CONFERENCE PROCEEDINGS

UGC sponsored NATIONAL SEMINAR

ज्ञान-विज्ञान विमुक्तये

"Modern Trends in Drug Development"

2nd & 3rd March 2021

Organized by

University College of Pharmaceutical Sciences

Acharya Nagarjuna University

Nagarjuna Nagar, Guntur,
Andhra Pradesh, India.

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Modern Trends in Drug Development

University College of Pharmaceutical Sciences,
Acharya Nagarjuna University, Gutur, A.P., India.

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The National Assessment and Accreditation Council (NAAC) Awarded ANU as 'A' Grade University

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MESSAGE

I am pleased to know that University College of Pharmaceutical Sciences, ANU is going to organize UGC Sponsored National Seminar on "Modern Trends in Drug Development" on 2nd & 3rd March, 2021.

Pharmacy as a vital division of life sciences deals with designing new drugs and their development into viable dosage forms with quality & safety. The field of pharmaceutical sciences is ever developing technically to develop new drugs and drug products in combating the diseases and infections. Pharmacy commercially meets the needs of public for their improved health. Designing and developing a drug product is usually time consuming process with huge money input. The modern technologies developed in the scientific field in biotechnology and computer science can be utilized to increase the pace of the drug development only to minimize the cost incurred due to prolongivity. To overcome the challenges encountered during the drug development, one needs adequate modern technology.

I firmly believe that this seminar will enlighten the delegates about the modern trends and technology in developing new drugs. I wish the seminar would be a splendid success.

(Prof. RAJA SEKHAR, P)

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RECTOR'S MESSAGE

I am happy that the University College of Pharmaceutical Sciences, ANU is going to organize the UGC Sponsored National Seminar on "Modern Trends in Drug Development" on 2nd& 3rd March 2021.

Development of new drugs and drug products involve wide range of studies and necessitate use of several technologies. The process of drug development is usually a long process and requires the knowledge and technology related to chemistry, biology, physics and computers for rapid and effective drug development. Newly developed technologies in the related fields are needed to be understood and applied suitably in the drug development process to hasten the process yet delivering safe and effective drug products.

I hope this seminar will explain some of those modern technologies that can be adopted in the drug development process and the participants will make best use of them for their research. I extend my wishes to the organizers for successful conduct of this two day National seminar sponsored by the UGC.

26/02/2021

ACHARYA NAGARJUNA UNIVERSITY
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REGISTRAR'S MESSAGE

I am glad to the University College of Pharmaceutical Sciences, ANU on organizing UGC Sponsored National Seminar on **"Modern Trends in Drug Development"** on 2nd& 3rd March 2021.

Novel technologies are continuously evolving for their multidimensional application in various fields of sciences including pharmaceutical sciences. Eruption of new diseases/ill-health conditions/infections also ever happen which should be combat effectively through development of new and effective drug products. Utilization of novel scientific technologies in the field of pharmacy for development of new drug products in less time with less money incurred so as to make them available for the public at low price

The University College of Pharmaceutical Sciences has grand history of conducting more than 12 successful Seminars/Conferences/Workshops and I aspire this seminar would also be a splendid success.

REGISTRAR

ACHARYA NAGARJUNA UNIVERSITY
COLLEGE OF PHARMACEUTICAL SCIENCES
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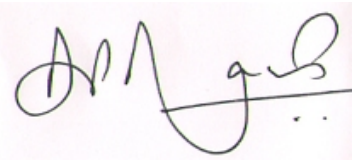
MESSAGE

I am delighted to share with you that our college, University College of Pharmaceutical Sciences, ANU is going to organize UGC Sponsored National Seminar on "Modern Trends in Drug Development" on 2nd & 3rd March, 2021.

Modern technologies developed from various fields of sciences including pharmaceutical sciences like *in silico* drug designing and high throughput screening from synthetic chemistry; advanced instrumentation methods like LC-MS and GC-MS from analytical chemistry; utilizing artificial neural networking in developing suitable dosage forms and also in their clinical trials will result in development of new drugs and drug products with improved efficiency in less time. Adopting modern technologies in drug development may pose several challenges which can be effectively overcome by careful understanding of the concepts and selective application.

I wish this seminar address application of modern technologies in various stages of drug development. I wish all the participants to have wonderful scientific interactions and hope the seminar will be huge success.



Prof. A. Prameela Rani

Prof. K.V. RAMANA MURTHY
M. Pharm., Ph.D., D.A.S.
PROFESSOR (STAGE-6) &
PRINCIPAL (Retired)
A.U. College of Pharmaceutical Sciences &
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MESSAGE

I am indeed privileged to be the Key Note Speaker for the UGC Sponsored National Seminar on "Modern Trends in Drug Development" being organized by University College of Pharmaceutical Sciences, Acharya Nagarjuna University, Nagarjuna Nagar.

Pharmaceutical scientists are exploring the new methods and approaches for development of drugs and formulations for combating the health problems posed to mankind caused by environment, life style changes, unforeseen infections etc. Novel techniques like combinatorial chemistry, high throughput synthesis, high throughput screening, use of software like computer aided drug design and delivery helped in developing new molecules and delivery systems. During the last two decades, novel drug delivery systems like chronotherapeutics, nano and targeted drug delivery systems, new type of vaccines were successfully introduced into the market. The regulatory agencies are also gearing up to meet the challenges for approving these new chemical entities and dosage forms by adopting techniques like quality by design, new stability testing protocols etc.

The organizers of the seminar should be congratulated for selecting such a novel theme for the conference for highlighting these advances and enlightening the young budding pharmacists with the latest advances by inviting resource persons of expertise in the field.

With great pleasure and pride, I welcome all the participants and convey my best wishes to the organizing committee and participants in this regard and wishing the conference a great success.

(K.V. RAMANA MURTHY)

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MESSAGE

It has been a great privilege to conduct the UGC sponsored National Seminar on '**Modern Trends in Drug Development'** on behalf of University college of Pharmaceutical Sciences, Acharya Nagarjuna University.

Viable drugs are becoming harder to find and subsequent ly more expensive to test and get to the market. The most expensive aspect of drug development is clinical trials which account for 60% of R&D's cost. Modern trends include usage of AI , machine learning etc, which not only decrease the material usage and time consumption but also the investment. Patient-centric clinical trials is another trend to save the cost of drug development. The two- day seminar is aimed at this discussion.

I would like to thank all the college managements, teachers and well-wishers from the industry who have contributed directly or indirectly towards planning, coordination and support.

On behalf of **Acharya Nagarjuna University College of Pharmaceutical Sciences** and organizing committee I extend a warm welcome to all the guests and delegates to **Acharya Nagarjuna University** to participate in the this national seminar and make it a grand success.

I wish all the participants to have a wonderful scientific interactions and memorable stay at **Acharya Nagarjuna University**.

U. Annapurna

Dr. U. Annapurna
(Seminar Director)

Abstracts of Plenary Sessions

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MODERN TRENDS IN DRUG DEVELOPMENT TOWARDS COMMERCIALIZATION

Dr. K.V. Ramana Murthy
Professor (Stage-6) and Principal (Retd.),
A.U. College OF Pharmaceutical Sciences,
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Drug development in olden days is a time consuming process where the process goes by empirical approach and fact based research. This process is a costly process and outcomes are not result oriented many a times. Hence, majority of the research organizations are not interested in going for drug development. However, during the last 2-3 decades, the situation changed significantly due to introduction of modern research practices like structure activity relationships, high throughput synthesis, high throughput screening, combinatorial chemistry, ligand based pharmacophore modelling, computer aided drug design etc. These technologies helped in the development of lead molecules initially for different diseases and they are screened in the laboratory for their therapeutic effects and successful molecules were further scaled up for commercial application.

Changes in the therapeutic regimes also lead to the development of new technologies for dosage form design like controlled drug delivery, transdermal drug delivery, gastric floating drug delivery, novel dosage forms like nanotechnology, targeted drug delivery etc. There is a need for targeting drugs to certain diseases like cancer, HIV, Parkinson's disease, Alzheimer's etc. for more therapeutic effect and to reduce the side effects of the drugs. These novel drug delivery systems gained lot of significance in recent times in addressing these issues. The present market for novel drug delivery systems in US is estimated to be $2.3 Billion during 2020 and projected to grow to $4.8 Billion by the end of 2027 with an expected Compound Annual Growth Rate (CGAR) of 24%. Other countries like China, Canada, European Union are also projecting similar CGAR (19-22%). This indicates the opportunities available for practicing the modern trends in drug development and their commercialization.

During the Covid-19 pandemic, pharma companies all over the world developed different types of vaccines for protecting the mankind against Covid. In India, Bharat Biotech in collaboration with Indian Council for Medical Research also used the earlier platforms that are

developed for different vaccines and modified the technology to develop COVAXIN using whole-virion inactivated vero cell using these technologies. Indian Institute of Technology, Hyderabad Scientists also helped Bharat Biotech in synthetic production of TLR7/8 (chemisorbed agonist) used in the production of requisite of immune response and also developed a suitable validated analytical method for TLR7/8. All this could be possible with these modern trends of research and effective use of these techniques that lead to commercialization.

The major advantages of these techniques are more number of trails can be performed with less manpower, predictable outcomes and low quantities of raw material. However, use of these modern trends of research are having certain limitations like initial higher cost, proper training for the researchers, effective interpretation of results. New horizons in drug research for many diseases like cancer, HIV etc. would be possible by proper balancing of these advantages and disadvantages.

ROLE OF *DE NOVO* DRUG DESIGN IN DRUG DEVELOPMENT

Dr. Deepthikini
Associate Professor, Karnataka College of Pharmacy, RGUHS

Drug design is the inventive process of finding new medications based on the knowledge of biological targets. ***De Novo*** drug design is an iterative process in which 3D structure of the receptor is used to design newer molecule. It involves structure determination of the lead target complexes and the design of lead modification using molecular modeling tools. The importance of scoring function that can be used to predict compounds reactivity and potency is highlighted, and several promising solutions. Here 3D structure of the receptor or 3D pharmacophore is used to design new molecules. This enables us to tailor a natural or individually designed gene to specific needs. This pathway is faster and easier, and encourages manufacturers to be more innovative.

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IN SILICO DRUG DESIGN AND VIRTUAL SCREENING

Dr. Perugu Shyam
Assistant Professor, Department of Biotechnology, NIT Warangal

In silico' is a modern word frequently used to perform experimentation by using computer technology and is related to the more commonly known biological terms *in vivo* and *in vitro*. The antiquity of the '*in silico*' term is poorly defined, with several researchers claiming their role in its origination. Informatics is a factual support to discovery when analysing biological functions. *In silico drug discovery and* pharmacology is a rapidly growing area that globally covers the development of techniques for using computer software to capture, analyse and integrate biological, medical and therapeutics. Computational methods are helping us to make proper decisions and simulate virtually every facet of drug discovery. Drug repurposing has become an important branch of drug discovery. drug repurposing has gained an important role, because it helps in optimization issues and finding new drug–target, target–disease, and ultimately drug–disease associations. Whenever high quantity of synthesized compounds are there single *in silico* performance is not sufficient, advanced computational methods need to perform high computational screening. Virtual screening (VS) uses computational power to test large sets of chemical compounds in a few days at low costs. Moreover, not only real compounds but also purely theoretical ones can be included in the virtual library and screened by using silico methods. High throughput screening (HTS) is typically used at an early stage of the drug design process in order to test a large compound assembly for potential activity against the chosen target. vHTS aims at using computational tools to estimate a *priori*, from an entire database of existing compounds, those that are the most likely to have some affinity for the target.

SCIENCE AND STATISTICS BEHIND THE DEVELOPMENT OF DRUG PRODUCT

Dr. T. E. Gopala Krishna Murthy
Principal & Professor, Bapatla College of Pharmacy, Bapatla

A new medicine will take an average of 10–15 years and more than US$2 billion before it can reach the pharmacy shelf. New technologies such as ultra-high-throughput drug screening and artificial intelligence are being heavily employed to reduce the cost and the time of early drug discovery. To formulate a drug in to drug product, the concepts and fundamentals of science and statistics are required. Science knowledge is required to know how a drug is absorbed, distributed, metabolized, and excreted, its potential benefits and mechanisms of action, the best dosage, the best way to give the drug (such as by mouth or injection),side effects or adverse events that can often be referred to as toxicity, how it affects different groups of people (such as by gender, race, or ethnicity) differently, how it interacts with other drugs and treatments, its effectiveness as compared with similar drugs, physico- chemical, microbiological and *in vivo* stability, possible repurposing . Based on the earlier scientific knowledge and evidence, certain factors which are influencing the technical feasibility, stability, efficacy and safety can be identified. To demonstrate the impact of experimental variables on outcome, a well-designed experimentation and proper interpretation of experimental results are required. The importance of science, descriptive and inferential statistics in development of simulation, empirical, mathematical models pertaining to drug product development is presented in this UGC sponsored national seminar on modern trends in drug development.

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IMPACT OF GENOTOXIC AND NITROSAMINE IMPURITIES IN APIS AND THEIR CONTROL STRATEGIES

For the past few years identification and control of genotoxic impurities in pharmaceutical products has become worldwide one of key issues within development and commercialization of the products. Since some of these impurities may cause mutations and potentially a cancer, efforts are necessary to avoid and/or keep them to minimal levels to limit the potential carcinogenic risks and so ensure the safety of the products. Recent findings of nitrosamine impurities in angiotensin II receptor blockers (For e.g. Losartan, Valsartan etc.), histamine H2 receptor blocker-Ranitidine brought a great attention and alert in both regulatory and scientific communities due to their high carcinogenic potential. Its an extreme importance to assess the causes for formation/contamination of these impurities in drug substances and adopt the suitable analytical methods to determine them at acceptable limits.

The presentation will cover the impact of Genotoxic and nitrosamines on human lives, sources of these impurities in drug substances and their control strategies.

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Scientific Abstracts

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Paper No: MTD-PH_01

NOVEL APPROACH TO IMPROVE THE ENTRAPMENT EFFICIENCY AND FLOW PROPERTIES OF ALGINATE BEADS LOADED WITH WATER SOLUBLE DRUGS [METAPROLALOL TARTRATE]

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Alginate beads are usually prepared by employing either ionic gelation or emulsification ionic gelation techniques. These beads are nearly spherical and suitable for controlled release; however the entrapment efficacy of water soluble drugs is relatively less compared to hydrophobic drugs. This investigation is aimed to develop a new process for improving the entrapment efficacy of hydrophilic drug metoprolol tartrate and to achieve perfect spherical shape to the beads. The drug layering was done by depositing the mixture of drug and alginate dispersion on inert microcrystalline cellulose beads in a conventional coating pan. Suitable heating conditions were maintained for the removal of water and then calcium chloride solution was sprayed on to the alginate beads. The curing solution was retained for sufficient period of time to complete the curing followed by drying.The formulated beads were evaluated for size, size distribution, micromeretic properties, drug entrapment efficiency and drug release studies. The observed physic chemical properties were compared with the beads prepared by employing ionic gelation technique. The entrapment efficiency is increased from 60% to 95% and excellent flow was observed. The equivalent quantity of microcapsules required to carry the desired dose was found to be reduced and small volume of the product is sufficient.

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Paper No: MTD-PH_02

SOLID DISPERSION: A TECHNIQUE IMPROVING SOLUBILITY OF POORLY SOLUBLE DRUGS

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The solubility behaviour of drugs remains one of the most challenging aspects in formulation development. Solid dispersion technologies are particularly promising for improving the oral absorption and bioavailability of BCS ClassII drugs. With the advent of combinational chemistry and high through put screening, the number of poorly water soluble compounds has dramatically increased. In this review, it is intended to discuss the recent advances related on the area of solid dispersions. New manufacturing processes to obtain solid dispersions have also been developed to reduce the drawbacks of the initial process. This review explains advantages, disadvantages, method of preparations, and characterization of the solid dispersion.

Keywords*:* Solubility, Solid Dispersions, Carrier, Bioavailability.

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Paper No: MTD-PH_03

MICROBALLOONS

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The purpose of this is to accumulate the recent study on floating drug delivery system with special emphasis on microballoons as drug delivery. Microballoons are emerging as the most promising drug delivery as it overcome many limitations of conventional drug delivery system. As microballoon delivery system provides longer retention in gastric pH environment. The formation of cavity inside the microsphere dependence upon the penetration temperature and surface smoothness determines the floatability and the drug release rate of microballoons.

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Paper No: MTD-PH_04

SUSTAINED RELEASE DRUG DELIVERY SYSTEMS

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Oral drug delivery is the largest and the oldest segment of the total drug delivery market and most preferred route for drug administration. Oral route has been the most popular and successfully used for sustained delivery of drugs because of its convenience, ease of administration, greater flexibility in dosage form design, ease of production and low cost of such a system. The main aim of preparing sustained release formulations was intended to modify and improve the drug performance by increasing the duration of drug action, decreasing the frequency of dosing, decreasing the required dose employed, providing uniform drug delivery. The goal of SRDF's is to obtain Zero order release from the dosage form. Zero order release is a release which is independent of the amount of drug present in the dosage form. Usually SRDF's do not follow zero order release but they try to mimic zero order release by releasing the drug in a slow first order fashion. Pharmacological action is seen as long as the drug is in therapeutic range, problems occur when drug concentration is above/below the therapeutic range.

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Paper No: MTD-PH_05

DEVELOPMENT OF CIPROFLOXACIN HYDROCHLORIDE LOADED IN-SITU GEL FOR THE TREATMENT OF PERIODONTITIS: IN-VITRO DRUG RELEASE STUDY AND ANTI-BACTERIAL ACTIVITY

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Background and Aim: Periodontitis is one of the widest spread oral diseases. Medicated ***in-situ*** gel of Ciprofloxacin Hydrochloride (CH) for an extended period of retention in the infected cavity were prepared for improved local action for the treatment of periodontitis. **Methods:** Medicated formulations were prepared using ion-sensitive (badam gum) and pH-sensitive (carbopol 934P) polymers. The central composite design was employed and prepared batches were characterized by FTIR, pH, syringeability, drug content, clarity, gelation temperature, gelling time, in-vitro gelling capacity, in-vitro diffusion study. **Results:** Gelation temperature, (in-vitro) gelling time and the nature of gel formed in simulated saliva showed polymeric concentration dependency. The diffusion study of optimized ***in-situ*** gel had been performed which showed augmented arrival of medication from 7-10 hours and the discharge was dependent on polymer utilized. In vitro anti-microbial study was carried out by utilizing E.coli and S.aureus and the results suggested that formulated ***in-situ*** gel have better anti-microbial activity when compared with pure CH. **Conclusion:** The formulated CH loaded ***in situ*** gel can be used as an alternative approach to treatperiodontitis.

Keywords: Periodontitis; *In-situ* gel; Sustained drug delivery; Ciprofloxacin hydrochloride; Polymers; Central composite design.

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Paper No: MTD-PH_06

PREPARATION AND CHARACTERIZATION OF HYDROXYAPATITE

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Waste materials from natural sources are important resources for extraction and recovery of valuable compounds. Hydroxyapatite (HAP) is a biomaterial that can be extracted from natural wastes .HAP has been widely used in biomedical applications owing to its excellent bioactivity, high biocompatability and excellent osteoconduction characteristics. HAP can activate fibroblast and accumulate vessel endothelial cells and thereby support the healing of skin wounds. HAP bioceramics contact tightly and adhere strongly with skin tissue to prevent exitsite and tunnel bacterial infection. HAP materials might be utilized as percutaneous device. HAP nanoparticles could stimulate the axanol out - growth thus HAP might provide a new approach for therapy or prevention of nerve injury. HAP was isolated from egg shells collected from Bapatla ladies hostel. Chitosan is a sugar that is obtained from the hard outer skeleton of shellfish, including crab, lobester, and shrimp. It is used for medicine, high blood pressure, high cholesterol, obesity, wound healing, and other conditions. Chitosan was also isolated from shrimp shells[Litopenaeussctiferus] collected from Nizampatnam fish market .HAP and chitosan were confirmed by differential thermal analysis and IR spectral studies.. HAP is incorporated in to chitosan gel.

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Paper No: MTD-PH_07

BIOINFORMATICS

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Bioinformatics is an interdisciplinary field that develops and applies computational methods to analyse large collections of biological data, such as genetic sequences, cell populations or protein samples, to make new predictions or discover new biology. The computational methods used include analytical methods, mathematical modelling and simulation. In this congress, a variety of research areas was discussed, including bioinformatics which was one of the major focuses due to the rapid development and requirement of using bioinformatics approaches in biological data analysis, especially for omics large datasets.

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Paper No: MTD-PH_08

LIQUISOLID TECHNIQUE

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At present 40% of the drugs in the development pipelines, and approximately 60 % of the drugs coming directly from synthesis are poorly soluble. The limited solubility of drugs is a challenging issue for industry, during the development of the ideal solid dosage form unit. Liquisolid technique is a novel and promising approach to overcome this consequence. The technique is based upon the dissolving the insoluble drug in the non-volatile solvent and admixture of drug loaded solutions with appropriate carrier and coating materials to convert into acceptably flowing and compressible powders. The selection of non-toxic hydrophilic solvent, carrier, coating materials and its ratios are independent of the individual chemical moieties. The increased bioavailability is due to either increased surface area of drug available for release, an increased aqueous solubility of the drug, or improved wettability of the drug particles.

Key words: Moieties, bioavailability.

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Paper No: MTD-PH_09

RECENT UPDATES ON COMPUTER AIDED DRUG DISCOVERY

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Computer aided drug designing (CADD) has gained a wide popularity among biologists and chemists as a part of interdisciplinary drug discovery approach. It plays a vital role in the discovery, design and analysis of drugs in pharmaceutical industry. It is extensively used to reduce cost, time and speed up the early stage development of biologically new active molecules. In the current review we presented a brief review of CADD, merits and demerits, DNA, protein and enzyme as targets, types of CADD: Structure based drug designing (SBDD), ligand based drug designing (LBDD), Pharmacophore based drug designing (PBDD) and fragment based drug designing (FBDD), theory behind the types of CADD and their applications. The review also focuses on the in-silico pharmacokinetic, pharmacodynamic and toxicity filters or predictions that play a major role in identifying the drug like molecules. Currently in pharmaceutical sciences computational tools and software are exhibiting imperative role in the different stages of drug discovery hence the review throws light on various commercial and freeware available for each step of CADD.

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Paper No: MTD-PH_10

NEW TRENDS: DRUG DELIVERY SYSTEMS

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There are many Drug delivery systems are under development. The main aim of Drug delivery system is to reduce drug degradation and loss and to prevent side effects to improve bioavailability. Drug delivery system to target organs or tissues has become one of the challenges of the new century. This type of delivery methods provides major advances in specific delivery.

Keywords: Drug delivery, drug degradation, Nasal Delivery, diabetes, cardiovascular diseases.

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Paper No: MTD-PH_11

FORMULATION AND EVALUATION OF TRANSDERMAL PATCHES OF VALSARTAN

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The aim of the present studies was to formulate and evaluate the transdermal patches of valsartan an angiotensin receptor blocker used mainly by relaxing blood vessels and lowering high blood pressure helps in preventing the strokes, heart attacks, and kidney problems.Valsartan transdermal patches were prepared by using HPMC K15M and poly vinyl alcohol (PVA), as polymers PEG 400 and dimethyl sulfoxide (DMSO) as plasticizers and permeation enhancer which were prepared by solvent casting method. The preparaed patches were evaluated for folding endurance values are in-between 90-100 which indicates that the prepared patches are having good flexibility and elasticity. The valsartan patches prepared with HPMC K15M with showed increased mechanical and tensile strength compared to formulation prepared with poly vinyl alcohol (PVA). The drug release studies showed that the optimized formulation VS-5 released the drug 90.89% at the end of 12 hours. FTIR and DSC studies were conducted for pure drug, polymers and optimized formulation VS-5 which indicated that were no interaction between the drug and the polymers. SEM analysis was conducted for pure drug and optimized formulation VS-5 showed that was no surface fractures and flaws in the patches.

Keywords: Valsartan, Transdermal patches, Solvent casting method, polymers, plasticizers & Permeation enhancer.

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Paper No: MTD-PH_12

DESIGN AND EVALUATION OF ORODISPERSABLE TABLETS OF ESOMEPRAZOLE

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Department of pharmaceutics, Chebrolu Hanumaiah Institute of Pharmaceutical Sciences, Chandramoulipuram, Chowdavaram, Guntur-522019, India.

Aim: The present research work is mainly focused on design and evaluation of Orodispersable tablets of esomeprazole, which are used for the treatment of Gastroesophageal reflux disease. **Materials and methods:** An attempt was made to increase the solubility and dissolution rate of esomeprazole by formulating it as solid dispersions by Physical method, Kneading method and solvent evaporation method. Later the Optimized Solid dispersions were further formulated into Orodispersable tablets using superdisintegrants such as Crosmellose sodium &crospovidone by direct compression technique. **Results:** Characterization studies were carried out by pure drug (Esomeprazole) superdisintegrants (Croscarmellose sodium &Crospovidone) and optimized formulation E6 by FTIR and DSC Studies. The Studies were shown that there was no drug and excipient interaction. The similarity factor f2 values&difference factor f1 values obtained for dissolution profiles of esomeprazole formulations after storage were revealed that there was no change in the dissolution profile and thus the optimized formulation was found to be stable.**Conclusions:**Based on the study, it may be concluded that esomeprazole tablets prepared by using optimized solid dispersions (ES2) with soluplus&Croscarmellose sodium as superdisintegrant was found to be ideal for rapid dispersion and for improving dissolution rate, which in turn increases the bioavailability.

Keywords: Solid dispersions Oro dispersible tablets,Esomeprazole, Soluplus, Croscarmellose sodium and crospovidone.

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Paper No: MTD-PH_13

GOLD NANOSHELLS: A RAY OF HOPE IN CANCER DIAGNOSIS AND TREATMENT

G. OohaDeepika, *Dr. P. BhargavBhushan Rao, *Dr. A. Lakshman Rao

V.V.Institute of Pharmaceutical Sciences, Gudlavalleru

Ideal properties of gold nanoshell has resulted in making it a ray of hope in biomedical areas such as targeted drug delivery, cancer detection and treatment and in eliminating tumors without harming normal healthy cells. Gold nanoshells are spherical particles with diameter ranging from 10-200 nm consisting of a dielectric core that is covered by a thin metallic shell of gold. An important role of gold nanoparticle based agents is their multifunctional nature. This review focuses on physics, synthesis and biomedical applications of gold nanoshells due to their inert nature, non-cytotoxicity and biocompatibility.

Keywords: Gold nanoshell, cancer, diagnosis, treatment

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Paper No: MTD-PH_14

FORMULATION OF SUGAR FREE ANTACID SUSPENSION FOR DIABETIC PATIENTS

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Sugar free antacid suspension is desired for diabetic patients suffering with acid reflex problems. The main objective of this study is to develop a patient friendly antacid suspension with good palatability. Aluminium hydroxide is one of the most commonly used ingredient of the antacid preparations. Sugar is contraindicated for diabetic patients and artificial sweeteners such as Aspartame and Saccharin are having stability and safety issues. So natural sweetening agent Stevia powder (Steviarebaudiana) is used as sweetening agent. The Indian traditional system recommends the usage of Jeera water to relieve gastric discomforts. Jeera(Cuminumcyminum) water is used as aqueous phase. To disperse the Aluminium hydroxide in aqueous phase, linseed (Linumusitatissimum) mucilage was used as suspending agent. The suspension was evaluated for various physical parameters such as sedimentation volume, redispersibility, pH, acid neutralizing capacity and rheological characteristics. The suspension was found to be palatable and physically stable. The acid neutralizing capacity of the suspension was compared with the acid neutralizing capacity observed from the suspension prepared without Jeera water. The suspension prepared with Jeera water exhibited higher acid neutralizing capacity compared with the suspension formulated with water. Thus this investigation successfully developed a physically stable antacid suspension suitable for diabetic patients.

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Paper No: MTD-PH_15

TRANSDERMAL DRUG DELIVERY SYSTEMS

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A transdermal patch is a medicated adhesive patch that is placed on the skin to deliver a specific dose of medication through the skin and into the bloodstream. Often, this promotes healing to an injured area of the body. An advantage of a transdermal drug delivery route over other types of medication delivery such as oral, topical, intravenous, intramuscular, etc. is that the patch provides a controlled release of the medication into the patient, usually through either a porous membrane covering a reservoir of medication or through body heat melting thin layers of medication embedded in the adhesive. The main disadvantage to transdermal delivery systems stems from the fact that the skin is a very effective barrier; as a result, only medications whose molecules are small enough to penetrate the skin can be delivered in this method. A wide variety of pharmaceuticals are now available in transdermal patch form.

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Paper No: MTD-PH_16

TASTE MASKING HERBAL EXCIPIENTS

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The herbal excipient nontoxic and compatible, they have major role to play a pharmaceutical formulation. The active sweet principles stored in plants can be grouped under: terpenoids, steroidal saponinsdihydroisocoumarins , dihydrochalcones, proteins polyols, volatile oils etc., natural food preservatives have been used and known to mankind since a very long time. These are used in both raw as well as cooked food to increasing the shelf life of food so that aroma, taste and the food itself can be for a longer period of time. Natural binders like different starch,gums,mucilages,dried fruits process binding capacity as well as some other properties like filter,disintergrant and natural polymers are safe and economical than synthetic polymers like polyvinylpyrrolidone.The natural colours are naturally provided by living organisms such as plant,animals and microorganisms.

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Paper No: MTD-PH_17

NIOSOMES: A NOVEL DRUG DELIVERY SYSTEM

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Drug delivery systems are defined as formulations aiming for transportation of a drug to the desired area of action within the body. The basic component of drug delivery systems is an appropriate carrier that protects the drug from rapid degradation or clearance and thereby enhances drug concentration in target tissues. Based on their biodegradable, biocompatible, and nonimmunogenic structure, niosomes are promising drug carriers that are formed by self-association of nonionic surfactants and cholesterol in an aqueous phase. In recent years, numerous research articles have been published in scientific journals reporting the potential of niosomes to serve as a carrier for the delivery of different types of drugs. The present review describes preparation methods, characterization techniques, and recent studies on niosomal drug delivery systems and also gives up to date information regarding recent applications of niosomes in drug delivery.

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Paper No: MTD-PH_18

FORMULATION OF NUTRACEUTICALS FROM CHICORY INTYBUS BY TRADITIONAL METHODS

T.V. Gopalakrishna, M. Suryaprabha, Dr. Ch. Baburao

Priyadarshini Institute of Pharmaceutical Education and Research, Pulladigunta, Guntur-522017.

Chicory intybus was the traditionally used medicinal plants in many countries and it was reported for having potpourri of nutrients ranging with carbohydrates, proteins, vitamins, minerals, soluble fiber, trace elements and other bioactive phenolic elements. We can formulate different types of formulations using traditional methods. The nutraceuticals formulated from the chicory can be active against the following properties the include anti-inflammatory, anti-carcinogenic, anti-mutagenic, anti-fungal, anthelmintic, immune stimulating, anti-hepatotoxic and antioxidative property. These formulations can be economical and having good therapeutic effects with less toxic effects. They can be formulated by following traditional methods.

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Paper No: MTD-PH_19

FORMULATION DEVELOPMENT AND CHARACTERIZATION OF DONEPEZIL MOUTH DISSOLVING FILMS

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The purpose of the present work is to formulate and enhance the drug release of Donepezil by the incorporation of natural polymers in the mouth dissolving films for use in specific populations viz. geriatrics and patients experiencing difficulty in swallowing.The oral dissolving films loaded with Donepezil were prepared by solvent evaporation method using methyl cellulose, by adding suitable plasticizer: PG and glycerin. The prepared oral dissolving films were evaluated for drug content, weight variation, thickness, pH, folding endurance, *In vitro* drug release and stability. The evaluation parametersof Donepezil were found to be satisfactory in terms of drug content, thickness and pH. Comparison of the dissolution profiles of Donepezil oral dissolving films in phosphate buffer (pH 6.8). Effectivedrug release was achieved for Donepezil by way of preparation of oral dissolving films by solvent evaporation method. DNZ 09 showed the highest drug release 99.3% at the 10 min time point. The DNZ 09 oral dissolving film with higher amount of superdisintegrant CCS and SSG showed fastest onset of drug release.

Keywords: Donepezil oral dissolving films, solvent evaporation method and Dissolution rate.

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Paper No: MTD-PH_20

RECENT TRENDS IN DRUG DESIGN AND DISCOVERY

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Objective: The aim of the present research was to improve the drug design strategies in field of design of novel inhibitors with respect to specific target protein in disease pathology. Recent statistical machine learning methods applied for structural and chemical data analysis had been elaborated in current drug design field. **Methods:** As the size of the biological data shows a continuous growth, new computational algorithms and analytical methods are being developed with different objectives. It covers a wide area, from protein structure prediction to drug toxicity prediction. Moreover, the computational methods are available to analyze the structural data of varying types and sizes of which, most of the semi-empirical force field and quantum mechanics based molecular modeling methods showed a proven accuracy towards analysing small structural data sets while statistics based methods such as machine learning, QSAR and other specific data analytics methods are robust for large scale data analysis. **Conclusion:** In this chapter, we focus on the recent developments in the structure-based drug design using advanced molecular modeling techniques in conjunction with machine learning and other data analytics methods. Natural products based drug discovery is also discussed.

Keywords: Structure-based drug design, SBDD, Machine learning, QSAR, Data analytics, Data science.

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OSMOTIC DRUG DELIVERY SYSTEMS

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A number of design options are available to control or modulate the drug release from a dosage form. Majority of them are per oral dosage form and they fall in the category of matrix, reservoir or osmotic system Osmotic drug delivery system is one among the controlled drug delivery employed orally and also as an implantable devices. These systems utilize osmosis as the major driving force for drug release. Adequate water solubility of the drug is a prerequisite for osmotic drug delivery system. Osmotic drug delivery devices are composed of an osmotically active drug core, which is surrounded by a rate controlling membrane. Osmotic drug delivery systems differ from diffusion based systems in that the delivery of the active agents is driven by an osmotic gradient rather than the concentration of drug in the device. In this article, different types of osmotic system and their applications were reviewed.

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Paper No: MTD-PH_22

BIOTECHNOLOGICAL APPROACHES FOR DRUG DISCOVERY & DEVELOPMENT

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Biotechnological methods have become an important tool in pharmaceutical drug research and development. Biotechnology helps the pharmaceutical industry to develop new products, new processes, methods and services and to improve existing ones. Biotechnology provides better targeted biopharmaceuticals addressing different stages of a disease. Genomic and Proteomic approaches offer new information on the mode of action of drugs that leads to better, safer treatments. Biotechnology also allows the development of tools that can advance research and development in different therapeutic areas. Biopharmaceutical technology is one of the most promising biotechnologies in the world. The biopharmaceutical technology is mammoth field including biopharmaceuticals to cure and prevent diseases such as cancer, cardiovascular problems and growth retardation in children, to treat viral, bacterial and mycotic infections. With the development of modern biotechnology, biopharmaceuticals are thriving and developing rapidly as a global high-tech biotechnology industry. The most important technology applied in biopharmaceutical industry is genetic engineering technology, which uses cloning technology and tissue culture technology to cut, insert, link, and recombine DNA fragments to gain useful biopharmaceutical products. Biopharmaceutical products include genetic engineering drugs, biological vaccines, and biological diagnostic agents that play an important role in the diagnosis, prevention, control, and eradication of infectious diseases to protect and extend human health and longevity.

Key words: Biopharmaceuticals; Genetic engineering; Vaccines.

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Paper No: MTD-PH_23

THE TRENDING ROLE OF ARTIFICIAL INTELLIGENCE IN PHARMA: UTILIZING VALUABLE RESOURCE

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Using AI for data mining and analytics is already transforming many industries including pharma and biotech. Its uses range from drug discovery to production process automation to clinical applications (such as medical imaging and surgical robots). AI has the capability to optimise marketing strategies, benefit manufacturing processes and drug trailing, so will be adopted for further use in the future. In the pharmaceutical industry, Artificial Intelligence can applicable for R&D (Research and Development), Drug development, Diagnosis, Disease prevention, Epidemic prediction. By integrating this AI technology with smartphone apps, it is possible to monitor the opening and closing motions of the hands of a patient from a remote location. Pharma companies can implement artificial intelligence in the manufacturing process for higher productivity, improved efficiency, and faster production of life-saving drugs. AI can replace the time-consuming conventional manufacturing techniques. AI tools can analyse past marketing campaigns and compare the results to identify which campaigns remained the most profitable. This allows companies to design the present marketing campaigns accordingly, while also reducing time and saving money.

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Paper No: MTD-PH_24

3D BIOPRINTING OF TISSUES AND ORGANS

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Additive manufacturing, otherwise known as three-dimensional (3D) printing, is driving major innovations in many areas, such as engineering, manufacturing, art, education and medicine. Recent advances have enabled 3D printing of biocompatible materials, cells and supporting components into complex 3D functional living tissues. 3D bioprinting is being applied to regenerative medicine to address the need for tissues and organs suitable for transplantation. Compared with non-biological printing, 3D bioprinting involves additional complexities, such as the choice of materials, cell types, growth and differentiation factors, and technical challenges related to the sensitivities of living cells and the construction of tissues. Addressing these complexities requires the integration of technologies from the fields of engineering, biomaterials science, cell biology, physics and medicine. 3D bioprinting has already been used for the generation and transplantation of several tissues, including multilayered skin, bone, vascular grafts, tracheal splints, heart tissue and cartilaginous structures. Other applications include developing high-throughput 3D-bioprinted tissue models for research, drug discovery and toxicology.

Keywords: 3d bioprinting , tissue models

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Paper No: MTD-PH_25

CARBON NANOTUBES BASED DELIVERY SYSTEMS FOR GENES & siRNA

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Carbon nanotubes (CNT's) are composed exclusively of carbon atoms belonging to the family of fullerenes, which is the third allotropic form of carbon following graphite and diamond. The carbon atoms of the nanotubes are assembled in a series of condensed benzene rings rolled up to a tubular form. There are different types of carbon nanotubes available such as single walled carbon nanotubes (SWCNT) and Multi walled carbon nanotubes (MWCNT). There are different methods available for synthesis of carbon nanotubes. Efficient uptake properties of carbon nanotubes have encouraged their use as drug delivery systems. When CNT's, are functionalized with drugs, genes/siRNA's it passes the lipid bilayer by passive diffusion where it undergoes endocytosis and is released at targeted tumour cells upon radiation. Due to their high surface area and unique needle-like structure, CNTs are uniquely equipped to carry therapeutic molecules across biological membranes. Functionalization of CNT's for gene and siRNA include non-covalent and covalent interactions. The applications of CNT's in drug development are promising and widely investigated. Modern applications using CNT's are widely pursued and provide a promising future for drug development.

Keywords: carbon nanotubes, targeted delivery, siRNA, gene delivery.

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Paper No: MTD-PH_26

FORMULATION, OPTIMIZATION AND STUDY OF VARIABLES APPROACH FOR LANSOPRAZOLE LOADED MICROPARTICLE

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Background: The current study deals with quality by design (QbD) approach for lansoprazole loaded microparticle and studying the impact of independent variable on formulation results; while selecting the optimized formulation. *Objective*: The present study deals with Lansoprazole loaded microparticleby studying the effect of variable for response with the help of box-behnken design (BBD). Method: Sixteen formulations were prepared by altering the proportion of excipients and polymers. BBD statistical design was employed to optimize formulation and correlate relationship among all variables. Also the microparticle characteristics, physiochemical properties and dissolution test were performed as per standard monograph. *Result:* Significant quadratic model and second order polynomial equations were established using BBD. To find out the relationship between variables and responses 3D simulated response plot and 2D contour plot were established and studied. An optimized formula was selected based on predicted response with predicted value. *Conclusion:* The optimized formulation with desired predetermined parameter and formulation with variable and responses can be obtained by QbD and could be useful in large experiment with involvement of large number of variables and responses.

Keywords: Lansoprazole, microparticle, box-behnken design, response surface,polynomial equations.

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Paper No: MTD-PH_27

ORAL DISINTEGRATION TABLETS

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Oral drug delivery remains the most preferred route for administration of various therapeutic agents. Recent advances in technology prompted researchers and scientists to develop oral disintegrating tablets (ODTs) with improved patient convenience and compliance. ODTs are solid unit dosage form which dissolve or disintegrate rapidly in the mouth without water or Chewing. Novel ODT technologies address many patient and pharmaceutical needs such as enhanced life cycle management to convenient dosing particularly for pediatric, geriatric and psychiatric patients who have difficulty in swallowing (Dysphagia) conventional tablet and capsules. Technologies used for manufacturing of ODTs are either conventional technologies or patented technologies. This review depicts the various aspects of ODT formulation, super disintegrants and technologies developed for ODT, along with various drugs explored, evaluation tests and marketed formulations in this field.

Keywords: Disintegration, Oral disintegrating tablets, Super disintegrant.

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Paper No: MTD-PH_28

SUPERPOROUS HYDROGELS -VERSATILE DRUG RELEASE RETARDANTS

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Superporous hydrogels (SPHs) are porous hydrophilic crosslinked structures with the facility of absorbing aqueous fluids. Initially hydrogels were developed as a novel drug delivery system for gastric retention devices. But they have the disadvantage that, they swells into aqueous fluids at slow rate (it takes several hours to attain equilibrium swelling), but many of the pharmaceutical applications need fast swelling property. Therefore, Superporous hydrogels (SPHs) were developed, these systems have to immediately swell in the stomach and retain their consistency in the insensible stomach environment, while releasing the pharmaceutical active constituent. For many years, the synthetic characteristics and properties of these SPH materials take account to meet the needs for gastric retention applications. Moreover, an instant swelling of hydrogel has too revealed potential application for peroral intestinal peptide and protein absorption. This review discusses the generations of SPHs, formulation, preparation, characterization and applications of these SPH polymers.

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Paper No: MTD-PA_01

UV SPECTROPHOTOMETRIC METHOD DEVELOPMENT AND VALIDATION OF DEXLANSOPRAOLE BY USING INTERNAL STANDARD PANTOPRAZOLE IN BULK AND PHARMACEUTICAL DOSAGE FORMS

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Background and Aim: Dexlansoprazole is a class of PPI. It is a medication used to treat moderate to severe gastro-esophageal reflux &Pantoprazole is a gastric hydrogen-potassium adenosine triphosphates inhibitor. Simple, accurate, rapid, sensitive, etc estimations have been developed by using the UV spectrophotometric method for the purity of Dexlansoprazole by comparing with the internal standard drug pantoprazole. **Methods:** To determine the purity of DEXO & PANTO different trials have been performed among those **(trail-7**) 70:30 ratio of ACN &Phosphate buffer solution is used as a solvent medium at (Temp- 20-25 ^{0} c). The absorbance maxima were found to be DEXO at 285nm & PANTO at 290nm. The isosbestic point was found to be 285nm. This obeys beer's law & lambert's law and exhibited a good correlation coefficient (R^{2} = 0.992). **Results:** The proposed method satisfied the validation criteria for all parameters evaluated and it is reliable, simple, and rapid. System suitability parameters like accuracy, precision, linearity, robustness& stability according to ICH Q2 (R1) guidelines and were found to be satisfactory**. Conclusion:** It was concluded that the method development was well suitable for routine analysis of DEXO by Using internal standard drug PANTO in bulk drug & its pharmaceutical dosage form.

Keywords: Dexlansoprazole, Pantoprazole, UV spectrophotometry, bulk drug, beer's law, lambert's law.

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Paper No: MTD-PA_02

DEVELOPMENT AND VALIDATION OF STABILITY INDICATING RP-HPLC METHOD FOR THE SIMULTANEOUS ESTIMATION OF SOFOSBUVIR AND VELPATASVIR IN TABLET DOSAGE FORM

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A simple, accurate, precise method was developed for the simultaneous estimation of the Sofosbuvir and Velpatasvir in Tablet dosage form. Chromatogram was run through Std Dis 250 x 4.6 mm, 5µ. Mobile phase containing Buffer 0.1%OPA: Acetonitrile taken in the ratio 50:50 at a flow rate of 1 ml/min. Buffer used in this method was 0.1% OPA buffer. Temperature was maintained at 30°C. Optimized wavelength selected was 240nm. Retention time of Sofosbuvir and Velpatasvir were found to 2.473 min and 3.316. %RSD of the Sofosbuvir and Velpatasvir were and found to be 0.2 and 0.3 respectively. %Recovery was obtained as 99.32% and 100.43% for Sofosbuvir and Velpatasvir respectively. LOD, LOQ values obtained from regression equations of Sofosbuvir and Velpatasvir were 0.44, 1.32 and 0.33, 1.01 respectively. Regression equation of Sofosbuvir is y=10179.x+3201, y=16944x+13228 of Velpatasvir. Retention times were decreased and run time was decreased, so the method developed was simple and economical that can be adopted in Industries.

Keywords: Sofosbuvir, Velpatasvir, RP-HPLC

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Paper No: MTD-PA 03

DEVELOPMENT AND VALIDATION OF RP-HPLC METHOD FOR SIMULTANEOUS ESTIMATION OF MOEXIPRIL AND HYDRO-CHLORTHIAZIDE IN BULK AND TABLET DOSAGE FORM

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In this study a simple, specific, precise and accurate reverse phase high performance liquid chromatographic (RPHPLC) methods has been developed for simultaneous estimation of moexipril and hydrochlothiazide in Tablet dosage form.In the proposed chromatographic method separation was achieved by Inertisil ODS 3v(250 x 4.6 mm, 5um.) column, Mobile phase containing 70 volumes of 0.1% OPA buffer and 30 volumes of acetonitrile in the A was pumped through column at a flow rate of 1.0 ml/min. Temperature was maintained at 20-25°C. Optimized wavelength for moexipril and hydrochlorthiazide was 230 nm. Retention time of moexipril and hydrochlorthiazide were found to be 2.403 min and 3.304 min. %RSD of the moexipril and hydrochlorthiazide were and found to be 0.2 and 0.4 respectively. %Recover was Obtained as 98.44% and 98.81% for Moxeipril and Hydrocholthiazide. LOD, LOQ values were obtained from regression equations of Moxeipril and Hydrochlothizide were 0.13ug/ml, and 0.59mcg/ml.different parameters likes linearity, precision, accuracy, and limit of detection, limit of quantitation, range and selectivity, robustness ruggedness, solution stability as per ICH guidelines and successfully applied to the estimation of Moexipril and Hydrochlorthiazide in the tablet dosage form.

Keywords: Moexipril, Hydrochlorthiazide, RP-HPLC

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Paper No: MTD-PA 04

DEVELOPMENT AND VALIDATION OF NOVEL STABILITY INDICATING RP-HPLC METHOD FOR THE ESTIMATION OF ULIPRISTAL ACETATE IN PHARMACEUTICAL DOSAGE FORM

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A simple, novel, precise, accurate stability indicating RP-HPLC method was developed and validated for the estimation of Ulipristal Acetate in pharmaceutical dosage form. A Phenoxneome,C18 (150 cm × 4.6 mm I.D., 5 µm particle size) column was used as stationary phase with mobile phase consisting of 0.1 %Orthophosphoricacid:acetonitrile 50:50 v/v (pH adjusted to 4.0 with triethyl amine). The flow rate was 1.0 mL/min and effluents were monitored at 223 nm. The retention time was 1.895 min. The linearity was observed in concentration range of 20-100 µg/mL with correlation coefficient of 0.999. The method was validated for linearity, precision, accuracy, system suitability and forced degradation studies like acidic, alkaline, oxidative and hydrolytic stress conditions performed as per ICH guidelines. The results in the study within the acceptable limits and hence this method is used for the estimation of Ulipristal Acetate in pharmaceutical dosage form.

Keywords: Ulipristal Acetate; HPLC; Validation; Dosage Form

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Paper No: MTD-PA 05

DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS ESTIMATION OF PROGUANIL AND ATOVAQUONE BY USING RP-HPLC METHOD

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In this study a simple, specific, precise and accurate reverse phase high performance liquid chromatographic (RPHPLC) methods has been developed for simultaneous estimation of Proguanil and Atovaquone in Tablet dosage form. In the proposed chromatographic method separation was achieved by Kromasil (150 x 4.6 mm, 5.) column, Mobile phase containing Buffer and Acetonitrile in the ratio of 50:50 A was pumped through column at a flow rate of 1 ml/min. Temperature was maintained at 30°C. Optimized wavelength for Proguanil and Atovaquone was 287 nm. Retention time of Proguanil and Atovaquone were found to be 2.155 min and 2.482 min. %RSD of the Proguanil and Atovaquone were and found to be 0.8 and 0.2 respectively. %Recover was Obtained as 99.23% and 99.67% for Proguanil and Atovaquone. LOD, LOQ values were obtained from regression equations of Proguanil and Atovaquone were 1.10ppm, 3.33ppm and 0.88ppm, 2.65ppm respectively. Regression equation of Proguanil is y = 2007x + 4766, and of Atovaquone is y = 2839x+13918. The proposed methods were validated as per International Conference on Harmonisation (ICH) guidelines by means of different parameters likes linearity, precision, accuracy, and limit of detection, limit of quantitation, range and selectivity, robustness ruggedness, solution stability as per ICH guidelines and successfully applied to the estimation of Proguanil and Atovaquone in the tablet dosage form.

Keywords: Proguanil, Atovaquone, RP-HPLC

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Paper No: MTD-PA 06

DEVELOPMENT AND VALIDATION OF NOVEL STABILITY INDICATING RP-HPLC METHOD FOR THE ESTIMATION OF ULIPRISTAL ACETATE IN PHARMACEUTICAL DOSAGE FORM

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A simple, novel, precise, accurate stability indicating RP-HPLC method was developed and validated for the estimation of Ulipristal Acetate in pharmaceutical dosage form. A Phenoxneome, C18 (150 cm × 4.6 mm I.D., 5 µm particle size) column was used as stationary phase with mobile phase consisting of 0.1 %Orthophosphoric acid: acetonitrile 50:50 v/v (pH adjusted to 4.0 with triethyl amine). The flow rate was 1.0 mL/min and effluents were monitored at 223 nm. The retention time was 1.895 min. The linearity was observed in concentration range of 20-100 µg/mL with correlation coefficient of 0.999. The method was validated for linearity, precision, accuracy, system suitability and forced degradation studies like acidic, alkaline, oxidative and hydrolytic stress conditions performed as per ICH guidelines. The results in the study within the acceptable limits and hence this method is used for the estimation of Ulipristal Acetate in pharmaceutical dosage form.

Keywords: Ulipristal Acetate; HPLC; Validation; Dosage Form.

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Paper No: MTD-PA 07

HPLC METHOD DEVELOPMENT AND VALIDATION FOR THE ANALYSIS OF CEPHALEXINE AND BROMHEXINE IN CAPSULE DOSAGE FORM

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A simple, rapid, specific, precise and accurate HPLC method has been developed for the estimation of cephalexineand bromhexine in capsule dosage forms. The mobile phase consisted: Acetonitrile: Methanol:water 50:50(v/v) The flow rate is 1 ml/min. Chromatographic determination of cephalexine and bromhexine was performed on Inertsil ODS -3V, C18 (250 X 4.6 mm Id, 5?m) column. The wavelength of detection is 279.1and 255.9 nm. The injection volume is 20?L. The retention time of bromhexine2.5minutes and cephalexine 4.3 minutes. The developed method was validated in terms of specificity, accuracy, precision, linearity, solution stability, ruggedness, robustness and system suitability. The influence of Acid, Alkaline, Oxidative Stress, Photolytic stress, Thermal stress, and Humidity stress conditions on cephalexine and bromhexine was studied. Results indicated that cephalexine and bromhexine is stable under the experimental conditions. The proposed method has been successfully used for the routine analysis of cephalexine and bromhexine in capsule dosage forms.

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Paper No: MTD-PA 08

ANALYTICAL MEHTOD DEVELOPMENT AND VALIDATION FOR THE QUANTIFICATION OF CLOPIDOGREL AND ROSUVASTATIN BY RP-HPLC IN BULK AND PHARMACEUTICAL DOSAGE FORMS

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A simple, reproducible and efficient reverse phase High performance liquid chromatography (RP-HPLC) method has been developed for estimation of Clopidogrel and Rosuvastatin in its bulk and tablet dosage forms by using RP-HPLC C18, 250X4.6mm, particle size 5µm column. Acetonitrile: Phosphate buffer (pH 3) in the ratio (50:50 v/v), as mobile phase, at flow rate 0.8 mL/min. From the overlay spectrum 238 nm was selected as a wavelength of measurement. The retention times were 2.3 and 3.5 min for Clopidogrel and Rosuvastatin, respectively. Calibration plots were linear (r2 >0.998) over the concentration range 20-100µg/ml for Rosuvastatin and Clopidogrel respectively. The method was demonstrated to be precise, accurate, specific and robust. The proposed method was successfully used for quantitative analysis of capsules. No interference from any component of pharmaceutical dosage form was observed. Validation studies revealed that method is specific, rapid, reliable and reproducible.

Key words: HPLC, Method development, Validation, ICH, Clopidogrel and Rosuvastatin.

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Paper No: MTD-PA 09

VALIDATED ANALYTICAL MEHTOD DEVELOPMENT FOR THE SIMULTANEOUS ESTIMATION OF LEDIPASVIR AND SOFOSBUVIR BY RP-HPLC IN BULK AND PHARMCEUTICAL DOSAGE FORMS

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A specific, effective and precise liquid chromatographic method has been developed and validated for the simultaneous estimation of *Ledipasvir and Sofosbuvir*by RP-HPLC in bulk and pharmaceutical dosage forms. RP-HPLC method was established by using C18, 250X4.6mm, particle size 5µm column. Acetonitrile: Phosphate Buffer (pH 5)in the ratio (50:50 v/v), as mobile phase, at flow rate 1 mL/min. From the overlay spectrum 212 nm was selected as a wavelength of measurement. The retention times were 2.1 and 4.0 min for *Ledipasvir and Sofosbuvir*, respectively. Calibration plots were linear (r2 >0.998) over the concentration range 20-100µg/ml for *Ledipasvir and Sofosbuvir*respectively. The method was demonstrated to be precise, accurate, specific and robust. The proposed method was successfully used for quantitative analysis of marketed formulations. No interference from any component of pharmaceutical dosage form was observed. Validation studies revealed that method is specific, rapid, reliable and reproducible.

Key words: HPLC, Method development, Validation, ICH, *Ledipasvir and Sofosbuvir*.

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Paper No: MTD-PA 10

A NOVEL VALIDATED ANALYTICAL METHOD DEVELOPMENT FOR THE SIMULTANEOUS QUANTIFICATION OF DOLUTEGRAVIR AND RILPIVIRINE BY RP-HPLC IN BULK AND PHARMACEUTICAL DOSAGE FORMS

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A specific, effective and precise liquid chromatographic method has been developed and validated for the simultaneous estimation of Dolutegravir and Rilpivirine by RP-HPLC in bulk and pharmaceutical dosage forms. RP-HPLC method was established by using C18, 250X4.6mm, particle size 5µm column. Acetonitrile:Phosphate buffer pH (4.0)in the ratio (40:60 v/v), as mobile phase, at flow rate 0.8 mL/min. From the overlay spectrum 235 nm was selected as a wavelength of measurement. The retention times were 2.6 and 3.9 min for Dolutegravir and Rilpivirine, respectively. Calibration plots were linear (r2 >0.998) over the concentration range 50-250µg/ml for Dolutegravir and Rilpivirine respectively. The method was demonstrated to be precise, accurate, specific and robust. The proposed method was successfully used for quantitative analysis of marketed formulations. No interference from any component of pharmaceutical dosage form was observed. Validation studies revealed that method is specific, rapid, reliable and reproducible.

Key words: HPLC, Method development, Validation, ICH, Dolutegravir and Rilpivirine.

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A MODIFIED ANALYTICAL MEHTOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS ESTIMATION OF TELMISARTAN AND RAMIPRIL BY RP-HPLC IN BULK AND PHARMCEUTICAL DOSAGE FORMS

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A specific, effective and precise liquid chromatographic method has been developed and validated for the simultaneous estimation of Telmisartan and Ramiprilby RP-HPLC in bulk and pharmaceutical dosage forms. RP-HPLC method was established by using C18, 250X4.6mm, particle size 5µm column. Phosphate bufferpH (4.0):Methanol in the ratio (70:30 v/v), as mobile phase, at flow rate 1 mL/min. From the overlay spectrum 261 nm was selected as a wavelength of measurement. The retention times were 2.8 and 4.7 min for Telmisartan and Ramipril, respectively. Calibration plots were linear (r2 >0.998) over the concentration range 40-80µg/ml for Telmisartan and Ramiprilrespectively. The method was demonstrated to be precise, accurate, specific and robust. The proposed method was successfully used for quantitative analysis of marketed formulations. No interference from any component of pharmaceutical dosage form was observed. Validation studies revealed that method is specific, rapid, reliable and reproducible.

Keywords: HPLC, Method development, Validation, ICH, Dolutegravir and Rilpivirine.

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ANALYTICAL MEHTOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS ESTIMATION OF ELBASVIR AND GRAZOPREVIR BY RP-HPLC IN BULK AND PHARMCEUTICAL DOSAGE FORMS

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A specific, effective and precise liquid chromatographic method has been developed and validated for the simultaneous estimation of Elbasvir and Grazoprevirby RP-HPLC in bulk and pharmaceutical dosage forms. RP-HPLC method was established by using C18, 250X4.6mm, particle size 5µm column. Methanol: Water in the ratio (50:50 v/v), as mobile phase, at flow rate 1 mL/min. From the overlay spectrum 277nm was selected as a wavelength of measurement. The retention times were 6.31 and 3.35 min for Elbasvir and Grazoprevir, respectively. Calibration plots were linear (r2 >0.998) over the concentration range 5-25µg/ml for Elbasvir and Grazoprevirrespectively. The method was demonstrated to be precise, accurate, specific and robust. The proposed method was successfully used for quantitative analysis of marketed formulations. No interference from any component of pharmaceutical dosage form was observed. Validation studies revealed that method is specific, rapid, reliable and reproducible.

Key words: HPLC, Method development, Validation, ICH, Elbasvir and Grazoprevir.

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Paper No: MTD-PA 13

DEVELOPMENT AND VALIDATION OF UV SPECTROPHOTOMETRIC METHOD FOR THE DETERMINATION OF BAMIFYLLINE HYDROCHLORIDE IN PHARMACEUTICAL DOSAGE FORM

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A Simple, precise, cost effective, accurate uv spectrophotometric method has been developed for the estimation of bamifylline hydrochloride in the pharmaceutical dosage form. Bamifylline hydrochloride shows highest λmax at 263nm.The bamifylline hydrochloride follows linearity in the concentration range of 2-10µg/ml, With correlation-coefficient value of 0.9997. The precision of the method was studies as an intra-day and inter-day studies the % RSD value is less than two indicates that the method is precise. The percent recovery was found to be in the range of 99.52 -99.99%. percentage assay of bamifylline hydrochloride tablet (Bamifix) got 99.83%. The proposed spectrophotometric method was validated as per the ICH Q2(R1)guidelines.The proposed UV method is pricise, reproducible and acurrate.Hence this rapid method can be feastble employed for the regular quality control analysis of bamifylline hydrochloride in pharmaceutical dosage forms.

Keywords: Bamifylline hydrochloride, validation ,method development, ultraviolet spectroscopy

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Paper No: MTD-PA 14

RP-HPLC METHOD DEVELOPMENT AND VALIDATION FOR THE ESTIMATION OF ITRACONAZOLE IN BULK AND BIOLOGICAL FLUIDS.

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A simple, specific, accurate and precise reverse phase high performance liquid chromatographic method was developed and validated for the estimation of Itraconazole in biological fluids. Luna Phenyl Hexyl 250x4.6 mm, 5µ with mobile phase containing Acetonitrile : 0.1% OPA(70:30) mixture was used. The flow rate was 1ml/min and effluents were monitored at 209nm. The retention time for 3.237 (Miconazole), 5.190 (Itraconazole). The method was validated for linearity, accuracy, precision, specificity, limit of detection, limit of quantification and robustness. Limit of detection and limit of quantification were found to be 0.059µg/ml and 0.118µg/ml respectively and the % recoveries of proposed method was found to be 100.4 % for Itraconazole. The system suitability parameters such as theoretical plates and tailing factor were found to be 6648 (itraconazole), 3932 (miconazole) 1.20(itraconazole), 1.51(miconazole) The proposed method was successfully applied for the estimation of itraconazole in bulk and biological fluids.

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Paper No: MTD-PA 15

THE ROLE OF ANALYSIS IN DRUG DEVELOPMENT

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The drug discovery has now evolved into a much more scientific and rational process due to better understanding of biological processes and the underlying chemistry, owing to the progress made due to advances in high throughput experimental techniques and availability of high performance computation resources. The process has matured to the stage where drugs are designed rather than being discovered. The development and validation of analytical methods play important roles in the discovery, development, and manufacture of pharmaceuticals. Method development is the process of proving that an analytical technique is acceptable for use to measure the concentration of an active pharmaceutical ingredient (API) in a particular compound dosage form. This allows simplified procedures to verify that a proposed analytical method will accurately and consistently perform reliable measurements of APIs in a given drug preparation. The validation of analytical method is essential for its development, whereby it is extensively tested for specificity, linearity, accuracy, precision, range, limit of detection, limit of quantitation, and robustness. Thus, the development and validation of analytical methods allows one to confirm that accurate and reliable measurement of the potency a pharmaceutical preparation can be performed. The present review highlights the process of drug development, its phases, and analytical methods, including chromatographic, spectroscopic, and electrochemical techniques,which have been applied in the analysis of pharmaceuticals.

Keywords: Drug discovery; drug analysis.

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Paper No: MTD-PA 16

METHOD DEVELOPMENT AND VALIDATION OF STABILITY INDICATING RP-HPLC METHOD FOR THE ESTIMATION OF DORAVIRINE, LAMIVUDINE AND TENOFOVIR IN BULK AND TABLET DOSAGE FORMS

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To develop and validate an accurate and precise RP-HPLC for the simultaneous estimation of Doravirine, Lamivudine and Tenofovir in Bulk and Tablet Dosage Forms. Separation of the selected drugs was optimized on X-Bridge Phenyl C_{18} (4.6 x 150mm, 3.5 µm) column using a mixture of Acetonitrile and Buffer in the ratio of 50:50 v/v with flow rate of 1 ml/min and detected at a wavelength of 232 nm. The method was validated for system suitability, linearity, precision, accuracy, specificity, ruggedness, robustness, LOD and LOQ. The system suitability parameters were within the limits and retention times for Doravirine, Lamivudine and Tenofovir were found to be 3.169, 5.867, and 7.046 min respectively. The method showed linearity between the concentration range of 9.3 – 139.5 µg/ml for Doravirine), 28-420 µg/ml for Lamivudine and 28-420 µg/ml for Tenofovir. The %recovery at 50%, 100% and 150% of Doravirine, Lamivudine and Tenofovir were found to be in the range of 100.52 % - 100.92 %. The assay of the tablets is in good agreement with the developed method. The proposed method was effective for obtaining reliable results and was found to be suitable for the routine analysis of Doravirine, Lamivudine and Tenofovir in bulk and tablet dosage forms.

Key words: Doravirine, Lamivudine and Tenofovir,RP-HPLC,Method development

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Paper No: MTD-PCL 01

A PROGNOSTIC STUDY ON THE EFFECT OF POSTTRAUMATIC STRESS DISORDER ON CEREBRAL ISCHEMIAREPERFUSION INDUCED STROKE.

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Previous studies have been established that the persons experienced a stroke are soon likely to develop several anxiety disorders. In which one of the main anxiety disorders is Posttraumatic Stress Disorder (PTSD). Yet, the likelihood of PTSD in conjunction with cerebral stroke has not been well described. Hence, we evaluated the impact of PTSD on cerebral ischemia reperfusion injury in rodents subjected to single prolonged stress (SPS) and bilateral common carotid artery occlusion (BCCAo) respectively. The relation between PTSD and cerebral stroke is evaluated by performing behavioral, biochemical, histopathology and brain lesion area measurement studies. Interestingly, SPS+BCCAo induction increased the behavioral abnormalities like cognitive impairment, anxiety-like behavior when compared to SPS, BCCAo groups alone. Motor impairment was also observed in SPS+BCCAo rats when compared to SPS rats whereas no change with BCCAo rats. Furthermore, Brain tissues MDA and acetylcholinesterase activity were increased while SOD, catalase and GSH were decreased in SPS+BCCAo subjected rats compared to SPS and BCCAo rats alone. Additionally, SPS+BCCAo induction considerably increased the plasma corticosterone levels and caused severe neurotransmitter alterations. Further, SPS+BCCAo exposure significantly increased the brain lesion area in comparison with BCCAo rats. Moreover, severe histopathological alterations were observed in the hippocampus (CA1) of SPS+BCCAo rats when compared to SPS and BCCAo rats alone. In conclusion, our study results suggested that SPS induced PTSD may aggravate the BCCAo induced cerebral ischemia reperfusion injury.

Keywords: Posttraumatic Stress Disorder, Single Prolonged Stress, Bilateral Common Carotid Artery Occlusion, Bio-chemicals, Histopathology, Brain Lesion Area Measurement.

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Paper No: MTD-PCL 02

ANTI-ARTHRITIC, ANTI-INFLAMMATORY AND ANTI-OXIDANT ACTIVITIES OF POLYHERBAL FORMULATION (RHEUMATIGO) IN RATS

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Rheumatigo is an ancient Siddha medicine that comprises roots of *Pavonia odorata*, *Withania somnifera*, *Plumbagozeylanica*, rhizomes of *Zingiber officnale*, fruits of *Piper nigrum*, *Piperlongum*, leaves of *Vitexnegundo*, metallic powder of *Kantha Chendooram*, and an additive such as lactose. The review of literature on the plants used in the formulation suggests the fact that they act as astringent, immunostimulatory, analgesic, anti-inflammatory, anticonvulsant, antioxidant, bronchial relaxant and also in the treatment of various rheumatic diseases. Different compounds obtained from these species have been evaluated to find out supposed pharmacological effects. Therefore Present research has been undertaken to evaluate the anti-arthritic, anti-inflammatory and anti-oxidant activities of polyherbal formulation (Rheumatigo) in rats. The data analyzed in numerous reports on the chemical and pharmacological characteristics of rheumatigo sustain the view that the formulation retains many therapeutic properties, signifying its prospects in herbal remedy.

Key words: Rheumatigo, rheumatic diseases, pharmacological, therapeutic.

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Paper No: MTD-PCL 03

THE EFFECT OF AQUEOUS EXTRACT OF V. NEGUNDO LINN LEAVES AGAINST GENTAMICIN INDUCED NEPHROTOXICITY IN RATS

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The kidneys are dynamic organs and represent the major control system maintaining body homeostasis, affected by many chemicals and drugs. Still there is no medicine for nephrotoxicity because there is regenerative capacity of nephrons hence herbal medicines may improve renal activity to reduce several wastes metabolites from body instead of dialysis. The present study was an attempt to investigate the phytochemical and pharmacological (nephroprotective) activity of aqueous extract of *V. negundo* leaves. Fresh leaves of *V. negundo* were collected and the sample of the plant specimen was identified and authenticated by a botanist from botanical garden. Phytochemical tests for saponins, tannins, carbohydrates, flavonoids, alkaloids, steroids triterpenoids and glycosides were performed according to the standard protocol. Preliminary phytochemical screening of aqueous extract of *V. negundo* leaves showed the presence of flavonoids, glycosides, steroids and absence of saponins, tannins. Evaluation of Nephroprotective activity shows gentamicin increase the concentration of serum urea, uric acid, blood urea nitrogen than the normal animals indicated severe nephrotoxicity. *V. negundo* act as a potent natural nephroprotective agent to prevent ongoing gentamicin induced nephrotoxicity.

Keywords: *V. negundo*, Phytoconstituents, Gentamicin, Nephroprotective.

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Paper No: MTD-PCL 04

PHARMACOLOGICAL APPLICATIONS OF Nrf2 INHIBITORS AS POTENTIAL ANTINEOPLATIC DRUGS

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Oxidative stress (OS) is associated with many diseases ranging from cancer to neurodegenerative disorders. Nuclear factor- erythroid 2 p45-related factor 2 (Nrf2) is one of the most effective cytoprotective controller against OS. Modulation of Nrf2 pathway constitutes a remarkable strategy in the antineoplatic treatments. A big number of Nrf2-antioxidant response element activators have been screened for use as chemo-preventive drugs in OS associated diseases like cancer even though activation of Nrf2 happens in a variety of cancers. Research proved that hyper activation of the Nrf2 pathway produces a situation that helps the survival of normal as well as malignant cells, protecting them against OS, anticancer drugs, and radiotherapy. In this review, the modulation of the Nrf2 pathway, anticancer activity and challenges associated with the development of an Nrf2-based anti-cancer treatment approaches are discussed.

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Paper No: MTD-PCL 05

IN-VITRO ANTI-INFLAMMATORY ACTIVITY ASSESSMENT BY VISIBLE SPECTROPHOTOMETRIC METHOD

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Manilkarazapota L. (Sapotaceae) seeds have been reported to exhibit antibacterial activity. The present study was carried out to investigate phytochemical and antioxidant profile of seeds of *Manilkarazapota* L. The methanolic crude extract of its seeds were subjected for in-vitro anti-oxidant activity by savenging of hydroxyl radical in p-NDA method. The successive methanol extract have shown potent anti-oxidant activity by p-NDA method with 25 µg/ml, 50 µg/ml and 100µg/ml respectively. The crude methanol extract has shown significant anti-oxidant activity by scavenging of hydroxyl radical in p-NDA method. All the concentrations prepared were paving dose dependent anti-oxidant activity.

Keywords: *ManilkaraZapota* L, Methanolic Extract, p-NDA Method, Anti-Oxidant Activity

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Paper No: MTD-PCL 06

BIOSENSORS AND ITS APPLICATIONS

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The development of biosensors has been the center of scientist's attention for recent decades. Biosensors can essentially serve as low-cost and highly efficient devices for this purpose in addition to being used in other day to day applications. Biosensor is a device that consists of two main parts. A biological and a transducer. Bioreceptor id a biological component that recognizes the target analyte and transducer is a physicochemical detector component that converts the recognition event into a measurable signal. Biomolecules such enzymes, antibodies, receptors, organelles and microorganisms as well as animal and plant cells or tissues have been used as biological sensing elements. In this paper, we review recent development in use of biosensors as a diagnostic tool, as well as some future applications of biosensor technology.

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Paper No: MTD-PCL 07

A NOVEL TREATMENT COMBINATION FOR EVALUATION OF CEREBROPROTECTIVE POTENTIAL OF PUNICAGRANATUM AND NIGELLA SATIVA AGAINST ISCHEMIA

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Cerebral infarction or ischemia has become the second commonest cause of death and disability after ischemic heart disease in worldwide. Global cerebral ischemia entails diminution in cerebral blood flow over the entire brain. Cerebral ischemia and reperfusion is known to induce the generation of reactive oxygen species that can lead to oxidative damage to proteins, membrane lipids and nucleic acids. The prime objective of this study was to evaluate the combined cerebroprotective action of *Punicagranatum* fruit powder and *Nigella sativa* seed powder against global ischemic reperfusion injury in Wistar rats. Ischemia was induced by bilateral common carotid artery occlusion method. Rats were treated with various combinations of *Punicagranatum* fruit powder and *Nigella sativa* seed powder for 14 days. After treatment, infarction size and from the tissue homogenate samples, oxidative stress markers like catalase, SOD, MDA and GSH levels were estimated. All the results were statistically analyzed. It was observed that combined treatment showed significant reduction in both lipid peroxidation and oxidative damage in wistar rats due to the presence of respective active constituents like tannins, resins, thymoquinone and punicalagins.

Keywords: Ischemia, oxidative stress, cerebro-protective, carotid artery occlusion.

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Paper No: MTD-PCL 08

ANTI-INFLAMMATORY ACTIVITY OF ETHANOLIC EXTRACT OF FLOWERS HYMENOCALLIS LITTORALIS (JACQ.) SALISB. BY HRBC MEMBRANE STABILIZATION METHOD

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Hymenocallis littoralis (Jacq.) Salisb. (Amaryllidaceae)commonly known as Beach spider lily, is an ornamental and medicinal plant, traditionally used for wound healing. It is used as an emetic and has shown anti-neoplastic, cytotoxic and anti-viral properties. The plant is folk remedy to treat freckles and blemishes. The aim of this research is to explore the anti-inflammatory potential of this selected plant material. Two successive and two crude extract of its flowers were subjected for in vitro anti-inflammatory activity using inhibition of protein denaturation method. The successive ethanol extract has shown potent anti-inflammatory activity by HRBC membrane stabilization method with 83.46 % and 84.72% for 100 and 500µg/ml, respectively. The crude ethanol hasshown significant anti-inflammatory activity by HRBC membrane stabilization method. All the concentrations prepared were paving dose dependent anti-inflammatory activity

Keywords: Hymenocallis littoralis (Jacq.) Salisb., Ethanolic extract; HRBC membrane stabilization method, Anti-inflammatory activity.

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Paper No: MTD-PCL 09

INVITRO THROMBOLYTIC ACTIVITY OF HERBS

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Thrombus formation inside the blood vessels obstructs blood flow through the circulatory system leading hypertension, stroke to the heart, anoxia, and so on. Thrombolytic drugs are widely used for the management of cerebral venous sinus thrombosis patients, but they have certain limitations. Medicinal plants and their components possessing antithrombotic activity have been reported before. However, plants that could be used for thrombolysis has not been reported so far. Plants were collected, dried, powdered and extracted by methanol and then fractionated by *n*-hexane for getting the sample root extracts. An *in vitro* thrombolytic model was used to check the clot lysis potential of four *n*-hexane soluble roots extracts viz., *Acacia nilotica*, *Justiciaadhatoda*, *Azadirachtaindica*, and *Lagerstroemia speciosa* along with streptokinase as a positive control and saline water as a negative control . The selected extracts of the plant roots possess marked thrombolytic properties that could lyse blood clots *in vitro*; however, *in vivo* clot dissolving properties and active components responsible for clot lysis are yet to be discovered.

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Paper No: MTD-PCL 10

LATEST DIAGNOSTIC AND THERAPEUTIC APPROACH FOR COVID 19

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The most important aspect of controlling COVID 19 IS timely diagnosis. Molecular diagnostic tests target the detection of any of the following markers such as the specific region of the viral genome certain enzyme, RNA - dependent RNA polymerase ,the structural proteins such as surface spike glycoprotein, nucleocapsidnucleoprotein,envelop protein or membrane protein of SARS- COV-2. Diagnostic and therapeutic approaches to control the disease and repurposed drugs mainly focusing on chloroquine /hydroxychloquin and convalescent plasma. More research is required for further understanding of the influence of diagnostic and therapeutic approaches to develop vaccines and drugs for COVID 19. The treatment requires both limiting viral multiplication and neutralising tissue damage induce by inappropriate immune reaction .As the global demand for diagnostic and therapeutic continue to rise in order to prevent and treat the ongoing COVID - 19 pandemic,the antibodies are molecules produced in the host's body as a defence response to infection.

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Paper No: MTD-PCL_11

POTENTIAL DRUG OPTIONS FOR TREATMENT OF COVID-19

K. Srija Reddy*, P. Saidulu, T. Chandrika, E. N. L. Mounika, P. Silpa , G. Durga Bhavani, P. Vijaya Lakshimi.

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A virus known as novel corona (SARS-CoV-2) which causes COVID-19 pandemic disease is an invisible enemy, appeared for the first time in the world's most populous country, China, and became a reason for causing death of many people all over the world. As a result of this, a remarkable investigation and clinical trials are ongoing to discover the treatment for this devastating pandemic disease. Effective vaccines and anti-viral treatments are immediately required in order to control and eradicate the disease. But still, neither vaccine nor any drug is approved for prevention and control of COVID-19 pandemic. Proper and well-designed strategies are needed to reduce social and economic consequences arisen due to this pandemic disease. There are some drugs that are used for other diseases which are showing valuable outcomes to elicit the virus causing COVID-19. However, there are no approved drugs full of clinical evidence. A systematic review literature search was carried out from different electronic databases to identify available articles on the effectiveness of drugs against COVID-19.Four therapies suggested recently via World Health Organization (abbreviated "WHO") that were later incorporated for under taking efficient clinical trial of the newly established project (European Discovery), comprise remdesivir, combination of anti-viral drugs (lopinavir and ritonavir), lopinavir plus ritonavir with beta interferon, and anti-malarial drugs like hydroxyl chloroquine and chloroquine. On May 25 2020, hydroxychloroquine and chloroquine were suspended by WHO from Solidarity trial because of their safety and efficacy concerns. However, there were neither effective specific antivirals nor drug combinations approved which were supported by great-level of clinical evidence.

Keywords: Coronavirus, treatment, pandemic, anti-viral drug, COVID-19, SARS-CoV-2.

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Paper No: MTD-PCL 12

BIOPROSPECTING AND BROADER SCALE INFLUENCE OF PHYTOPOLYPHENOLS

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An approach used in the search for natural substances that possess therapeutic value is ethanobotany or ethano-pharmacology. Active substances that have phenolic groups in their structure have great pharmacological potential. To establish a quantitative relationship between the species popularly considered to be antimicrobial, anti-diarrheal, the contents of tannins and flavonoids were determined. Tannins occur abundantly in following source - Barks, seeds, leaves, roots and rhizomes. The growth of many fungi, yeast, bacteria, and viruses inhibited by tannins. This have also been reported to exert other physiological effects, such as to accelerated blood clotting, reduce blood pressure, decreases the serum lipid level, produce liver necrosis and modulate immuno responses. However recent finding indicate that the major effect of tannins was not due to their inhibition on food consumption or digestion but rather the decreased efficiency in converting the absorbed nutrients to new body substances. The anti-carcinogenic and anti-mutagenic potentials of tannins may be related to their antioxidative property, which is important in protecting cellular oxidative damage, including lipid peroxidation.

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Paper No: MTD-PCL 13

STAGES OF DRUG DEVELOPMENT

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New drug development program for the different compound is initiated because there is a disease or clinical condition without suitable pharmacotherapeutic products available. New drug development can proceed along varied pathways for different compounds. Drug invention programs result in the synthesis of compounds that are tested in assays and animal models.

Keywords: Drug development; Toxicology testing

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Paper No: MTD-PCL 14

COVALASCENT PLASMA THERAPHY AND VACCINES FOR COVID-19

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COVID -19 pandemic, an infection caused by novel β- corona virus is an emerging problem that has led to a dramatic loss of human life worldwide and presents an unprecedented challenge to public health. There is a need for finding best possible approach to confront the ongoing healthcrisis and improve patient health status. Convalescent plasma therapy and Vaccines are some of the best possible approaches currently followed in covid-19 pandemic. Convalescent plasma therapy is the technique of administration of antibodies against a given agent to a susceptible individual for the purpose of preventing or treating an infectious disease due to that agent by transfusing the plasma from recovered patients. The convalescent plasma therapy is found effective in many viral infections of past decades such as SARS, MERS, EBOLA, CHICKEN POX, MEASELS etc, hence proves to be a better therapeutic option in current scenario. An unprecedented research effort and global coordination has resulted in a rapid development of vaccines and initiation of trials. Currently 3 Vaccines viz., Moderna, Pfizer, Astrazeneca are accepted for emergency use by W.H.O. and extensive work is carrying out on developing effective vaccines for covid-19 that includes 73 vaccine candidates in various phases of clinical trials and 182 candidates in pre-clinical phase studies.

Keywords: Covid-19, Convalescent Plasma Therapy, vaccines.

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Paper No: MTD-PCL 15

HOT RESEARCH AREAS IN DRUG DISCOVERY – 2021

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Things like gene editing, stem cells, immunotherapies and new types of biologics are now mega-trends in the pharmaceutical industry, widely covered in media, and I guess there is little doubt that biology is the next big thing in medicine. However, in this post I would like to outline several hot areas in small molecule drug discovery, suggesting a lot of untapped potential and investment prospects in this more "traditional" pharmaceutical research space.

Keywords: RNA, Epitranscriptomics, Protein Degraders, Human microbiome

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Modern Trends in Drug Development

University College of Pharmaceutical Sciences,
Acharya Nagarjuna University, Gutur, A.P., India.

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PHARMACEUTICAL CHEMISTRY

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Paper No: MTD-PC_01

DESIGN, SYNTHESIS, ANTI-TOBACCO MOSAIC VIRAL AND MOLECULE DOCKING SIMULATIONS OF UREA/THIOUREA DERIVATIVES

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The objectives are to design, syhthesize and introduce novel Urea/Thiourea derivatives of 2-(piperazine-1-yl)-pyrimidine and 1-(4-Fluoro / 4-Chlorophenyl)-piperazine molecules as tobacco mosaic virus (TMV) inhibitors. A series of Urea/Thiourea derivatives containing pyrimidine and piperazine moieties were synthesized, characterized using Fourier-transform infrared (FTIR) mass spectra, nuclear magnetic resonance (NMR) spectroscopy, elemental analysis and evaluated their sustainability using biological experiments. The anti-viral bioassay of the title compounds showed an antiviral activity against TMV. All these compounds were allowed to quantum-polarized-ligand (quantum mechanical and molecular mechanical (QM/MM)) docking experiments. The docking interactions proposed had two stage inhibition of TMV virus by binding to coat protein and helicase for inhibition of RNA replication. The present study outcomes good binding propensity for active-tunnel of TMV-Hel enzyme, by these thiourea, urea derivatives, to suggest that the designed and synthesized were ideal for proposing as selective novel inhibitors to target for TMV.

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Paper No: MTD-PC 02

SYNTHESIS, CYTOTOXICITY, APOPTOSIS AND MOLECULAR DOCKING STUDIES OF NOVEL PHENYLBUTYRATE DERIVATIVES AS POTENTIAL ANTICANCER AGENTS

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Phenylbutyrate (PB), a small aromatic fatty acid, has been known as an interesting compound with the ability of anti-proliferation and cell growth inhibition in cancer cells. In the present study, a series of PB derivatives were synthesized by Passerini multicomponent reaction and their cytotoxic activities against various human cancer cell lines including A549 (non-small cell lung cancer), MDA-MB-231 (breast cancer), and SW1116 (colon cancer) were evaluated. The effects of these compounds on the proliferation of MCF-10A as non-tumoral breast cell line, showed good selectivity of the compounds between tumorigenic and non-tumorigenic cell lines. The molecular docking studies of the synthesized compounds on pyruvate dehydrogenase kinase 2 (PDK2; PDB ID: 2BU8) and histone deacetylase complex (HDAC; PDB ID: 1C3R), as the main targets of PB were applied to predict the binding sites and binding orientation of the compounds to these targets.

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Paper No: MTD-PC 03

DESIGN, SYNTHESIS, AND MOLECULAR DOCKING STUDY OF NEW PIPERAZINE DERIVATIVE AS POTENTIAL ANTIMICROBIAL AGENTS

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The successful design and synthesis of seventeen new 1,4-diazinanes, compounds commonly known as piperazines. This group of piperazine derivatives were fully characterized by 1H NMR, 13C NMR, FT-IR, and LCMS spectral techniques. All reported compounds were evaluated for their antibacterial and antifungal potential against five bacterial (*Staphylococcus aureus, Escherichia coli, Klebsiellapneumoniae, Acinetobacterbaumannii,* and *Pseudomonas aeruginosa*) and two fungal strains (*Candida albicans and Cryptococcus neoformans*). The complete bacterial screening results are provided. As documented, piperazine derivative performed the best against these bacteria. Additionally, data obtained during molecular docking studies are very encouraging with respect to potential utilization of these compounds to help overcome microbe resistance to pharmaceutical drugs, as explicitly noted in this manuscript.

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Paper No: MTD-PC 04

SYNTHESIS, BIOLOGICAL EVALUATION OF SOME NOVEL HETEROCYCLIC MANNICH BASES

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Heterocyclic compounds offer a high degree of structural diversity and have proven to be broadly and economically useful as therapeutic agents. Many heterocyclic compounds are found as key components in biological processes. Essential diet ingredients such as Thiamine (Vitamin B1), Riboflavin (Vitamin B2), Nicotinamide (Vitamin B3), Pyridoxal (Vitamin B6) and Ascorbic acid (Vitamin C) are heterocyclic compounds. Two of the essential amino acids tryptophan and histidine are also heterocycles.

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Paper No: MTD-PC 05

ORPHAN DRUGS

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Orphan drugs have been used to treat rare diseases since last three decades. The incidences of such diseases have been increasing at a greater pace than the speed with which drugs are researched and developed to treat such diseases. One of the major reasons is that the pharmaceutical industry is not very keen to carry out research on the development of orphan drugs as these drugs do not capture a bigger market. This is the current scenario inspite of the various incentives provided in the Orphan drug act. However, in this review, we have tried to focus on the results of few of the recently conducted clinical trials carried out towards the development of such orphan drugs.

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Paper No: MTD-PC 06

CONTEMPORARY AND ANCIENT SCIENCES: DRUG DEVELOPMENT AND AYURVEDA

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Ayurveda, one of the oldest systems used by mankind for well being(Sharma 1995), originated in ancient India many thousand years ago (about 4500 BC as agreed by most scientists). The origin, development, existence and even practice of Ayurveda has many dimensions and complex theories based on religions, faith and ancient Vedic science (Patwardhan & Mashelkar 2009). Ayurveda, as a system of medicine, is one of the official systems of medicine in India (Mashelkar 2008) and is also widely practiced in many other countries (Mashelkar 2008). Evidence for effectiveness of many ayurvedic drugs and therapies is being generated rapidly from many research institutes and also there are projects under way to decipher unanswered questions related to Ayurveda. In this chapter we have tried to cover different but important aspects which give us a futuristic vision. After giving an overview of basics of Ayurveda, a comprehensive review of current status of research in Ayurveda is attempted. In later part of the chapter a dialogue on the key term "Drug Rediscovery" is being presented for the first time with a scientific perspective. The later part of the chapter also covers futuristic discussion where possibilities of linking Ayurveda with drug discovery process are described. We have tried to lay down conceptual framework for win-win relationship between ancient and contemporary health care sciences backed by strong scientific evidence being generated in recent years

Keywords: Ayurveda, contemporary science, drug development

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Paper No: MTD-PC 07

SYNTHETIC BIOLOGY

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We live in an era where biotechnology, information technology, manufacturing and automation all come together to form a capability called synthetic biology. Now synthetic biology is shaping up to be the dominant technology of this century, and Australia has made clear moves to be on board. Synthetic biology is the design and construction of new, standardised biological parts and devices, and getting them to do useful things. Parts are encoded using DNA and assembled either in a test tube or in living cells – and then applied to deliver many different kinds of outcomes. Many other global businesses are also investing heavily in the use of whole cells – so-called chassis cells – to produce useful chemicals.

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Paper No: MTD-PC 08

DRUG DEVELOPMENT: THE ROLE OF BIOLOGICAL RESEARCH

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This article provides a brief overview of the processes of drug discovery and development. Our aim is to help scientists whose research may be relevant to drug discovery and/or development to frame their research report in a way that appropriately places their findings within the drug discovery and development process and thereby support effective translation of preclinical research to humans. One overall theme of our article is that the process is sufficiently long, complex, and expensive so that many biological targets must be considered for every new medicine eventually approved for clinical use and new research tools may be needed to investigate each new target. Studies that contribute to solving any of the many scientific and operational issues involved in the development process can improve the efficiency of the process. An awareness of these issues allows the early implementation of measures to increase the opportunity for success. As editors of the journal, we encourage submission of research reports that provide data relevant to the issues presented.

Keywords: Drug discovery, drug development, biological research.