

中华预防医学会科学技术奖项目公示内容

一、项目名称：基于循证医学证据的新发重大传染病疫苗免疫策略的建立

二、推荐单位及推荐意见

推荐单位：上海市预防医学会

推荐意见：项目组针对新发重大传染病严重危害人群健康和公共安全的严峻形势，围绕其疫苗免疫策略制定的全链条证据，包括传染病疾病负担及时空流行规律、疫苗免疫原性和保护效果、疫苗优先接种人群，及其大规模疫苗接种的健康和经济学影响等紧密关联的前沿科学领域，开展了近十五年的系统、深入研究，取得了重要科技创新。

项目组解析了呼吸道和肠道病毒所致传染病的完整疾病负担金字塔，揭示其季节性特征；阐明了疫苗接种的免疫持久性和保护效果；定量测算出人群大规模疫苗接种的健康影响；明确疫苗优先接种人群及其规模，确定其疫苗接种的有效成本阈值。成果发表于 BMJ、Nat Med、Lancet Infect Dis、Lancet Public Health、Nat Hum Behav、Lancet Child Adolesc Health、Nat Commun、PLoS Med 等领域内国际顶尖期刊。项目组建立了疫苗系统评价和免疫策略建立及优化（包括确定优先接种人群，疫苗最佳接种时机、接种剂次和接种间隔）的关键技术，研究成果被正面引用以支撑 WHO 和我国急性呼吸道及肠道传染病疫苗免疫决策。项目成果达到该领域的国际领先水平。同意推荐 2025 年度中华预防医学会科学技术奖。

三、项目简介(项目简要介绍, 技术路线, 创新点及项目产出)

当前全球面临急性呼吸道传染病、肠道传染病等多种新发重大传染病的持续威胁, 对人群健康和社会经济危害严重。使用最佳的科学证据研发疫苗, 并针对已注册上市疫苗在人群的应用制定最佳的免疫决策, 是预防控制传染病最安全且经济有效的特异性医学干预手段。项目组紧密围绕国家新发重大传染病防控一线重大需求, 特异性聚焦疫苗免疫策略制定亟需解决的前沿科学问题, 开展近十五年的系统研究, 取得的重大科技创新包括:

1. 阐明急性呼吸道和肠道病毒感染的完整疾病负担金字塔, 精准定义重症、死亡高风险人群; 发现地区特异的周期性与季节性流行模式, 确定疫苗最佳接种时机。通过构建贝叶斯模型测算方法, 可靠识别并定量解决了传染病暴发流行期间公众就医行为改变、临床缺乏实验室诊断和/或检测漏诊导致无法归因等难题, 形成了一套具备可迁移、可推广的精确测算发病-重症-死亡风险的研究方法和技术体系。
2. 阐明疫苗免疫持久性和真实世界的保护效果, 确定疫苗接种剂次和最佳接种间隔。通过临床队列研究, 阐明了基础免疫和加强免疫的免疫原性和中和抗体时变趋势; 构建了基于抗体水平及时、高效地预测保护效力的统计模型, 精准测算出多种技术路线疫苗针对多型别毒株, 以及感染-发病-重症等多临床结局随时间变化的保护效力; 并率先开展检测阴性病例对照研究阐明了疫苗接种的真实世界保护效果, 突破了疫苗“免疫原性-效力-效果”传统研究方法资源消耗大、时效性差等局限。

3. 定量测算出“接种人群+接种剂次+接种间隔”多维组合模式下，人群大规模疫苗接种的健康影响，实现时空特异的免疫策略优化。开发特异性随机动力学模型，破解传统流行病学研究设计面临的资源有限性、可操作性、及时性等方面难题，解析疫苗接种在人群层面的间接保护和血清型替换等复杂问题，通过本土真实世界数据参数提升疫苗免疫策略优化的时空精准度。

4. 明确疫苗优先接种人群及其规模，确定优先人群疫苗接种纳入免疫规划的有效成本阈值。率先确立优先接种人群的多尺度测算及其多层次空间分布规律和成因解析；创新地建立有效疫苗成本方法，明确了疫苗纳入免疫规划具有成本效益的必要条件，即“接种成本-疫苗保护效果”二者的定量关系。

上述系列成果发表在 *BMJ*、*Nat Med*、*Lancet Infect Dis* (2 篇)、*Lancet Public Health*、*Nat Hum Behav*、*Lancet Child Adolesc Health*、*Nat Commun* (2 篇)、*PLoS Med* (3 篇) 等，为 WHO “流感疫苗立场文件”和“新冠疫苗加强免疫策略”，我国“流感疫苗预防接种指南”和“中国手足口病诊疗指南”等制定提供了关键流行病学证据，并建立了新发重大传染病疫苗系统评价和免疫策略制定的全链条循证证据研究的关键技术方法体系，对于推动未来新型疫苗研发和应用研究具有引领、示范作用。这些成果被国际顶级期刊评述为“方法学模板”、“对研发和引入疫苗至关重要”、“增进健康的重磅声音”等。

四、主要支撑材料目录（被引用论文题目及作者）

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5	香港大学
6	北京协和医学院

公示单位：上海市预防医学会 签章

2025年4月25日

