to overcome the disease fully. In most instances the side effects associated with the cytotoxic classical drugs are often too debilitating and result in acute morbidity or even mortality at times, not to mention the poor QoL of the patients undergoing chemotherapy. Furthermore, the high and mostly unaffordable treatment costs add to the patient woes and often become a major reason for patient non-compliance. To reiterate, chemotherapy has remained a mainstay of cancer therapy protocol but has proven effective only in the early stages of cancer while the malignant cancers are still untreatable or elicit a very limited disease amelioration. Eventually, the therapeutic concerns still continue to revolve around the presence of increased drug burden, increased toxicity and growing resistance. Henceforth, the goal of the pharmaceutical scientist is the exploration of fruitful means for curtailing the above problems in a manner that is profusely beneficial to the patient. Moreover, with the advancement into the insight of cancer biology and the unravelling of cancer genetic and resulting extreme patient response variability, therapeutic investigations are focused towards development of targeted personalized cancer medicine. Hence, the complexity of cancer as a disease demands no less than the ultimate “Magic bullet” to fully conquer it and the futuristic dream particle capable of doing so is envisaged to carry various arms and have a multipronged, precise attack on the disease without compromising the patient.</p>

TECHNICAL SESSION - III

Lecture 4 (2 hours)	Dr. Mukesh Nandave Assoc. Professor, DPSRU, New Delhi	Applications of Personalized Medicine to Healthcare System: Opportunities and Challenges Personalised medicine (PM) is known by different names such as Precision Medicine or Pharmacodiagnosics, and Theranostics. PM is considered as an emerging model that is expected to transform our current healthcare system. In recent years, many genomic aberrations were discovered which are now used as predictive biomarkers for treatment and management with targeted pharmacotherapy. Advances in technology and tools including the development of DNA microarrays, real time polymerase chain reaction (RT-PCR), second generation sequencers, have led to a significant rise in the number of genomic profiling studies. In the proposed talk, speaker will provide an overview on the current updates of PM in various diseases. Speaker will also discuss the use of the various technologies and tools in PM and the opportunities and challenges that arise during use of these technologies in PM.
Lecture 5 (1 hour)	Dr. Deepshikha Pande Katare Professor, Asst. Director & Centre Head, Amity University, Noida	Proteomics in Disease Diagnosis and Drug Targeting Proteomics deals with the development of biomarkers for the early detection of lung and liver cancer. A <i>proteome</i> is a set of proteins produced in an organism, system, or biological context. Proteomics has given a new dimension to the study of proteins (diversity in structure, function and dynamic range). It has made important impact on both the biotechnology and pharmaceutical sciences, permitting the identification, characterization and quantification of large number of proteins. The objective of proteomics along with biomarkers is to measure and evaluate as an indicator of normal biological process, pathological process or pharmacological responses to a therapeutic intervention. The various tools of proteomics include sodium dodecylsulfate polyacrylamide gel electrophoresis (SDS-PAGE), isoelectric focusing, mass spec-2d gels. Proteomics is also used to control the severity of lung and liver cancers and uses various biomarkers for its detection and further prevention and treatment.

TECHNICAL SESSION - IV

Lecture 6 (1 hour)	Dr. Sanjula Baboota Assoc. Professor, Dept. of Pharmaceutics, SPER, Jamia Hamdard University, New Delhi	Telepharmacy and Telehealth: Future of Pharmacy Telepharmacy (TP) is the use of telecommunication and information technology to provide pharmaceutical care from a distance. It has been used to overcome distance barriers and to improve access to pharmacy services that would often not be consistently available in distant rural communities. The various services which come under the ambit of telepharmacy include drug therapy monitoring, filling and refilling of the prescription drugs and patient counselling. This service can be delivered at retail pharmacy sites or through hospitals, nursing homes, or other medical care facilities. It refers to the provision of remote pharmacy services, via real-time two-way communication between the patient and the pharmacist, using electronic audio and visual means. It replaces face-to-face consultation when it is needed, but complements it. The real role of telepharmacy at present lies in the convenience it offers to patients and
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<p>Lecture 7 (2 hours)</p>	<p>Dr. Rajiv Gulati Independent Consultant and Mentor to mChemist.com and Essentium Phygen, Gurgaon</p>	<p>E-pharmacy: Its Challenges</p> <p>E- pharmacy, which is also known as internet pharmacy, or mail-order pharmacy, is a pharmacy, that operates over the internet and sends the orders to customers through the mail or shipping companies. Conventional stationary pharmacies usually have controlled distribution systems from the manufacturer. Validation and good distribution practices are followed. Home delivery of pharmaceuticals can be a desirable convenience but sometimes there can be problems with uncontrolled distribution.</p> <p>The shipment of drugs through the mail and parcel post is sometimes a concern for temperature-sensitive pharmaceuticals. Uncontrolled shipping conditions can include high and low temperatures outside of the listed storage conditions for a drug. He also discussed about the risk and concerns regarding e-pharmacy such as illegal or unethical pharmacies sometimes send outdated, substituted, or counterfeit medications. Sometimes an online pharmacy may not be located in the country that is claimed. Minors or children can order controlled substances without adult supervision. Other concerns include potential lack of confidentiality, improper packaging, inability to check for drug interactions, and several other issues. E-pharmacies in India have significantly increased due to growing E-commerce in India and little regulation of the industry. There is "no regulatory control over drug advertisements on television or the Internet".</p> <p>There is no specific law to deal with online pharmacies in India but multiple laws govern online pharmacies in an indirect manner. The Drugs and Cosmetics Act, 1940, and the Drugs and Cosmetics Rules, 1945, have</p>

		<p>guidelines on the sale of <u>Schedule H</u> and <u>Schedule X</u> drugs. These can be sold only on prescription and there are specific rules, including for labelling and bar coding. It appears that electronic prescriptions should be valid especially in the light of the Pharmacy Practise Regulations of 2015 declared by Pharmacy Council of India in January 2015. In these regulations, “Prescription” is defined by regulation means a written or electronic direction from a Registered Medical Practitioner. On basis of existing regulations it appears that a scanned copy of prescription will be perfectly considered as a valid prescription.</p>	
TECHNICAL SESSION - V			
<p>Lecture 8 (1 hour)</p>	<p>Dr. P. Pachauri Director (P & P), NIET, Greater Noida</p>	<p>Additive Manufacturing in Pharmaceutical Industry Addictive manufacturing, as per ASTM, is a process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies. 3D printing is any of various processes in which material is joined or solidified under computer control to create a three-dimensional object. Various 3D printed objects available in the market are prosthetic parts, ear cartilage, medical equipment, cranium replacement, synthetic skin, organs and drugs. A 3D printed “polypill” that contains three different drugs has already been developed for patients with diabetes and hypertension (captopril, nifedipine, and glipizide, to treat hypertension and type 2 diabetes). Along with 3d printing, the newer concept of 4D printing has originated, which creates 3D objects that change their shape over time in response to stimuli such as heat, moisture or light. It is useful for making structures that can adapt to their environment, but is often a laborious process. The most common materials used in 4D printing, shape-memory polymers, normally require at least five steps to make them into adaptable objects. Hydrogels are simpler to use, but too soft to fashion into rigid structures. Thus 4D bioprinting has emerged as a useful tool for biomedical applications, such as tissue regeneration and drug delivery.</p>	
<p>Lecture 9 (1 hour)</p>	<p>Mr. Avikshit Saras Chief Operating Officer – I Print My Things, Delhi</p>	<p>Introduction to 3DP</p>	<p>3D Printing is a process for making a physical object from a three-dimensional digital model, typically by laying down many successive thin layers of a material. It brings a digital object (its CAD representation) into its physical form by adding layer by layer of materials. 3DP technology relies on computer-aided designs to achieve unparalleled flexibility, time-saving, and exceptional manufacturing capability, when applied to pharmaceutical drug products. The process involves 3D proto-typing of layer-by-layer fabrication (via computer-aided design models) to formulate pharmaceutical ingredients into the desired dosage form. 3DP is gaining increasing attention in pharmaceutical formulation development as an effective strategy to overcome some challenges of conventional pharmaceutical processes.</p>
<p>Lecture 10 (1 hour)</p>		<p>Pharma 3DP</p>	

TECHNICAL SESSION - VI			
Lecture 11 (1 hour)	Mr. Avikshit Saras Chief Operating Officer – I Print My Things, Delhi	CAD Designing	The session included CAD Designing, where participants were trained on how to design CAD files.
Lecture 12 (2 hours)		Practical Approaches on CAD Designing	
TECHNICAL SESSION - VII			
Lecture 13 (1 hour)	Mr. Nipun Sachdeva M2R Technomations, Gurgaon	Introduction of AI	Artificial intelligence (AI, also machine intelligence, MI) is intelligence demonstrated by machines, in contrast to the natural intelligence (NI) displayed by humans and other animals.
Lecture 14 (1 hour)		Applications of AI	Artificial intelligence is breaking into the healthcare industry by assisting doctors. There is a great amount of research and drugs developed relating to cancer. In detail, there are more than 800 medicines and vaccines to treat cancer. Its goal is to memorize all the papers necessary to cancer and help predict which combinations of drugs will be most effective for each patient.
Lecture 15 (1 hour)		Introduction & Basics of Python	Python is a widely used general-purpose, high level programming language. It was initially designed by Guido van Rossum in 1991 and developed by Python Software Foundation. It was mainly developed for emphasis on code readability, and its syntax allows programmers to express concepts in fewer lines of code.
TECHNICAL SESSION - VIII			
Lecture 16 (1 hour)	Mr. Ashish Kumar M2R Technomations, Gurgaon	AI/ML Algorithms like Linear Regression, Logistic Regression	logistic regression is a technique borrowed by machine learning from the field of statistics. It is the go-to method for classification of problems. Despite the name “logistic regression” this is not a algorithm for regression problems, where the task is to predict a real-valued output. Unlike linear regression, the prediction for the output is transformed using a non-linear function called the logistic function. Logistic regression measures the relationship between the categorical dependent variable (target class: yes/no, spam/not spam, positive/negative) and one or more independent variables by estimating probabilities. Like linear regression, logistic regression does work better when you remove attributes that are unrelated to the output variable as well as attributes that are very similar (correlated) to each other. The reason Logistic Regression is widely used despite the fact of the state of the art algorithms such as deep neural networks it’s because logistic regression is

			very efficient and does not require too much computational resources which makes it affordable to run on production.
Lecture 17 (1 hour)		Naive Bayes, Clustering, Fuzzy Logics, Neural Nets	Naive Bayes is a classical supervised machine learning algorithm widely used for text classification. Artificial neural network (ANN) is a network of efficient computing systems the central theme of which is borrowed from the analogy of biological neural networks. ANNs are also named as “artificial neural systems,” “parallel distributed processing systems,” “connectionist systems.” ANN acquires large collection of units that are interconnected in some pattern to allow communications between units. These units, also referred to as nodes or neurons, are simple processors which operate in parallel.
Lecture 18 (1 hour)		Introduction to Deep Learning and Neural Networks	Fuzzy logic is largely used to define the weights, from fuzzy sets, in neural networks. When crisp values are not possible to apply, then fuzzy values are used. We have already studied that training and learning help neural networks perform better in unexpected situations. At that time fuzzy values would be more applicable than crisp values. When we use fuzzy logic in neural networks then the values must not be crisp and the processing can be done in parallel. Deep Learning is at the cutting edge of what machines can do, and developers and business leaders absolutely need to understand what it is and how it works. This unique type of algorithm has far surpassed any previous benchmarks for classification of images, text, and voice. Neural networks are inspired by the structure of the cerebral cortex. At the basic level is the perceptron, the mathematical representation of a biological neuron. Like in the cerebral cortex, there can be several layers of interconnected perceptrons.
TECHNICAL SESSION - IX			
Lecture 19 (1 hour)	Mr. AvikshitSaras Chief Operating Officer – I Print My Things, Delhi	Review of CAD Designing	In this session, the CAD file designing was reviewed and the participants were trained to 3D print the prepared CAD files.
Lecture 20 (2 hours)		Practical Approaches on 3D Printing in Pharmacy	

VALEDICTORY SESSION

Valedictory Speeches (3 Hours)	Dr. Avijit Mazumder , Director, NIET Pharmacy Institute, Greater Noida	Dr. Girdhari Lal Garg, Asst Director, RIFD, AICTE, New Delhi delivered the significance of personalized medicines and suggested the doctors should avoid giving randomized medicines on the basis of trial and errors. He highlighted that medical and personal insurances should cover the cost of various diagnostic tests commonly used so that it does not become a personal burden to the patients in a poor country like India. Dr Ajay Kumar suggested that the faculties should percolate the crux to the students so that they can face the challenges. Dr Rupa Mazumder highlighted the sessionwise summary of various lectures by speakers.
	Dr. Ajay Kumar , Director, NIET, Greater Noida	
	Dr. P. Pachauri , Director (P & P), NIET, Greater Noida	
	Dr. Giridhari Lal Garg , Asst. Director, AICTE, New Delhi	
	Dr. Rupa Mazumder , Professor and Dean (R & D) Pharmacy, NIET Pharmacy Institute, Greater Noida	