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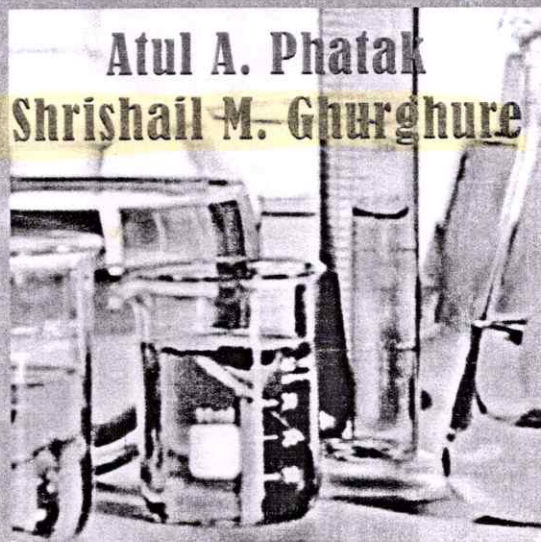
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| 2 | Textbook of Industrial Pharmacy | Mr. Baburao N. Chandkavathe and Mr. Shivsharan B. Dhadde | 2019-20 | 8-15 |
| 3 | Handbook of Experimental Pharmacology | Mr. Shivsharan B. Dhadde | 2019-20 | 16-24 |
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Lab Manual of
**PHYSICAL
PHARMACEUTICS**
I and II

Atul A. Phatak
Shrishail M. Ghurghure



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*A Practical Manual of
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Pharmaceutics
I and II*

Strictly As Per Syllabus Prescribed for B. Pharmacy,
Semester-III by Pharmacy Council of India, New Delhi

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Premiere Edition

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Lab Manual Physical Pharmaceutics I and II

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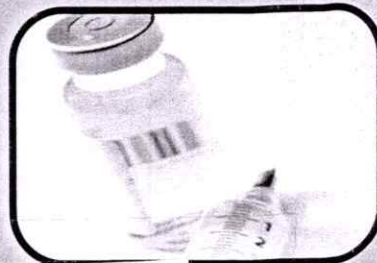
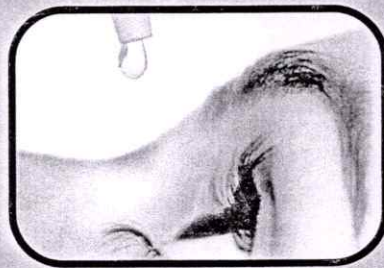
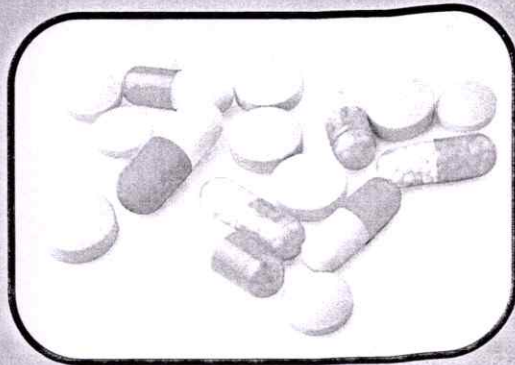
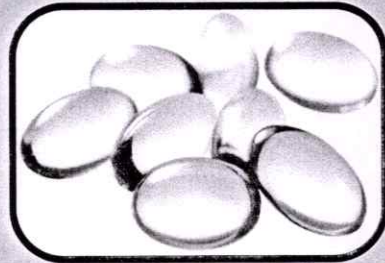



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Textbook of
Industrial Pharmacy



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Baburao N Chandakavathe ✓
Shivsharan B Dhadde




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B1

Textbook of Industrial Pharmacy

About the Book

This book provides fundamental knowledge of Industrial Pharmacy aspects right from pre-formulation studies to pharmaceutical packaging sciences. The topics covered in this book are based on the Third Year B. Pharmacy (Semester-V) syllabus designed by Pharmacy Council of India, New Delhi as per Bachelor of Pharmacy Course Regulations 2014. Adhering to the prescribed syllabus the content of the book is modulated to help students for GPAT and other equivalent exam preparations. This book is reader-friendly, complex pharmaceutical concepts are elaborated in simple and easy language. At the end of each chapter glossary of words and question bank are provided as per the examination pattern prescribed by Bachelor of Pharmacy Course Regulations 2014. Moreover, Appendix with commonly used pharmaceutical additives, short listed questions from previous GATE/GPAT question papers related to the subject, model question papers as per Bachelor of Pharmacy Course Regulations 2014 question paper pattern are incorporated. The content of the book cover the answers for questions with relevant explanation collected from robust scientific materials. Overall book content is emphasized to provide the basic knowledge of Industrial Pharmacy along with the prospectus related to the subject for competitive examination preparation in the field of pharmaceutical sciences.



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Textbook of **Industrial Pharmacy**

Third Year B. Pharmacy (Semester-V)

Acc no. 3832

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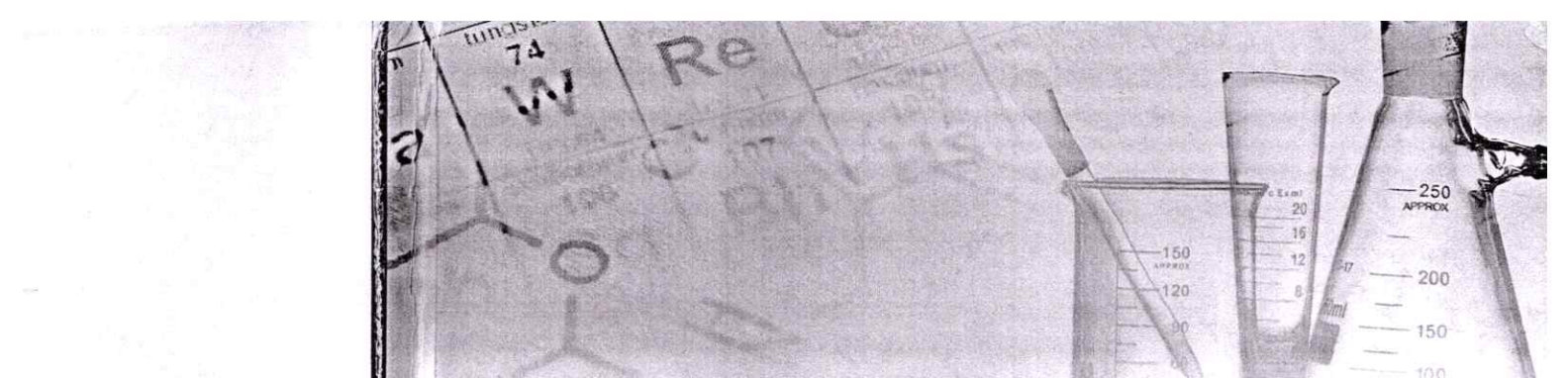
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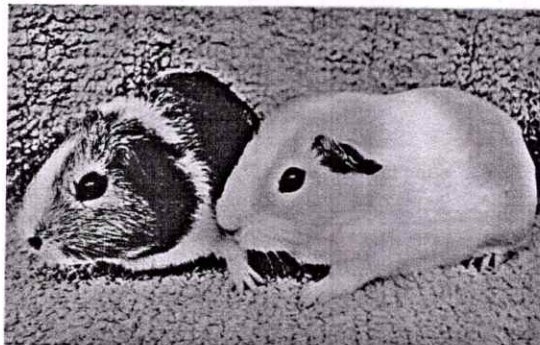
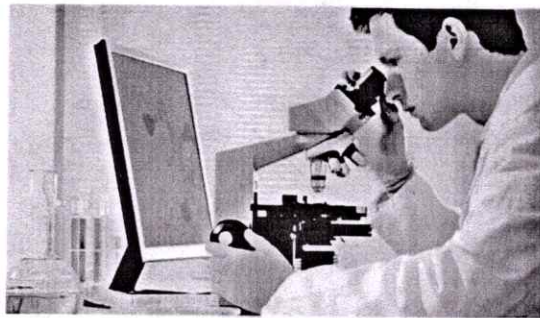



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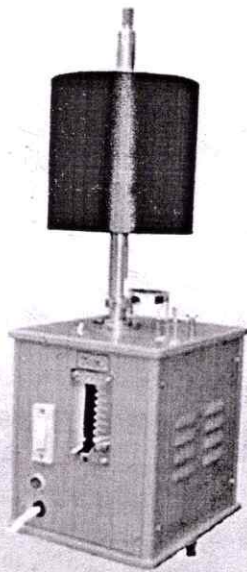



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Handbook of EXPERIMENTAL PHARMACOLOGY

About the Book

This book provides fundamental knowledge of practical aspects of the experimental pharmacology right from laboratory animals handling and tissue mounting to practical implications of various important complex experimental procedures. This book is prepared using simple language and tried to explain the experiment with a model data of observation, calculation, graph and results for better clarity to carry out the experiments in animals or understand the experimental pharmacological techniques by observing the simulated experiments. Exact simulation of real animal experiments on a computer is not easy because the biological responses are very complex. Moreover, imagination of experimental outcome and acquiring the skill of hands-on experiment is not satisfactorily learned by observing the effect of the drug in simulated experiments. This book helps to reduce the gap between hands-on experiments in animal and simulated experiments in pharmacology. The experimental methodology and experimental data explained in this book are designed on the basis of robust scientific materials and personal experience in hands-on experiments under the guidance of eminent personalities. This book will be helpful for graduates and postgraduates related to pharmacology, trainees, research workers during their day-to-day activities including allied health discipline and scientists in industrial drug discovery set-up and CRO. Several simple and newer experimental models have been incorporated which will help the students to engage in drug discovery activities in future. Besides this, several important points have been discussed e.g., ethics of animal experimentation, care and handling of experimental animals, preparation of solutions, tissue mounting for *in vitro* studies etc.



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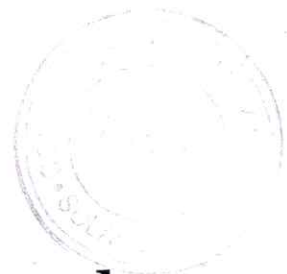
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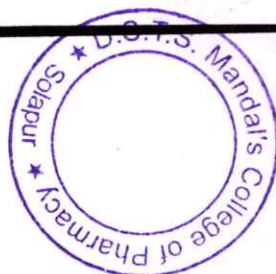
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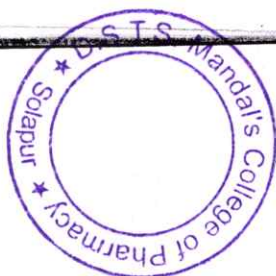

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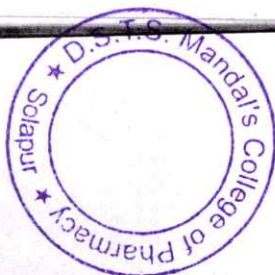
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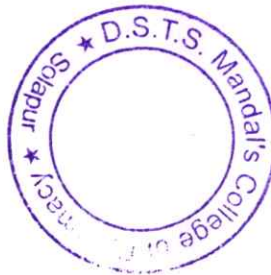
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ड्रग डोपिंग - अर्थ व अनर्थ

डॉ. योगेश श्रीपाद थोरात

सहयोगी प्राध्यापक,

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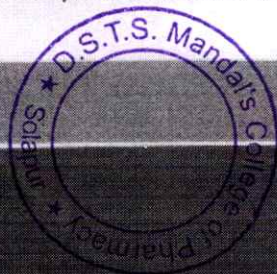
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(अहो..... मला खरंच माहिती नव्हतं की खून करणं गुन्हा आहे ! चुकून केला.. प्लिज शिक्षा देऊ नका !! हे असं कोणी म्हणाले तर ? मिळेल का माफी ? नक्कीच नाही ! शेवटी नियम व कायद्याची इत्यंभूत माहिती ही जबाबदारी तरी आपलीच आहेना ! तसंच खेळाडूला डोपिंग ही संकल्पना कायदा व घ्यावयाची काळजी हे सर्व माहित असणं हे खेळाच्या नियमांच्या ज्ञाना एवढंच गरजेच आहे. अज्ञानाच्या अंधारामुळे उद्याचे सचिन, बोल्ट, फेल्ट्स किंवा सायना, सिंधू हिमादास, पी.टी. उषा डोपिंगच्या विळख्यात अडकून मानहानीच्या अंधारात हरवून जाऊ नयेत आणि डोपिंगचा अर्थ नसमजल्याने त्यांच्या कारकिर्दीत अनर्थ ओढवू नये म्हणून ह्या लेखनाची उठावेव !

आयुष्य समृद्ध आणि विकसित करण्यात जशा अन्न - पाणी ह्या प्राणदायी गरजा किंवा शिक्षण, कला ह्या आनंददायी गरजा कारणीभूत असतात तशीच मनुष्याच्या उन्नतीत महत्वपूर्ण भूमिका बजावणारी आनंददायी गरज म्हणजे खेळ ! (हे आपल्या पालकांनं केंव्हा समजणार...? देव जाणे ! शारीरिक क्षमता असो वा मानसिक स्थिरता, मन, मेंदू आणि मनगट विकसित करण्यात खेळ नक्कीच कारणीभूत ठरतात. (बहुतांश पालकांना हे कळणे तर अशक्यच !) मैदानी खेळ खेळाडूला शारीरिक कसोट्यांवर पारखताना त्याच मानसिक तयारी देखील तपासतात. आणि बैठे खेळ त्याच्या एकाग्रतेची आणि भक्कम बैठकीची परीक्षा घेतात. म्हणूनच तर चित्याच चपळाईने स्टॅपिंग करत फलंदाजाला तंबूत धाडणारा धोनी अटीतटीच्या वेळी धीरगंभीर रहात योग्य ती चाल करतो आणि कॅप्टनकून ठरतो ! किंवा बुद्धिबळाच्या पटावर अनाकलनीय व दूरदृष्टीच्या चाली करत मोहरे फिरविणारा आनंद अनेक संगणकांना एकाचवेळी सामोरे जाताना शारीरिक ताणतणाव येऊ न देता संगणकांनाही खिंडीत गाठतो आणि ह्या बुद्धिबळाच्या विश्वाचा नाथ असल्याच प्रचिती देतो ! खेळ आपल्या व्यक्तित्वाची खोली आणि आत्मविश्वासाची उंची वाढवतात. म्हणूनच तर कॅन्सरच्या कर्काची नांगी ठेच एक खेळाडू समस्त क्रीडा विश्वाला मी ह्या खेळपट्टीवर युवराज आहे सांगत इच्छाशक्तीची ताकद दाखवितो. जीवघेण्या चाकूहल्ल्याच धक्क्यातून सावरत मोनिका सेलेस पुन्हा टेनिसकोर्टवर अधिराज्य गाजवते. खेळावर दाखवलेले नितांत प्रेम आणि देशाप्रती समर्पण भावच एका मध्यमवर्गीय मुलाला क्रिकेटचा देव बनविते.

खरं म्हणजे सर्वच खेळाडू आपापल्या क्षेत्रात संघाचे ध्येय व चाहत्यांच्या अपेक्षा पूर्ण करण्यासाठी शारीरिक व मानसिक तयारीचे प्रदर्शन करतात. शारीरिक क्षमता वाढविण्यासाठी अहोरात्र मेहनत घेतात. खेळातील कसब मिळविण्यासाठी विद्यालय करतात. लवचिक व पिळदार शरीरासाठी बलोपासना आणि स्थिरबुद्धी व एकाग्रतेसाठी योगाभ्यास करतात. आहाराचे काटेकोर नियोजन करतात. एवढे कष्ट घेतल्यावर खेळा मुळे शरीर व मन भक्कम होतेच, पण त्याच बरोबर खेळ आपल्या मनावर आपसूकच संस्कार करतात, तो म्हणजे आपला पराभव पचविण्याचा ! आणि हरल्यावर मिळालेल्या टीकेने (कदाचित मानहानीने) खचून न जाऊ पुन्हा प्रयत्न करण्याचा संस्कार ! पण मानवी स्वभावच असा आहे की एकदा यशाची, प्रसिध्दीची गोड चव चाखली की तिचे व्यसन लागते व अपयश एखाद्या विषाप्रमाणे भासू लागते. अपयश नको म्हणून प्रयत्नांची पराकाष्ठा करणे ही गोष्ट चांगली आहे पण त्यासाठी रडीचा डाव खेळणे हे खिलाडूवृत्तीचे लक्षण नव्हे. जो यशाने हुरळून जात नाही आणि अपयशाने हरवून जात नाही तोच खरा खेळाडू !

पण रडीचा डाव खेळताना कधी कधी माणूस नैतिकतेची एक एक पायरी खाली येत जातो. चिडणे, मारहाणकरणे, पंचावळी निर्णय न मानणे, प्रतिस्पर्ध्याला शिवीगाळ करणे (स्लेजिंग), मुद्दाम इजा पोचवणे, बॉल टॅपिंग ते अगदी मॅच फिक्सिंग पर्यंत अशोभनीय कृत्ये करतो. अशाच भ्रष्टाचारांपैकी एक निर्दनीय आणि तितकाच धोकादायक प्रकार म्हणजे ड्रग डोपिंग ! उत्तेजक व द्रव्यसेवन !



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Carboxymethyl Cellulose

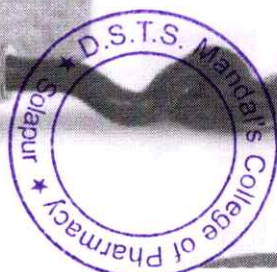
Volume II


Pharmaceutical and Industrial Applications

Md. Ibrahim H. Mondal

Editor

Biochemistry
Research Trends




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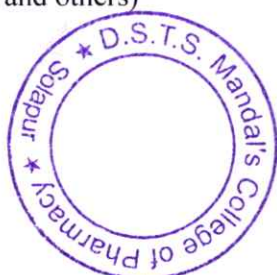
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Chapter 7

NATURALLY DERIVED CELLULOSE DERIVATIVES: VERSATILE APPLICATIONS IN NOVEL DRUG DELIVERY

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ABSTRACT

Natural based carbohydrate polymers show distinctive physical and biochemical characteristics beneficial for versatile biomedical applications. Cellulose derivatives such as carboxymethyl cellulose and hydroxypropyl cellulose are biocompatible and have been utilized in various novel drug delivery systems mainly as hydrogel drug carriers, encapsulating polymeric components and rate retarding materials. The gigantic usage of these cellulose derivatives in the fabrication of novel drug delivery systems is mainly because their cost is low, maximum hydrophilicity, degradability, and availability of chemical groups for modification to suit the need of the intended product. For example, carboxymethyl cellulose is a hydrophilic cellulose derivative that is degradable by cellulase. Though this enzyme is not synthesized by mammalian cells, cellulase and the fragments derived from carboxymethyl cellulose degradation are biocompatible. Indeed, because of this advantageous characteristic, fabrications of biocompatible, selectively degradable carboxymethyl cellulose based hydrogels are gaining much attention in the drug delivery research. Here, we emphasized mainly on the fundamental properties of carboxymethyl cellulose and different technologies employed to cross-link the cellulose and cellulose-based hydrogel drug delivery carriers using carboxymethyl cellulose as a matrix former, encapsulating agent or polymeric material. This chapter also contains the synthetic methods of hydrogels, swelling behaviour/mechanism, and selective

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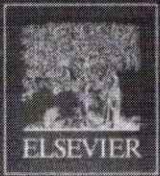
characterizations parameter drug release mechanics of these drug carriers. This chapter concomitantly covered the extensive review of the literature on versatile applications of carboxymethyl cellulose in novel drug delivery area.

Keywords: cellulose derivatives, carboxymethyl cellulose, novel drug delivery, cross-linking, natural polymers

INTRODUCTION

Introduction and Fundamental Properties of Celluloses

Cellulose is the most profuse naturally available renewable polymeric material of glucose, mainly derived from plants and natural fibres such as cotton and linen. Though a huge amount of cellulose is biosynthesized yearly, only 2% is recovered and utilized for industrial applications [1]. Celluloses are also synthesized by some bacteria like *Acetobacterxylium* [2]. Celluloses obtained from both sources are chemically identical although they possess different macromolecular structure and physical properties [3]. The association of glucose units in these cellulose molecules is by 1, 4- β -glucosidic linkages, which is responsible for high crystallinity and poor solubility of cellulose in the range of 40-60% and above 60% for plant cellulose and bacterial cellulose respectively. However, the particle size of cellulose fibres obtained from bacterial synthesis is fallen in the range of nanoscale compared to cellulose fibres obtained from plant sources. Hence, cellulose of bacterial source exhibits an uncharacteristic, ultrafine fibre network with high water retention capacity and greater strength compared to cellulose of plant source. Furthermore, bacterial cellulose is ultra-pure, whereas plant cellulose usually contains other biogenic compounds, such as lignin and pectin which require further purification and modification. Semi-synthetic chemical modification of cellulose by esterification of etherification of hydroxyl group yield cellulose derivative known as cellulosic, which are simply processable and find wide industrial applications. Cellulose and its derivatives are easily degradable by many bacteria and fungi present in the environment, which are able to produce a cellulose-specific enzyme called as cellulases and thus these are considered as eco-friendly [4]. The biodegradation patterns of cellulose have been extensively explored, and increasingly lead to reduced molecular weight, decreased mechanical strength with a reduced degree of crystallinity and enhanced solubility [5]. The outstanding biocompatibility of cellulose, cellulosic and cellulase-mediated degradation [5, 6] has encouraged the wider utilization of cellulose-based strategies in biomedical applications. Despite these successful applications and their very low cost, cellulose derivatives have been comparatively less utilized in the bioengineering field because of their non-degradable nature by mammalian enzymes and therefore may not be suitable as a temporary tissue scaffold in vivo. However, with respect to in vivo applications, it is worth reminding that cellulose is a biodurable material. Certainly, cellulose does not reabsorb in living tissues, due to the absence of a cellular mechanism to synthesize enzyme cellulases. This particular property gives rooms to fundamentally differentiate biodegradability and bioresorbability: the former refers to the capability of the material to be degraded by microorganisms, whereas the latter signposts the capability of the material to be digested or metabolized when implanted in vivo. But cellulose-based materials may be designed to be stable in mammalian tissue culture, yet completely degradable when



CHARACTERIZATION AND BIOLOGY OF NANOMATERIALS FOR DRUG DELIVERY

Nanoscience and Nanotechnology in Drug Delivery

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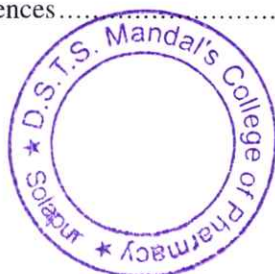
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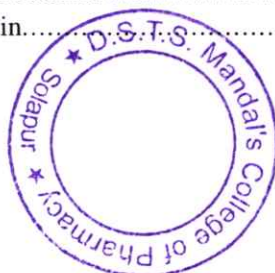
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Nanostructure Drug Delivery System Is an Option to Solve Antimicrobial Drug Resistance: Perspective Review

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1. INTRODUCTION

Antimicrobial agents are the substances that are used to kill or inhibit the growth of invading microorganisms in humans and other animals. Numerous antimicrobial agents are used to treat infectious diseases caused by pathogenic microbes like bacteria, fungi, and viruses. Antimicrobial agents are markedly differing in their physical, chemical, and pharmacologic properties, in antimicrobial spectra, and in mechanisms of action. Typically, antimicrobials destroy or limit the growth of bacteria by combining with some vital components of bacterial metabolism, thereby inhibiting the synthesis of functional biomolecules or impeding normal cellular activities. For example, β -lactams such as penicillins and cephalosporins inhibit the synthesis bacteria cell wall; tetracyclines, clindamycin, and macrolides inhibit the synthesis protein; quinolones and metronidazole inhibit the nucleic acid synthesis; and sulfonamides and trimethoprim have an inhibitory effect on enzymatic synthesis. Some antimicrobials such as penicillin are only effective against a narrow range of bacteria, whereas others, like ampicillin, kill a broad spectrum of Gram-positive and Gram-negative bacteria [1,2]. For a successful antibiotic therapy of an infection, the antimicrobial agent must reach its target in an active form, bind to the target, and interfere with microorganism function. The concentration of antimicrobial agent at the site of infection plays a key role in achieving a desired antibiotic therapy [1]. Hence, the active form of antimicrobial agent concentration at the site of infection must be sufficient to inhibit the growth of the offending microorganism. If host defenses are intact and active, a minimum inhibitory effect, such as that provided by bacteriostatic agents, may be sufficient.




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CHARACTERIZATION AND BIOLOGY OF NANOMATERIALS FOR DRUG DELIVERY

Edited by

Shyam S. Mohapatra, Shivendu Ranjan, Nandita Dasgupta,
Raghvendra Kumar Mishra and Sabu Thomas

Characterization and Biology of Nanomaterials for Drug Delivery explores the nanosystems with different compositions and biologic properties that have been extensively investigated for drug delivery and therapeutic applications. This book explores the large variety of classes of nanomaterials and their characterization, while focusing on their biologic interactions and applications as nanomaterials in drug delivery. By providing a broad range of knowledge regarding synthesis and characterization, readers are enabled to develop a fuller understanding of drug delivery technology.

The chapters of this volume describe the techniques successfully employed for the application of nanocarriers loaded with a variety of payloads and targeted to a wide range of biologic targets. In addition, methods of nanocarrier synthesis, loading techniques within various systems, and the characterization of nanocarriers based upon their functionality are covered in this volume. The advantages, disadvantages, and applications of specific nanoformulations are explored by the authors. Due to the modular nature of the targeting methodology employed, it is believed that these protocols will provide a solid foundation for the formulation of a wide variety of nano drug-targeting strategies.

Reflecting the interdisciplinary nature of the subject matter, this book includes contributions by experts from different fields, with various backgrounds and expertise. This book will appeal to researchers as well as students from different disciplines such as materials science and technology and various biomedical fields. Coverage includes industrial applications and bridges the gap between lab-based research and practical industrial applications.

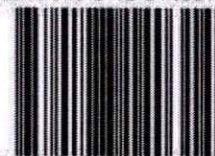
The resulting work is a reference and practical source of guidance for researchers, students, and scientists working in the fields of nanotechnology, materials science and technology, and biomedical science.



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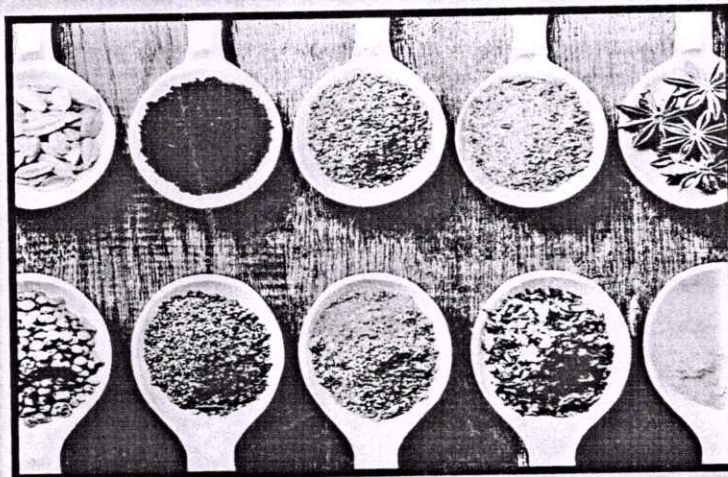
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Recent Advances in the
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4

Anti-diabetic Potential of Flavonoids ✓ and Their Molecular Mechanisms - A Review

SHIVSHARAN B. DHADDE¹ ✓ AND BABURAO N. CHANDAKAVATHE¹ ✓

ABSTRACT

Diabetes mellitus (DM) is one of the major health disasters of the 21st century. The World Health Organization estimates that after hypertension and tobacco use, hyperglycemia is the third highest risk factor for early death. Dietary and plant derived products have been evaluated in numerous preclinical and clinical trials for their antidiabetic activities. Flavonoids are a large class of phenolic compounds found in many natural products. Flavonoids including flavonol, flavanone, flavone, isoflavone, flavan-3-ols and anthocyanin containing foods play positive roles in sustaining blood glucose levels, glucose uptake, insulin release and adjusting immune functions. In this review, the association between flavonoids and DM is focused on the basis of the latest studies. The anti-diabetic activities of flavonoids found in dietary plants and fruits are summarized to delineate the underlying molecular signalling of flavonoids using in vitro and in vivo models.

Key words: Flavonol, Flavanone, Flavone, Isoflavone, Flavan-3-ols, Anthocyanin

1. INTRODUCTION

Diabetes mellitus (DM) is a heterogeneous group of metabolic disorders characterized by the annihilation of pancreatic β -cells or reduced insulin discharge and its action, which results in abnormal metabolism of

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Recent Advances in the **Molecular Mechanism of Flavonoids**

About the Book

The book focuses on the molecular mechanisms underlying the pharmacological properties of flavonoids. Flavonoids are the phenolic compounds present in many fruits and vegetables, and they are most commonly consumed by humans through diet. All the different classes of flavonoids like the flavanones, flavones, anthocyanins and catechins have been observed to exhibit a variety of pharmacological actions. Though the flavonoids are known to interact with many of the cellular targets, only recently there has been a great interest among the scientists to delineate the molecular mechanism of action of flavonoids. Since understanding the molecular mechanism is very much important for predicting the clinical feasibility of a drug, this edited volume has been designed to collect and compile the information's available on the molecular mechanisms of flavonoids as review articles. The book comprises of 14 chapters and each chapter summarizes on the progress made in the flavonoid research, for the treatment of various disorders like cancer, diabetes, infectious diseases and so on. The available literatures on the molecular mechanism of the flavonoids are discussed in all the chapters, which will promote the researchers for further investigation on the pharmacological applications of flavonoids.



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