同行专家业内评价意见书编号：20250860031

附件1

浙江工程师学院（浙江大学工程师学院）
同行专家业内评价意见书

姓名： 姜若琳

学号： 22260510

申报工程师职称专业类别（领域）： 生物与医药

浙江工程师学院（浙江大学工程师学院）制

2025年03月17日

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一、个人申报

（一）基本情况【围绕《浙江工程师学院（浙江大学工程师学院）工程类专业学位研究生工程师职称评审参考指标》，结合该专业类别(领域)工程师职称评审相关标准，举例说明】

1.对本专业基础理论知识和专业技术知识掌握情况(不少于200字)

在本科和硕士求学期间，我系统学习了药剂学、药物化学、药物分析学和药理学的理论知识，并着重习得了片剂和注射剂的基本原理，包括各种辅料在制剂中的作用，以及制剂生产的工艺流程。在工程实践期间，通过文献专利调研和基础理论学习，我深入了解了达格列净的药理作用及其在治疗2型糖尿病中的应用原理。在处方筛选与优化的过程中，我学会了如何从工业实际应用的角度设计实验，筛选和优化制剂的处方配比，理解了不同辅料及其组合对于片剂质量的影响。通过大量实验数据的记录和分析，我进一步掌握了片剂硬度、崩解时限、溶出度等理化性质的测试方法，并学会了如何根据这些指标调整处方，以确保药物的稳定性和有效性。

2.工程实践的经历(不少于200字)

依托浙江永宁药业股份有限公司的企业项目《达格列净片剂的处方工艺研究，我开展了为期一年的实践活动，研究内容主要包括：

1.文献调研与基础理论学习：

阅读和分析国内外关于达格列净片剂的文献和专利，了解其药理作用、制备工艺和相关研究进展，分析现有方案的优缺点。

2.处方筛选与优化：

根据文献和初步实验结果，选择合适的赋形剂、润滑剂、崩解剂等辅料，设计初步处方。随后进行处方筛选实验，通过理化性质测试（如片剂硬度、崩解时限、溶出度等）评价不同处方的效果，优化处方配比。

3.工艺参数研究：

确定制粒、压片等关键工艺步骤，进行工艺参数研究，优化各步骤的工艺条件。根据原研药（安达唐达格列净片剂）的表征方法及结果，对片剂的外观、含量均匀度、溶出度等进行检测和进一步优化。

4.实践总结与报告撰写：

总结实践期间的研究成果，分析实验数据，提出改进建议和后续研究方向，撰写达格列净片剂处方工艺研究报告。

3.在实际工作中综合运用所学知识解决复杂工程问题的案例（不少于1000字）

以项目《达格列净片剂的处方工艺研究》为例：

1.知识掌握：

在浙江永宁药业股份有限公司进行达格列净片剂的处方工艺研究期间，我掌握了大量之前在理论学习中较少涉及的实际操作和应用层面的药剂学相关知识。通过文献专利调研和基础理论学习，我深入了解了达格列净的药理作用及其在治疗2型糖尿病中的应用原理。同时，我系统复习了片剂制剂的基本原理，包括制粒、压片等工艺流程，以及各种辅料在片剂中的作用和选择标准。其次，在处方筛选与优化的过程中，我学会了如何从工业实际应用的角度设计实验，筛选和优化制剂的处方配比，理解了不同辅料及其组合对于片剂质量的影响。通过大量实验数据的记录和分析，我进一步掌握了片剂硬度、崩解时限、溶出度等理化性质的测试方法，并学会了如何根据指标调整处方，确保药物的稳定性和有效性。此外，在工艺参数研究中，我学习了如何系统地研究和优化制粒、压片等工艺步骤，理解了各工艺参数对片剂质量的影响，掌握了通过实验确定最佳工艺参数的方法。

2.能力提升：在项目实践中，我的综合能力得到了显著提升，尤其是在实验设计、数据分析和问题解决等方面的能力。例如，在实际实验过程中，我不断优化实验方案，调整实验条件，以获得最佳结果。同时，通过对实验数据的记录和分析，我的数据分析能力得到了显著提升。每次实验后，我都会详细记录实验数据，并灵活使用统计软件进行分析，找出数据中的规律和趋势。这种数据分析能力不仅帮助我理解实验结果，还使我能够在实验过程中做出科学合理的调整，并改善了自己行事较为拖延的习惯。

3.素质养成：

在企业的现场实践中，我的专业素质和职业素养也得到了全面提升。首先，通过参与项目的每一个环节，我培养了严谨的科研态度。在实验过程中，我严格按照实验流程操作，确保实验数据的准确性和可靠性。其次，通过与团队成员的合作，我培养了良好的团队合作精神和沟通能力。在项目中，我需要持续与制剂研发部、质量控制部和生产部的工作人员保持沟通。通过这种跨部门的合作，我学会了如何有效沟通，尽量化解团队内部的分歧，确保项目的顺利进行。此外，通过参加项目的各个环节，我增强了我的责任感和使命感。作为项目的一员，我深知自己所承担的任务的重要性，时刻保持高度的责任心，确保每一个实验步骤的准确性和每一个数据的可靠性。无论是在实验室还是在生产线，药学专业人员都必须时刻心系患者，以患者为中心，致力于提供高质量的药物和服务。

4.项目研究取得的经济和社会效益：

通过一系列实验研究和工艺优化，我们成功开发出了一种具有优良理化性质和生物利用度的达格列净片剂，表征结果表明，该处方工艺有望应用于后续大规模生产。在经济效益层面，在初期实验中，我们发现某些辅料组合导致片剂较于原研药过快崩解。通过正交试验系统优化辅料组合后，显著改善了片剂的硬度和崩解性能，确保药物能够在规定时间内有效释放。制剂的处方优化不仅提高了产品的稳定性和有效性，提高了生产效率，同时显著降低了生产成本。在社会效益层面，达格列净片剂作为一类用于治疗2型糖尿病的药物，具有重要的社会意义。通过优化处方和工艺，提高药物的生物利用度和稳定性，我们的制剂能够更好地模拟原研药的降血糖能力，降低患者的用药成本。这不仅增强了公司在医药市场的竞争力，也为社会公共健康事业作出了贡献。更高效的药物能够减少患者的用药负担，提升治疗效果，从而减轻社会医疗系统的压力。

（二）取得的业绩（代表作）【限填3项，须提交证明原件（包括发表的论文、出版的著作、专利证书、获奖证书、科技项目立项文件或合同、企业证明等）供核实，并提供复印件一份】					
1. 公开成果代表作【论文发表、专利成果、软件著作权、标准规范与行业工法制定、著作编写、科技成果获奖、学位论文等】					
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How Should We Think About Pharmaceutical Excipients in Clinical Pharmacy Education?	国际期刊	2023年02月06日	Indian Journal of Pharmaceutical Education and Research	2/4	SCI期刊收录
Zwitterionic hyaluronic acid derivatives for co-delivery of both chemotherapeutic and nucleic acid drugs in breast cancer treatment	TOP期刊	2024年10月18日	Nano Research	1/13	SCI期刊收录

2.其他代表作【主持或参与的课题研究项目、科技成果应用转化推广、企业技术难题解决方案、自主研发设计的产品或样机、技术报告、设计图纸、软课题研究报告、可行性研究报告、规划设计方案、施工或调试报告、工程实验、技术培训教材、推动行业发展中发挥的作用及取得的经济社会效益等】

（三）在校期间课程、专业实践训练及学位论文相关情况	
课程成绩情况	按课程学分核算的平均成绩： 87 分
专业实践训练时间及考核情况(具有三年及以上工作经历的不作要求)	累计时间： 1 年（要求1年及以上） 考核成绩： 83 分
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22260510

二、日常表现考核评价及申报材料审核公示结果

日常表现考核评价	非定向生由德育导师考核评价、定向生由所在工作单位考核评价： ☑优秀 ☐良好 ☐合格 ☐不合格 德育导师/定向生所在工作单位分管领导签字（公章）：2025 年 3 月 18 日
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浙 江 大 学 研 究 生 院

攻读硕士学位研究生成绩表

学号：22260510	姓名：姜若琳	性别：女	学院：工程师学院	专业：生物与医药	学制：2.5年
毕业时最低应获：24.0学分		已获得：27.0学分		入学年月：2022-09	毕业年月：
学位证书号：			毕业证书号：		授予学位：

学习时间	课程名称	备注	学分	成绩	课程性质	学习时间	课程名称	备注	学分	成绩	课程性质
2022-2023学年秋季学期	工程技术创新前沿		1.5	94	专业学位课	2022-2023学年春季学期	自然辩证法概论		1.0	82	专业学位课
2022-2023学年秋季学期	新时代中国特色社会主义理论与实践		2.0	89	专业学位课	2022-2023学年夏季学期	研究生英语基础技能		1.0	免修	公共学位课
2022-2023学年秋冬学期	工程伦理		2.0	89	专业学位课	2022-2023学年夏季学期	药品创制工程实例		2.0	91	专业学位课
2022-2023学年冬季学期	药物基因组学		2.0	81	跨专业课	2022-2023学年夏季学期	工程师创新创业思维		2.0	92	专业选修课
2022-2023学年冬季学期	先进制药技术		2.0	86	跨专业课	2022-2023学年春夏学期	高阶工程认知实践		3.0	87	专业学位课
2022-2023学年冬季学期	产业技术发展前沿		1.5	93	专业学位课	2022-2023学年夏季学期	研究生英语		2.0	免修	专业学位课
2022-2023学年秋冬学期	研究生论文写作指导		1.0	89	专业选修课		硕士生读书报告		2.0	通过	
2022-2023学年春季学期	数学建模		2.0	85	专业选修课						

说明：1.研究生课程按三种方法计分：百分制，两级制（通过、不通过），五级制（优、良、中、及格、不及格）。

2.备注中“*”表示重修课程。

学院成绩校核章：

成绩校核人：张梦依

打印日期：2025-03-20

论文 1：How Should We Think About Pharmaceutical Excipients in Clinical Pharmacy Education?（SCI 录用）

论文链接：[How Should We Think About Pharmaceutical Excipients in Clinical Pharmacy Education? | Indian Journal of Pharmaceutical Education and Research]

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‹ Insight into the Glycosylation Methods of the Flavonoids as an Approach to Enhance its Bioavailability and Pharmacological Activities

up

Application of the Case Teaching Method in a Pharmaceutical Analysis Online Course ›

Published on:March 2023
Indian Journal of Pharmaceutical Education and Research, 2023; 57(2):372-376
Original Article | doi:10.5530/ijper.57.2.46

How Should We Think About Pharmaceutical Excipients in Clinical Pharmacy Education?

Authors and affiliation (s):

Min Han, Ruo-lin Jiang, Xiao-Ying Ying, Jian-qing Gao

Institute of Pharmaceutics, College of Pharmaceutical Sciences, Zhejiang University, Hangzhou, CHINA.

Abstract:

Background: As the pharmaceutical industry shifts to a patient-oriented approach, pharmaceutical education has fairly garnered increasing attention from educators, so that the teaching course centered on pharmaceutical excipients is becoming more and more popular. Purpose: The purpose of this study was to evaluate the significance of pharmaceutical excipients in clinical pharmaceutical education by a single-blind and parallel group design. **Materials and Methods:** The course was given in the form of small classes at Zhejiang University. The control group was taught in a traditional mode, while the intervention group mainly focused on the importance of pharmaceutical excipients in teaching. Likert five-point scale was used to analyze the test difficulty and learning effect of students in both groups. **Results:** Firstly, we investigated the test difficulty and learning time of the two groups of students, no significant difference was detectable between the two groups (p>0.05). Then, we investigated the learning effect of the two groups from four dimensions: accessibility of teachers' teaching concept, inspiration of the teaching methods, independence of students in the teaching process, and the extent to which the curriculum expanded student's horizons. It was found that the learning effect was much preferred in the intervention group as compared with the control group (p<0.05). **Conclusion:** The results showed that the emphasis on the integration of pharmaceutical excipients in pharmacy education had a positive impact on students' learning. Therefore, it is worth to reevaluate the role of pharmaceutical excipients in clinical pharmacy education.

Keywords: Clinical pharmacy education, Pharmaceutical excipients, Parallel group design, Teaching improvement.

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Original Article

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ABSTRACT

Background: As the pharmaceutical industry shifts to a patient-oriented approach, pharmaceutical education has fairly garnered increasing attention from educators, so that the teaching course centered on pharmaceutical excipients is becoming more and more popular. **Purpose:** The purpose of this study was to evaluate the significance of pharmaceutical excipients in clinical pharmaceutical education by a single-blind and parallel group design. **Materials and Methods:** The course was given in the form of small classes at Zhejiang University. The control group was taught in a traditional mode, while the intervention group mainly focused on the importance of pharmaceutical excipients in teaching. Likert five-point scale was used to analyze the test difficulty and learning effect of students in both groups. **Results:** Firstly, we investigated the test difficulty and learning time of the two groups of students, no significant difference was detectable between the two groups ($p>0.05$). Then, we investigated the learning effect of the two groups from four dimensions: accessibility of teachers' teaching concept, inspiration of the teaching methods, independence of students in the teaching process, and the extent to which the curriculum expanded student's horizons. It was found that the learning effect was much preferred in the intervention group as compared with the control group ($p<0.05$). **Conclusion:** The results showed that the emphasis on the integration of pharmaceutical excipients in pharmacy education had a positive impact on students' learning. Therefore, it is worth to reevaluate the role of pharmaceutical excipients in clinical pharmacy education.

Keywords: Clinical pharmacy education, Pharmaceutical excipients, Parallel group design, Teaching improvement.

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INTRODUCTION

Significant strides have been made in pharmaceutical industry, shifting the focus from drugs to clinical pharmaceutical care, which lead to the emergence of clinical pharmacy. Due to its foundation and practicality, pharmacy courses based on pharmaceutical excipients have become one of the important basic courses for training pharmaceutical professionals.[1,2]

Originated from the United States in the 1960s, the concept of clinical pharmaceutical care came into being. Looking around the world, clinical pharmacy education in various countries has experienced continuous innovation. The Federal Union of German Associations of Pharmacists (ABDA) recently formulated "Pharmacy 2030", which stipulated that doctors and pharmacists shall share the responsibility in drug usage. Therefore, some German scholars proposed to add clinical practice into clinical Pharmacy education. In the meantime, students in Kitasato University School of Pharmacy, Tokyo, were asked to obtain patient data from a model medical chart, before performing stimulated patient interviews, which includes hospital admission and patient counseling. It was found that students were able to develop their communication skills through this approach. What's more, Umeå University in Northern Sweden tried to apply 3D virtual world (3DVW) technology to clinical pharmacy courses. More than half of students (76%) believe that the improvement of the course has helped them in their studies.[3-5]

As the birthplace of clinical pharmacy, clinical pharmacy degree education in the United States is divided into two stages: A pre-professional curriculum and a full-time professional curriculum, which is field-oriented and emphasizes positive learning results.[6] In 1964, China proposed to develop clinical pharmacy. Advanced clinical pharmacy education in China started in the early 1980s and has been developing for more than 40 years.[7] In recent years, clinical pharmacy education in China has developed rapidly and achieved satisfactory results. However, there are still many problems such as passive indoctrination of knowledge, poor connection between different disciplines and also with clinical practice, which are worth of our thinking.[8,9]

DOI: 10.5530/ijper.57.2.46

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第 1 条，共 1 条

标题: How Should We Think About Pharmaceutical Excipients in Clinical Pharmacy Education?

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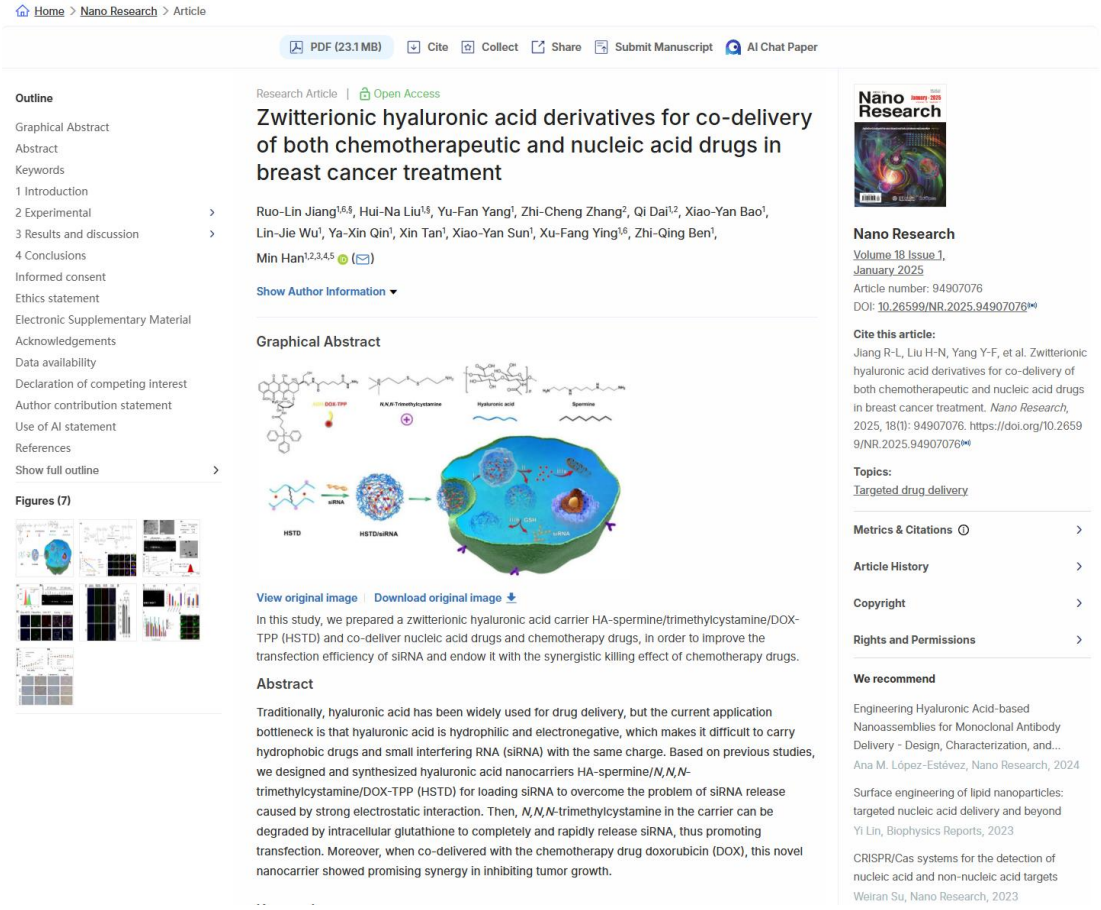

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Graphical Abstract
Abstract
Keywords
1 Introduction
2 Experimental
3 Results and discussion
4 Conclusions
Informed consent
Ethics statement
Electronic Supplementary Material
Acknowledgements
Data availability
Declaration of competing interest
Author contribution statement
Use of AI statement
References
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Figures (7)

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Zwitterionic hyaluronic acid derivatives for co-delivery of both chemotherapeutic and nucleic acid drugs in breast cancer treatment

Ruo-Lin Jiang[1,6,§], Hui-Na Liu[1,§], Yu-Fan Yang[1], Zhi-Cheng Zhang[2], Qi Dai[1,2], Xiao-Yan Bao[1], Lin-Jie Wu[1], Ya-Xin Qin[1], Xin Tan[1], Xiao-Yan Sun[1], Xu-Fang Ying[1,6], Zhi-Qing Ben[1], Min Han[1,2,3,4,5] (✉)

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Graphical Abstract

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In this study, we prepared a zwitterionic hyaluronic acid carrier HA-spermine/trimethylcystamine/DOX-TPP (HSTD) and co-deliver nucleic acid drugs and chemotherapy drugs, in order to improve the transfection efficiency of siRNA and endow it with the synergistic killing effect of chemotherapy drugs.

Abstract

Traditionally, hyaluronic acid has been widely used for drug delivery, but the current application bottleneck is that hyaluronic acid is hydrophilic and electronegative, which makes it difficult to carry hydrophobic drugs and small interfering RNA (siRNA) with the same charge. Based on previous studies, we designed and synthesized hyaluronic acid nanocarriers HA-spermine/*N,N,N*-trimethylcystamine/DOX-TPP (HSTD) for loading siRNA to overcome the problem of siRNA release caused by strong electrostatic interaction. Then, *N,N,N*-trimethylcystamine in the carrier can be degraded by intracellular glutathione to completely and rapidly release siRNA, thus promoting transfection. Moreover, when co-delivered with the chemotherapy drug doxorubicin (DOX), this novel nanocarrier showed promising synergy in inhibiting tumor growth.

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ABSTRACT

Traditionally, hyaluronic acid has been widely used for drug delivery, but the current application bottleneck is that hyaluronic acid is hydrophilic and electronegative, which makes it difficult to carry hydrophobic drugs and small interfering RNA (siRNA) with the same charge. Based on previous studies, we designed and synthesized hyaluronic acid nanocarriers HA-spermine/*N,N,N*-trimethylcystamine/DOX-TPP (HSTD) for loading siRNA to overcome the problem of siRNA release caused by strong electrostatic interaction. Then, *N,N,N*-trimethylcystamine in the carrier can be degraded by intracellular glutathione to completely and rapidly release siRNA, thus promoting transfection. Moreover, when co-delivered with the chemotherapy drug DOX, this novel nanocarrier showed promising synergy in inhibiting tumor growth.

KEYWORDS

zwitterionic hyaluronic acid, *N,N,N*-trimethylcystamine, small interfering RNA (siRNA), doxorubicin

1. Introduction

Hyaluronic acid (HA) is a linear polysaccharide, consisting of N-acetyl-D-glucosamine and D-glucuronic acid. As widely distributed in the extracellular matrix of most tissues, HA is water-soluble, biocompatible, biodegradable, non-immunogenic, and non-inflammatory. In addition, the specific receptor of hyaluronic acid, CD44, is overexpressed on the surface of various malignant tumor cells[1, 2]. There are various active groups in the structure of HA, which can be physically or chemically modified to prepare derivatives that can be used as good carrier materials for drug delivery. Over the past decade, HA and its derivatives have been used to deliver proteins[3], nucleic acids[4], and anti-tumor drugs[5]. It has proved that HA can be used as a kind of sustained-release carrier for drugs, which can delay drug release and prolong drug efficacy.

However, the application of HA in drug delivery, especially nucleic acid drugs, is still insufficient. For example, the large number of carboxyl and hydroxyl groups in the structure endows HA with strong hydrophilicity, which makes it difficult to physically encapsulate hydrophobic small molecule drugs[6]. Then, negatively charged HA makes it hard to adsorb nucleic acid drugs with the same charge, and it is necessary to introduce cationic polymers, such as polyethyleneimine (PEI) for adsorption[7, 8]. Even so, the introduction of cationic polymers makes the carrier difficult to degrade, which changes the basic properties of HA, such as the *in vivo* biocompatibility and tumor-targeting ability.

At the same time, it is well known that drug resistance is a major obstacle to effective cancer chemotherapy, and the Twist1 transcription factor is involved in epithelial-mesenchymal transition (EMT) and gives rise to chemoresistance. Therefore, delivering chemotherapeutics simultaneously with siRNA-inactivating Twist1 signaling pathways that are involved in the development of MDR phenotype would provide an effective approach to inhibit drug resistance and increase chemotherapy efficacy[9]. However, it remained a challenge to develop a single vector that incorporates both anionic siRNA and an amphiphilic chemotherapeutic agent, i.e. a doxorubicin (DOX) derivative targeting mitochondria that was achieved by triphenylphosphonium (TPP) conjugation (DOX-TPP), in a single nanocarrier to address various extracellular and intracellular critical barriers[10, 11].

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