

# 儿童寄生虫病学

## PEDIATRIC PARASITOLOGY

主 编 闻礼永

副主编 陆绍红 吴晓华 王 勇



人民卫生出版社  
PEOPLE'S MEDICAL PUBLISHING HOUSE

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PEDIATRIC  
PARASITOLOGY

第 1 卷 第 1 期  
2024 年 1 月 出版

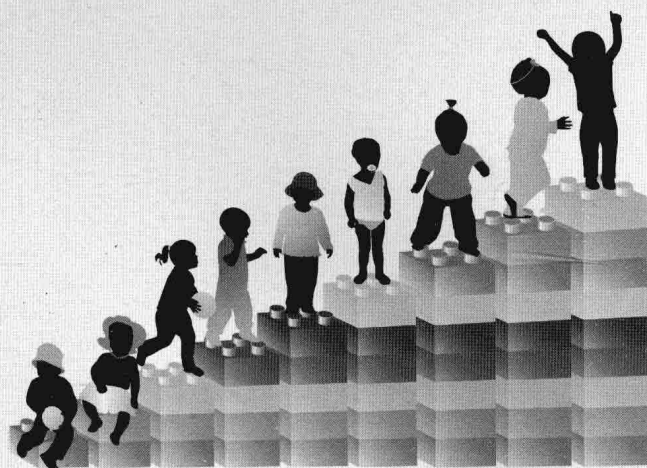


主编：王 强  
副主编：李 明



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## Pediatric Parasitology



主 编 闻礼永

副主编 陆绍红 吴晓华 王 勇

主 审 张悟澄 陈翠娥 吴观陵 吴中兴

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## 图书在版编目 (CIP) 数据

儿童寄生虫病学/闻礼永主编. —北京: 人民卫生出版社, 2010. 7

ISBN 978-7-117-12657-1

I. ①儿… II. ①闻… III. ①小儿疾病: 寄生虫病-防治 IV. ①R725. 3

中国版本图书馆 CIP 数据核字 (2010) 第 045157 号

门户网: <a href="http://www.pmph.com">www.pmph.com</a>	出版物查询、网上书店
卫人网: <a href="http://www.ipmph.com">www.ipmph.com</a>	护士、医师、药师、中医师、卫生资格考试培训

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## 儿童寄生虫病学

主 编: 闻礼永

出版发行: 人民卫生出版社 (中继线 010-59780011)

地 址: 北京市朝阳区潘家园南里 19 号

邮 编: 100021

E - mail: [pmph@pmph.com](mailto:pmph@pmph.com)

购书热线: 010-67605754 010-65264830

010-59787586 010-59787592

印 刷: 中国农业出版社印刷厂

经 销: 新华书店

开 本: 889×1194 1/16 印张: 36.5 插页: 8

字 数: 1182 千字

版 次: 2010 年 7 月第 1 版 2010 年 7 月第 1 版第 1 次印刷

标准书号: ISBN 978-7-117-12657-1/R · 12658

定 价: 98.00 元

打击盗版举报电话: 010-59787491 E-mail: [WQ@pmph.com](mailto:WQ@pmph.com)

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## 编委

(以姓氏笔画为序)

- |     |                         |     |                         |
|-----|-------------------------|-----|-------------------------|
| 王 勇 | 南京医科大学                  | 张悟澄 | 浙江大学                    |
| 毛亚飞 | 浙江大学                    | 张鸿满 | 广西壮族自治区疾病预防控制中心         |
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|     |                         | 漏磊君 | 浙江省医学科学院                |



## 主 编 简 介

### 闻礼永

男,1961年生,浙江杭州人,医学博士,硕士生导师。现任浙江省医学科学院寄生虫病研究所所长、研究员。兼任卫生部血吸虫病专家咨询委员会委员,卫生部寄生虫病标准专业委员会委员,中华预防医学会医学寄生虫分会委员会常务委员,中国地方病协会血吸虫病专业委员会委员,国家医疗器械审评专家库审评专家,浙江省血吸虫病防治中心主任,浙江省预防医学会医学寄生虫学专业委员会主任委员,浙江省血吸虫病研究委员会主任委员,浙江省预防医学会地方病专业委员会副主任委员,浙江省预防医学会理事,《中国寄生虫学与寄生虫病杂志》编委,《中国血吸虫病防治杂志》编委,《国际医学寄生虫病杂志》编委,《国际医学流行病学传染病学杂志》编委,《浙江预防医学》编委等。为浙江省151人才工程第一层次人员。长期从事血吸虫、土源性线虫等寄生虫病科研和防治工作,主持或参加完成世界卫生组织(WHO)、国家科技攻关项目、国家和省自然科学基金、部省级科研项目等。在国内外杂志发表学术论文80余篇,其中SCI收录论文7篇。主编或参编学术专著9部。获省部厅级科技成果奖14项次,其中省部级二等奖2项,省部级三等奖7项。获得国家药品监督管理局一类独立批件新药证书1项,制订卫生行业标准多项。作为主导师培养硕士研究生多人。曾获WHO奖学金以访问学者身份赴美国Yale大学、澳大利亚昆士兰医学研究所、澳大利亚James Cook大学研修。



## 副主编简介



**陆绍红** 女,1968年生,浙江临海人,医学博士,硕士生导师。浙江省医学科学院寄生虫病研究所副所长、研究员,兼任中国动物学会寄生虫学专业学会理事,浙江省血吸虫病研究委员会秘书长。曾先后两次获笹川医学奖学金赴日本名古屋市立大学研修。2008年担任WHO驻华代表处疟疾、媒介传播及其他寄生虫病项目官员。多年从事寄生虫病和寄生虫学研究,主持和参加WHO、国家科技攻关项目、省自然科学基金、省部级等科研项目多项,在国内外学术期刊发表研究论文40余篇,其中SCI收录论文9篇。获中华预防医学会和省级科技进步奖3项。



**吴晓华** 女,1970年生,山东济南人,硕士生导师。中国疾病预防控制中心寄生虫病预防控所血吸虫病室副主任、研究员。卫生部血吸虫病专家咨询委员会委员兼秘书,中国地方病协会血吸虫病专业委员会委员,中华预防医学会医学寄生虫分会委员。1987~1993年就读于上海医科大学;1995~1999年就读于中国预防医学科学院寄生虫病研究所并获硕士学位。参加国家科技攻关项目、国家自然科学基金重大项目 and WHO/TDR 课题等8项,在国内外学术期刊发表论文30余篇。获中华预防医学会科学技术奖二等奖和中华医学科技奖三等奖各1项。



**王 勇** 男,1963年生,南京医科大学病原生物学系教授、博士生导师,中华医学会热带病与寄生虫学会理事,中国动物学会寄生虫学会理事,《中国血吸虫病防治杂志》和《寄生虫与医学昆虫学报》编委,江苏省“青蓝工程”优秀中青年学术带头人培养对象。曾先后赴美国Tufts大学医学院和澳大利亚悉尼科技大学研修。先后承担国家“973”计划课题、国家传染病防治重大专项课题、国家自然科学基金课题等,已发表研究论文40余篇,其中SCI收录论文8篇;主编和副主编专著3部,参编国家级规划教材6部。主要研究方向为寄生虫感染的免疫,着重研究免疫调节的分子基础及机制。



# 序 一

欣闻《儿童寄生虫病学》专著即将出版,这是在闻礼永研究员组织下,全国近 30 位长期从事寄生虫病预防、教学、临床和科研工作的知名专家通力协作编撰的一本学术专著,不但对我国儿童卫生事业发展作出了杰出的贡献,而且唤醒了大家对全球儿童热带病——这个被忽视领域的关注。

半个多世纪以来,我从事国内外儿科临床和保健工作,并历任世界卫生组织(WHO)驻国家代表、地区办事处顾问及日内瓦总部助理总干事、副总干事等职,深知寄生虫病是儿童期最常见的一类疾病,其发病率及病死率仍占有很大的比例,严重危害儿童的健康和生长发育。据 WHO 统计,目前全世界每年有 100 多万人死于疟疾,其中绝大多数是 5 岁以下非洲儿童;腹泻是导致 5 岁以下儿童死亡的第二大原因,其中寄生虫所致的儿童腹泻多为迁延性过程,阻碍儿童对营养物质的吸收,导致贫血和发育迟缓。此外,弓形虫病是一种全球范围内广泛流行的疾病,妇女妊娠期间感染可对胎儿造成严重损害,如智力迟钝、失明、脑瘫、自发性流产等,在发病率最高的国家,每千名婴儿中就有 3~6 例先天性弓形虫病患儿,因此加强儿童寄生虫病的诊断和防治,降低其发病率和病死率,提高儿童的健康水平具有重要而深远的意义。

2000 年 9 月,在联合国千年首脑会议上,世界各国领导人就消除贫穷、饥饿、疾病、文盲、环境恶化和对妇女的歧视,商定了一套有时限的目标和指标,统称为千年发展目标(MDGs)。其中降低儿童死亡率,遏制疟疾和其他疾病发病率增长,是八项核心目标中的两个重要方面。这本专著的出版,对儿童寄生虫病广泛流行的发展中国家来说更具有现实意义。

儿童寄生虫病的发生、发展有其独特的规律,诊断与治疗也有其特有的复杂性,广大医务工作者和从事寄生虫病预防工作的专业人员急需一本系统介绍儿童寄生虫病的专业书籍,但目前国内外尚缺乏这方面的专著。本书以寄生虫病传播途径为编写主线,综合国内外最新的文献资料,在儿童寄生虫病的基本理论和基本知识的基础上,全面地介绍儿童寄生虫病的病原学、流行病学、发病机制和病理学改变、临床表现、实验室检查、诊断和鉴别诊断、治疗、预防与控制等,特别是每个病种后附有病案和分析,具有突出的临床指导实用价值。该书内容新颖丰富,具有较强的知识性、系统性和科学性,将为临床医生和预防专业人员开展儿童寄生虫病的正确诊治和科学防治提供重要的指导和参考。

愿此书被更多的医学和预防工作者所知晓和应用!并希望能有机会把这一学术专著介绍给联合国儿童基金会/联合国开发计划署/世界银行/世界卫生组织共同资助的热带病研究和培训特别规划(TDR),让全球更多被忽视的儿童受益!



胡广湧

联合国教科文组织国际生命伦理委员会委员  
上海交通大学医学院瑞金医院儿科终身教授  
中国关心下一代专家委员会上海分会主任  
卫生部国际卫生咨询委员会委员  
世界卫生组织前副总干事



# FOREWORD 1

Glad to hear the forthcoming issue of *Pediatric Parasitology*, this is a collaborating academic monograph, compiled by Prof. Li-yong Wen and 30 Chinese experts who have been long engaged in the prevention, teaching, clinical and research work of parasitic diseases. This is not only made great contribution for the child health development of China, but also arouses the special attention on the neglected disease — tropical disease of children in the world.

For almost half a century, I have been engaged in pediatric clinical and health care work at home and abroad, and have served in the World Health Organization (WHO), as the Regional Adviser, the Representative as well as the Assistant Director-General and Deputy Director-General, in Geneva headquarters, well aware that the parasitic disease is one of the most common disease in childhood. The incidence and mortality of parasitic diseases still remain prodigious proportion, which seriously endangering the health and growth of children. According to WHO statistics, more than a million people of the world die from malaria per year, most of them are African children under 5 years old; diarrheal disease in children under the age of 5 is the second leading cause of death, the childhood diarrhea caused by parasites which usually are persistent process, that can prevent the absorption of nutrients in children, leading to anemia and growth retardation. In addition, toxoplasmosis is a highly prevalent disease worldwide; its infection in pregnant women can cause serious damage to the fetus, such as mental retardation, blindness, cerebral palsy and spontaneous abortion etc. In countries with the highest incidence rates, there were 3~6 congenital toxoplasmosis cases per 1000 infants. Therefore, improving the diagnosis, treatment and prevention of children's parasitic disease, will particularly reduce the morbidity and mortality in children, and will have crucial and far-reaching impact to the health of children.

In September 2000, world leaders at the United Nations Millennium Summit agreed on a set of time-bound goals and targets, which was about the eradication of poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women, had been collectively known as the Millennium Development Goals (MDGs). The two important aspects of eight core objectives are to reduce child mortality and curb the incidence grows of malaria and other diseases. This monograph publication is of more realistic significance to the developing countries where widely prevalent of parasitosis in children.

The incidence and development of parasitic diseases in children has its own unique pattern, diagnosis and treatment also has its unique complexity. The majority of medical workers and professionals who engage in clinic and prevention on parasitic disease, are urgently need of a professional reference book in which systematic presented the knowledge of Pediatric Parasitology, while the kind of monograph in this area is just what worldwide lacks. On the basis of the basic theory and knowledge of children parasitic diseases, synthesize and review the latest bibliography and information from domestic and abroad, the book surround the transmission routes of parasitosis, give an over view of the Pediatric Parasitology with its present situation of etiology, epidemiology, pathogenesis and pathological changes, clinical manifestations, laboratory examination, diagnosis and differential diagnosis, treatment, prevention and control of the diseases, especially attached case studies and analysis of medical records after each of diseases entities, These are all useful for clinical guidance and practice. This new content-rich book, with a strong knowledge-based, systematic and scientific information, will be valuable for giving guidance and

reference to clinician and preventive medicine professionals, to improve their diagnosis, treatment and prevention of pediatric parasitic diseases.

I would like the book to be known and applied for more medical workers! And hope to have an opportunity to introduce the academic monographs to the Special Program for Research and Training in Tropical Diseases (TDR) which is co-sponsored by the UNICEF / UNDP / World Bank / WHO, let more neglected children in the world to be benefited!

**Dr. Ching-li Hu**

Emeritus Professor of Pediatrics Ruijin Hospital, Shanghai Jiao Tong University School of Medicine

Chairman of the Experts Committee on Care for Children, Shanghai Chapter

Panel Member of International Health, Ministry of Health China

Member of the International Bioethics Committee of UNESCO

Former Deputy Director-General of WHO



# 序 二

许多全球重度流行和高疾病负担的寄生虫病严重影响儿童健康,但这个问题尚未被普遍认识。事实上,令人吃惊的是,在亚洲、撒哈拉以南非洲、拉丁美洲和加勒比地区的中、低收入国家,几乎所有生活在贫困中的儿童都罹患至少一种寄生虫病。

三种主要的土源性蠕虫感染,即蛔虫、鞭虫和钩虫感染是最具有代表性的。如果去亚洲、非洲和拉丁美洲一些贫困的乡村就会发现,几乎所有儿童都感染蛔虫、鞭虫或钩虫。在儿童的胃肠道中同时感染这三种被称为“邪恶三巨头”的寄生虫并不少见。此外,从许多贫穷国家获得的大量证据显示,在儿童中寄生的蠕虫数量比成年人更多,并因此导致营养不良和贫血。由于这些蠕虫可在儿童消化道存活多年,慢性的肠道蠕虫感染可导致儿童发育和体能的明显缺陷,以及在认知和智力上的障碍,而导致这些现象的相关生化、营养和免疫机制多数尚未阐明。进一步的证据表明,包括血吸虫病在内的其他高度流行的蠕虫病也同样严重影响儿童健康。这些寄生虫感染代表一类被忽略的热带病,它们可能产生相当于 HIV/AIDS 或结核病的全球疾病负担。此外,土源性蠕虫感染和血吸虫病危害儿童健康,影响儿童的教育和学习,剥夺儿童的未来,使其陷入贫困的恶性循环。有研究显示这些寄生虫感染可能在初生及婴儿期就已获得,有时还可通过哺乳途径传播,因此需要对这些重要的状况进行充分的调查研究。与此同时,为减少儿童土源性蠕虫病和血吸虫病发病率,我们需要加强全球的查治行动,由于抗药性的出现(尤其是钩虫治疗药物甲苯达唑),我们还需要重视研发新一代驱虫药物和疫苗。

在低收入国家威胁儿童健康的另一重要寄生虫病是疟疾。有研究者将恶性疟列为 5 岁以下儿童死亡的一个主要原因。这些儿童大多死于脑型疟,严重贫血或急性呼吸窘迫综合征。目前,我们才开始了解其病理生理机制。也有越来越多的证据表明恶性疟是导致学龄儿童认知能力受损的一个重要原因,而间日疟和卵形疟也隐含严重的疾病负担。因此迫切需要在所有疟疾流行区扩大使用抗疟药和蚊帐(尤其是在撒哈拉以南非洲),同时研究新的药物和疫苗以有效防治疟疾。

寄生虫感染并非只存在于贫穷国家,人们越来越认识到在发达国家儿童也可由于慢性寄生虫感染导致发病。例如贾第虫病是导致很多慢性腹泻和儿童生长迟缓的原因,隐孢子虫病是幼儿园儿童腹泻的主要原因,犬弓首线虫病则与哮喘、发育迟缓和癫痫发作有关,滴虫病是青少年中一个重要的性传播疾病。虽然还不能获得广泛的数据,但已有研究表明,上述 4 种寄生虫感染是最常见的儿童感染。无论是发达国家还是发展中国家都需要更充分了解这些疾病的流行程度,发展和改进控制手段,包括更好的、更易广泛获得的诊断试剂。

弓形虫病和美洲锥虫病相关的先天性寄生虫感染也是严重的疾病负担,胎盘疟疾是导致胎儿宫内生长迟缓的主要原因。我们需要加强与先天性感染有关的风险因素及新的治疗方法的研究。

儿童感染寄生虫带来令人震惊的疾病负担,但迄今没有专门针对儿童寄生虫病的专业书籍,由主编闻礼永博士组织中国优秀的寄生虫病专家撰写的权威性专著《儿童寄生虫病学》,全面而缜密,将为各地儿童的健康作出贡献!

**Peter Hotez** 医学博士

《*PLoS Neglected Tropical Diseases*》主编

美国乔治·华盛顿大学微生物学、免疫学和热带医学系 主任 / 杰出教授

美国萨宾疫苗研究所 所长

美国儿科学会 委员



# FOREWORD 2

It is not commonly appreciated that many of the world's highest prevalence and high disease burden parasitic infections disproportionately affect children. Indeed it comes as a surprise to many people that in the low-and middle-income countries in Asia, sub-Saharan Africa, and Latin America and the Caribbean almost all of the children who live in poverty suffer from at least one parasitic infection.

One of the clearest examples of this observation is represented by the three major soil-transmitted helminth infections, i.e., ascariasis, trichuriasis, and hookworm infection. Travel to almost any rural village affected by poverty in Asia, Africa, and the Americas would reveal that almost all of the children harbor *Ascaris* roundworms, *Trichuris* whipworms, or hookworms. It is not uncommon for a child to harbor all three members of this "unholy trinity" in their gastrointestinal tract. Moreover, a large body of evidence acquired from many poor nations has revealed that children on average harbor larger numbers of worms than their adult counterparts, and as a result suffer from malnutrition and anemia. Because these worms can live for years in the gastrointestinal tract of a child, with time chronic infections with intestinal worms lead to marked impairments in child growth and physical fitness, as well as impairments in cognitive and intellectual development. Most of the biochemical, nutritional and immunological mechanisms underlying these phenomena have not yet been elucidated. There is further evidence to suggest that other high prevalence helminth infections, including schistosomiasis also disproportionately affect children in this and related ways. Together such parasitic infections represent a cluster of neglected tropical diseases that in aggregate may produce global disease burdens equivalent to better known conditions such as HIV/AIDS or tuberculosis. In addition, through mechanisms outlined above the soil-transmitted helminth infections and schistosomiasis impair childhood education and learning, such that they rob children of their future and trap them in a vicious downward spiral of poverty. Together with data indicating that some of these parasitic infections may be acquired in the first year of life and sometimes through lactogenic routes, there is a rich body of investigative activities that needs to be conducted for these important conditions. At the same time we need to step up global efforts for deworming in order to reduce childhood morbidity from soil-transmitted helminth infections and schistosomiasis, and because of the specter of emerging drug resistance (especially for mebendazole against hookworm), we need to look at the possibility of a new generation of anthelmintic drugs and vaccines.

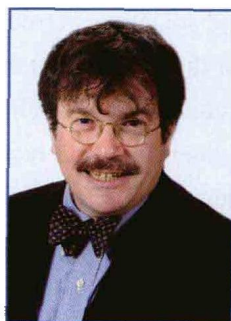
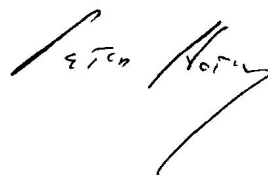
Also critical to the health of children in low income countries is malaria. Some investigators rank falciparum malaria as the single leading killer of children under the age of five years. Many of these children die from cerebral malaria, severe anemia during acute infection, or an acute respiratory distress syndrome. We are only beginning to understand the mechanisms of these pathophysiological processes. There is also increasing evidence that falciparum is now considered an important cause of impaired cognition and learning among school-aged children, while both vivax and ovale malarias produce a significant although largely hidden burden of disease. There is a desperate need to expand the use of antimalarial drugs and bednets in all the malarious endemic areas of the world (but especially in sub-Saharan Africa) while simultaneously looking to new innovations for the development of new drugs and human vaccines that prevent malaria infection and disease.

Parasitic infections are not exclusive to poor countries, and there is also increasing awareness of more subtle child morbidity resulting from chronic parasitic infections in wealthy industrialized nations. Giardiasis is

responsible for large numbers of cases of chronic diarrhea and childhood failure to thrive, cryptosporidiosis is a leading cause of diarrhea in day care settings, toxocariasis has been linked to asthma, developmental delays, and seizures, and trichomoniasis is an important sexually transmitted infection among adolescents. Although data are not widely available, some studies suggest that these four parasitic infections are among the most common pediatric infections in the world. A full elucidation of the extent of these diseases in both wealthy and developing countries is needed as well as efforts to develop improved control tools including better and more widely available diagnostic reagents and kits.

There is also an important burden of congenital parasitic infections associated with toxoplasmosis and chagas disease, while malaria in utero is a leading global cause of intrauterine growth retardation. We need new information on the risk factors associated with acquiring congenital infection and new treatment modalities.

Despite the devastating burden of parasitic and neglected tropical diseases among children, it has been quite some time since a single volume considered specifically pediatric parasitic diseases. Represented here is an authoritative volume that brings together some of the greatest experts in China and elsewhere on these conditions. Dr. Li-yong Wen has provided an important service to children everywhere by producing this comprehensive and thoughtful new book!



**Peter Hotez M.D. Ph.D.**

Co-Editor-in-Chief, PLoS Neglected Tropical Diseases  
Distinguished Research Professor and Chair  
Microbiology, Immunology, and Tropical Medicine  
George Washington University  
President of the Sabin Vaccine Institute  
Fellow, American Academy of Pediatric



# 前言

目前,寄生虫病仍然是严重危害人民身体健康和阻碍社会发展的重要公共卫生问题,其中儿童寄生虫病种类繁多、感染率高、感染度重,混合感染多,影响面广,危害严重,因此有效地控制和消灭儿童寄生虫病是一项长期和艰巨的任务。由于儿童生理解剖和机体免疫系统的特殊性,感染寄生虫具有一些自身特点,如感染某些寄生虫后其幼虫移行症或异位寄生表现突出,儿童感染寄生虫后易出现严重并发症并危及生命,孕妇感染某些寄生虫会对胎儿生长发育产生严重危害,儿童体内长期寄居寄生虫可造成其生长和智力发育迟缓甚至侏儒症,儿童易在原发疾病基础上出现严重机会性致病寄生虫感染等。儿童感染寄生虫后,临床表现往往较重或不典型,极易漏诊或误诊。

儿童作为社会未来建设的希望,关爱和保障儿童健康成长已经成为全社会的共识,世界卫生组织(WHO)和我国政府也都将妇幼健康列为重点关注的领域,加大了“被忽略热带病”的工作力度。在中国,14岁以下儿童人口将近3亿,在全球各国中位居第二,儿童寄生虫病防治工作不容小觑,但是迄今未见出版针对儿童人群寄生虫病诊治的专业书籍,难以适应社会发展的需求。为了更规范和有效地诊断、治疗和预防儿童寄生虫病,推动儿童寄生虫病控制工作,促进儿童的健康成长,WHO将《儿童寄生虫病学》学术专著列入2008~2009年度世界卫生组织/中国卫生技术合作项目,人民卫生出版社也将本书列为社长重点推荐图书之一。

《儿童寄生虫病学》是我国首次编写的有关儿童寄生虫病的学术专著,经过全国近30位长期从事寄生虫预防、教学、临床和科研工作的知名专家学者共同努力,反复推敲,历时两年编撰完成。全书力求突出儿童寄生虫病特点,在收集国内外儿童寄生虫病的相关资料及新进展,重视基础、临床和预防紧密结合的基础上,以寄生虫病传播途径为编写主线,以百万字的篇幅、附以百幅插图的形式,全面、系统、科学地介绍儿童寄生虫病的病原生物学、流行病学、发病机制、临床表现、实验室检查、诊断与鉴别诊断、治疗、预防与控制以及病案分析等,并附以儿童临床检验参考值、寄生虫病有关标准和寄生虫病相关信息网站等,旨在帮助临床医生正确诊治儿童寄生虫病、指导疾控专业人员规范防治儿童寄生虫病。本书中所列出的药物及治疗剂量仅供各级医务人员在临床或预防用药时参考,实际应用中可根据药物说明书使用。本书的出版将为预防、临床、教学和科研工作者提供集科学性、系统性、规范性、新颖性和实用性于一体的图文并茂的专业书籍。

在本书编写和出版过程中,承蒙前辈张悟澄教授、陈翠娥研究员、吴观陵教授、吴中兴研究员等专家的精心审阅,世界卫生组织前副总干事胡庆澧教授和《PLoS Neglected Tropical Diseases》主编 Peter Hotez 教授在百忙中热情地为本书作序,李理女士承担了全书的文字编辑工作,漏磊君先生参考《人体寄生虫学》等书籍重新绘制了全书的插图。本书的编撰得到了WHO、泛美卫生组织(PAHO)、美国乔治·华盛顿大学、卫生部、浙江省卫生厅、浙江省医学科学院以及Chin-kei Lee博士、亓庆东博士、周晓农研究员、张小栋博士、詹斌博士、沈丽英研究员等大力支持,在此一并谨致谢忱。

由于编者经验和水平有限,书中难免存在疏漏和不妥之处,祈望读者批评斧正。

闻礼永  
2009年12月

# PREFACE

Parasitic infections are still important public health problems that severely harm people's health and impedes social and economic development, in which child parasitic diseases appear more serious because children are usually more vulnerable to all kinds of parasite infections with high infection rate, high intensity and multiple parasite concurrent infections. Therefore, it is an arduous and long-term task to control and eliminate pediatric parasitic diseases effectively. Child parasitic infections hold distinguishing features due to children's particular physiological structures and immature immune system. For instance, in children it is more often to observe larval parasite migration and heterotopic parasitism, more serious complications with higher mortality. Pregnant women infected with parasites can cause abnormal fetal development and abortion. Children with persistent and chronic parasitic infections can cause permanent impairment of physical and mental development with intelligent retardancy or/and dwarf. Children are easier to obtain serious opportunistic parasitic infection on the base of original diseases. Child parasitic diseases are often neglected or misdiagnosed due to their non-typical or more serious clinical manifestations.

Children's health care has drawn more and more attention from whole society of the world. World Health Organization (WHO) and the government of the People's Republic of China have put women and children's health as a big concern and paid more attention to the "Neglected Tropical Diseases". In China, the population of children under age 14 amounts to 300 million ranked second worldwide. Control and prevention of child parasitic diseases is one of the most important public health cares. Over the past few years, although some professional books regarding parasitology and parasitic diseases have been published, there is still a lack of prevention and treatment guidelines specifically for child parasitic diseases. In order to facilitate the control and prevention of child parasitic diseases and thus to improve children's health, writing and editing of *Pediatric Parasitology* have been included in the collaboration project between WHO and China, and in the publishing list of People's Health Publishing House of China.

*Pediatric Parasitology* is the first scholar and scientific collection edited and published in China with the efforts from near 30 experts and scholars who have long engaged in the prevention/control, education, clinic and research of parasitic diseases. The editing of this book lasted for more than two years. The book has highlighted and focused on the characteristics of child parasitic diseases based on the specific transmission pattern. This book covers more than one million Chinese words with approximate one hundred photograph and diagram to fully describe pathogen biology, epidemiology, nosogenesis and pathology, specific clinical manifestation, laboratory examination, clinical diagnosis and treatment, control and prevention of child parasitic diseases. It also include the diagnostic standard and laboratory parameters of child parasitic diseases in order to assist clinic pediatrics to correctly diagnose and treat child parasitic diseases. This book is suitable for all people who are engaged in the children heath care and control, prevention, research and education of pediatric parasitic diseases.

Here we would like to express our sincere gratitude to Prof. Wucheng Zhang, Cui'e Chen, Guanling Wu and Zhongxing Wu for their valuable advice and revision, to Prof. Qingli Hu (former WHO deputy director-general) and Prof. Peter J. Hotez (Editor-in-Chief, *PLoS Neglected Tropical Diseases*) for his writing foreword for the book, to Miss Li Li for her text editing, to Mr. Leijun Lou for drawing most of the illustrations. We would also like

to express our appreciation to WHO, Pan American Health Organization (PAHO), George Washington University, Ministry of Health of China, the People's Health Publishing House, Zhejiang Bureau of Health, Zhejiang Academy of Medical Science, and Dr/prof. Chin-kei Lee, Qingdong Qi, Xiaonong Zhou, Xiaodong Zhang, Bin Zhan, Liying Shen for their great support.

Although we have tried to carefully avoid any mistakes, it is possible to exist some errors or mistakes in this book. Therefore, comments and suggestions are always welcome.

**Li-yong Wen**



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