

国家出版基金资助项目

# 烧伤 代谢营养学

SHAOSHANG DAIXIE YINGYANGXUE

○ 名誉主编 / 黎介寿  
主 编 / 汪仕良 邓诗琳

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**董燕麟教授**

# 烧伤代谢营养学

成永勇题





黎介寿

黎介寿，1924年10月生，中国工程院院士，博士和博士后导师，中国人民解放军普通外科研究所所长及胃肠外科重点实验室主任，南京大学医学院外科教授，第二及第三军医大学外科兼职教授。1949年毕业于国立中正医学院，毕业后即从事普通外科工作已近60年，重视外科基础理论临床应用的研究，擅长胃肠外科，特别是肠外瘘、短肠综合征等的外科治疗，是我国肠外瘘治疗、外科营养支持的先行者，并首先在我国成功地进行了同种异体小肠的移植。为《手术学全集》的总主编，《围手术期处理》、《肠外瘘》、《临床肠外与肠内营养》等书的主编。

Li Jie-shou, born in October 1924, tutor for doctorate and post-doctorate; member of the Chinese Engineering Academy, head of the Research Institute of General Surgery of People's Liberation Army (PLA); chief of the Key Laboratory of Gastroenterology of PLA; professor of surgery at the Medical School of Nanjing University; and committant professor of both the Second and the Third Military Medical University of PLA.

Prof. Li graduated from the National Chungcheng Medical College in 1949, and since then has been engaged in general surgery for about 60 years. He concentrates his efforts on the study of the basic science and clinical practice of surgery, and is expert in gastrointestinal surgery, especially the surgical management of enteric fistula and short bowel syndrome. He is one of the pioneers in management of enteric fistula and surgical nutritional support and is the first one succeeding in small bowel transplantation in China. He was the prime editor-in-chief of the *Complete Works of Surgical Operation*, and the editor-in-chief of the following monographs *Perioperative Management*, *Enterocutaneous Fistula*, *Clinical Parenteral and Enteral Nutrition*, etc.





汪仕良

汪仕良, 1935 年 4 月生, 上海市人, 一级教授, 主任医师、博士导师, 1956 年 12 月毕业于第二军医大学医疗系。从事烧伤、外科 50 余年。1984 年美国 Cincinnati Shriners 烧伤研究所进修 1.5 年, 参与本所及全国数十城市、地区抢救会诊重危烧伤数千例, 长期从事代谢营养临床及实验研究。发表论文 300 余篇, 国际会议发表论文约 50 篇, 主编、参编专著 45 部。提出烧伤“肠源性高代谢”理论、“早期喂养促进伤后肠道复苏”新论点及“烧伤成人热量供应公式”, 获国家、军队科技奖励 18 项 (含国家科技进步二等奖 2 项、解放军四总部“专业技术重大贡献奖”等)。先后任第三军医大学烧伤研究所所长、中华医学会烧伤分会副主委、西南地区烧伤整形协会主委及名誉主委、重庆烧伤整形学会副主任委员、《中华烧伤杂志》主编及 10 多种杂志编委、常务编委。

Wang Shi-liang (1935, 4—), born in Shanghai, China, professor of surgery, tutor for doctorate, graduated from the Second Military Medical University in 1956, engaged in burns, surgery more than 50 yrs. In 1984, worked as research fellow of Shriners Burns Institute (Cincinnati, USA) for 1.5 yrs. Has participated in treating several thousands of severe burn patients in this institute of burn research and dozens of other cities. Published more than 300 scientific papers in journal and about 50 articles in international conferences, edited and participated in editing 45 monographs. He has advanced the theory of “enterogenous hypermetabolism”, found “early feeding could resuscitate gut postburn”, developed the first formula for supplying energy of burn adults in China. Gained 18 items of nation and/or army prizes (including 2 items of the 2nd prize of National Science and Technology Advance Award, the Great Contribution to Speciality Technology Award of 4 General Department in PLA). Held posts of chief of Institute of Burn Research, the co-chairman and consultant of Chinese Burn Association, chairman and honorary chairman of South-west China Society for Burns and Plastic Surgery, co-chairman of Chongqing Burn Association, editor-in-chief of *Chinese Journal of Burns*, editorial or senior editorial board members of more than 10 journals.



邓诗琳

邓诗琳，天津市烧伤研究所教授、主任医师。1955年毕业于中山医学院。长期从事烧伤外科和基本外科的医疗科研教学工作，在重症烧伤救治、代谢营养、感染和 MODS 诊治有专长。现任《中华烧伤杂志》副总编辑、《中国临床营养杂志》编委、《肠外与肠内营养杂志》编委。历任中华医学会烧伤外科学会副主委、常委；中国病理生理学会危重病学会委员、天津市医学会烧伤外科学会主任委员。国家技术发明奖、国家科技进步奖医疗卫生组、中华医学科技奖评委。发表论文 100 余篇，参编《中华烧伤医学》、《黎鳌烧伤学》、《中华人民共和国药典临床用药须知》（2005 年版）、《国家基本药物及新特药临床指南》、《实用临床营养学》等 11 部著作。获卫生部及天津市科技进步奖等奖共计 15 项。

Deng Shi-lin, professor and chief physician of Tianjin Burn Research Institute, graduated from Zhongshan Medical University in 1955. He has long been involved in medical research and teaching on burn surgery and fundamental surgery, and specializes in diagnosis and healing of severe burn, disorder of metabolism and nutrition, infection and multiple organ dysfunction syndrome (MODS).

He is now the vice editor-in-chief of *Chinese Journal of Burns*, and editorial board member of *Chinese Journal of Clinical Nutrition* and *Parenteral & Enteral Nutrition*. He has ever worked as vice-director of Chinese Burn Society Chinese Medical Association, committee member of Chinese Critical Care Society Chinese Association of Pathophysiology, president of Burn Society Tianjin Medical Association, medical and hygiene committee member of National Technical Invention Award and National Science & Technology Progress Award, and committee member of Chinese Medical Sciences and Technology Award.

He has published over 100 papers and jointly edited 11 monographs involving *Li'ao Science of Burn*, *Clinical Guide to the Chinese Pharmacopoeia* (2005 edition), *The Clinical Guide of National Basic, New and Special Drugs* and *Practical clinical Nutriology*. He has been awarded total 15 prizes of Science and Technology Progress Award in provincial and ministry level.



尤忠义

尤忠义 (1935 年 1 月 ~ 2007 年 2 月), 生于江苏无锡。1958 ~ 1960 年上海复旦大学学习, 1966 年毕业于北京协和医科大学, 曾任该校学生会主席。1967 ~ 1974 年中国人民解放军军事医学科学院任实习、助理研究员。1975 年起在第三军医大学西南医院烧伤研究所长期从事烧伤生化和代谢营养研究工作, 历任助理研究员、副研究员、四川省色谱学会名誉理事、重庆市色谱学会副理事长。1996 年起享受国务院特殊津贴, 曾获国家科学技术进步二等奖 1 项, 军队科学技术进步一等奖 1 项、二等奖 3 项。

You Zhong-yi (1935.01—2007.02), was born in Wuxi, Jiangsu, China. Studied in Fudan University from 1958 to 1960, and received MD of Peking Union Medical College in 1966. In 1967, he joined the Academy of Military Medical Sciences of PLA as an assistant researcher. Since 1975, he joined the research of metabolism and nutrition in Burn Institute of Southwest Hospital, Third Military Medical University of PLA. He was also appointed Honorary Director of Sichuan Society of Chromatography and Vice President of Chongqing Society of Chromatography. In 1996, he was granted the State Special Allowance by the State Council for his efforts and achievement in burn research. He has won the second class prize of National Science and Technology Progress Award once, the first class prize once and the second class prize three times of Army Science and Technology Progress Award.



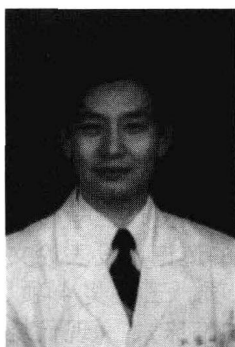
许霖水

许霖水，福建惠安人，1962年毕业于福建医学院医学系，第三军医大学生物生化与分子生物学教授、博士生导师。担任《国外医学临床生物化学与检验分册》及《中国检验医学与临床》杂志常务编委。

从事生物化学与分子生物学教学与科研工作40余年，在烧伤代谢调控研究中对严重烧伤糖代谢和胰岛素受体信号传递障碍发生机制作了深入和系统研究，有较深的造诣。发表论文60余篇，获得省、部级科技进步二等奖2项、三等奖4项。参编《实用肝胆外科》、《细菌内毒素基础与临床》、《现代烧伤病理学》、《中华烧伤医学》、《烧伤代谢营养学》等专著5部。

Xu Lin-shui, a native of Hui'an, Fujian Province, graduated from the medical department of Fujian Medical University in 1962, professor of biochemistry and molecular biology, and tutor for doctorate, the Third Military Medical University of PLA. And he is the executive editorial member of *Journal of Foreign Medical Sciences of Clinical Biochemistry and Laboratory Sciences* and *Chinese Journal of Laboratory Medicine and Clinical Sciences*.

He has engaged in medical education and scientific research over 40 years, and made significant contribution to the mechanism of impairment of carbohydrates metabolism and insulin receptor signal transduction in burn injury. He has won 2 items of second class prize and 4 items of third class prize of Science and Technology Progress Award in provincial and ministry level. He has published over 60 papers and edited 5 monographs, such as *Practical Surgery of Liver and Biliary*, *Basic and Clinical Sciences of Bacterial Endotoxin*, *Modern Pathology of Burns*, *Chinese Burn Surgery* and *Metabolism and Nutrition of Burns*.



韩春茂

韩春茂，1960年生，博士。浙江大学医学院教授、主任医师，烧伤外科学博士生导师。中华医学会烧伤外科学会第五届常务委员，中华医学会肠外肠内营养学分会常务委员，浙江省医学会烧伤外科分会主任委员，浙江省医学会肠外肠内营养学分会主委。临床主要擅长各种烧伤治疗与手术、烧伤营养代谢支持、瘢痕防治。研究方向：组织工程化皮肤研制与临床应用；疤痕机制研究与防治；烧伤营养代谢支持研究。发表论文100多篇，参编图书4本，获得省科技成果奖4项。

Han Chun-mao, PhD and MD, born in 1960, professor, chief physician and doctoral tutor in Medical College of Zhejiang University. He is both a member of Standing Committee of Chinese Burn Society Chinese Medical Association, and a member of Standing Committee of Chinese Parenteral and Enteral Nutrition Society Chinese Medical Association. And also he is the chairman of Zhejiang Division of Chinese Burn Society Chinese Medical Association and the chairman of Zhejiang Society of Parenteral and Enteral Nutrition. In clinic, he is good at burns treatment and operation, nutrition and metabolic support in burn patients and scar's prevention and treatment. The directions of his studies are skin tissue engineering, scar formation mechanism and nutrition support in burns. Up to now, his publications are more than 100 papers and 4 books, and he has won the Science and Technology Achievement Award of Zhejiang Province 4 times.



王凤君

王凤君，1963 年出生，医学博士，第三军医大学西南医院烧伤研究所创伤、烧伤与复合伤国家重点实验室博士生导师。1999 年毕业于第三军医大学并获博士学位，2002 ~ 2004 年在美国芝加哥大学进行博士后研究。先后主持研究国家自然科学基金、国家 973 创伤项目分题、重庆市自然科学基金、教育部回国人员科研基金等课题，为教育部创新团队成员。参与获得国家科技进步奖二等奖 3 项，军队科技进步奖一等奖 1 项、二等奖 3 项，国家发明专利 1 项、国家新药证书 1 项。在《Gastroenterology》、《Am J Pathol》、《J Biol Chem》等国内外杂志发表论文 100 余篇，其中 SCI 论文 13 篇，SCI 总影响因子 110 余分，第一作者单篇 SCI 论著最高影响因子 12.46 分。主要从事烧伤代谢营养及肠道屏障功能紊乱的发生机制与防治策略的研究。

Wang Feng-jun, PhD, MD, born in 1963, professor and doctoral tutor at the State Key Laboratory of Trauma, Burns and Combined Injury, Southwest Hospital, Third Military Medical University, graduated from Third Military Medical University in 1999, and was a postdoctoral research fellow at The University of Chicago during 2002 - 2004. He has undertaken some scientific research projects supported by the National Natural Science Foundation of China, burn sub-project under 973 National Program, etc. He is also the member of the Innovative Research Team supported by the Education Ministry of China. He has won 7 scientific awards, including 3 items of the second class prize of the National Science and Technology Advance Award of China, 1 item of the first class, 3 items of the second class prize of the Army Science and Technology Advance Award. He has published more than 100 papers, with the highest impact factor of 12.46. His research interests are focusing on nutrition, metabolism, the molecular mechanisms and preventive strategies of intestinal barrier dysfunction of burn injury.



彭 曦

彭曦，医学博士，第三军医大学西南医院全军烧伤研究所研究员，博士研究生导师。现为中国科协青年委员，中华医学会肠体肠内营养分会委员，《中华烧伤杂志》等5个杂志编委。主要研究领域为创伤后代谢营养，提出了烧伤后肠道损伤和修复的主要机制及调理措施，在国内率先开展了肠三叶因子的系列研究。先后获国家和军队科技进步奖4项，主持国家级科研项目7项，总经费三百余万元，发表论著70余篇，其中SCI收录期刊8篇，研发新药2个，获发明专利授权3项。2005年入选重庆市“322”人才库，2006年被评为总后“科技新星”，获全军优秀专业人才岗位津贴，并荣获重庆市“五四青年奖章”。

Peng Xi, MD, researcher of burn surgery, tutor for doctorate, youth member of the Chinese Science and Technology Association Committee, member of CSPEN, and editorial board member of five medical journals, graduated from the Third Military Medical University in 1990. After graduation, he engaged in burn surgery and research works of metabolism and nutrition, and proposed the main mechanism and modulation of intestinal damage after burn injury. He has carried out a series research of intestines trefoil factor, a new characteristic protecting polypeptide of gastrointestinal mucosa. He published more than 70 scientific papers, in which 8 papers were included in SCI, and hosted 7 items of Nation Science Foundation, the total funds were more than three million yuan. He has won the second class prize of National Science and Technology Progress Award, and both the first and second class prize of Army Science and Technology Progress Award.



## 序

营养支持 (nutrition support) 是 20 世纪后 1/4 世纪医学进展之一。实际上, 自古以来, 对患者的营养问题, 不论是医者、病者与亲者都是倍加重视的。然因病时胃肠功能发生障碍, 难以达到进补的愿望。1968 年肠外营养 (intravenous hyperalimentation) 成功应用于临床后, 解决了胃肠功能有障碍时能从肠外途径为患者供给营养的问题, 同时, 借鉴太空饮食 (space diet) 免消化、易吸收、少渣的特点, 也为临床肠功能不良的患者提供了从肠道供应营养的方法, 发展了肠内要素膳 (elemental diet) 与配方膳 (formulated diet) 等。从此, 临床营养支持进入了新的发展阶段, 发展速度极为迅速, 涉及的范围也越来越广, 营养制剂、输入方法、设备、营养代谢、营养药理等等, 都随之发展, 相互促进。

营养是生物赖以生存、机体得以维护组织器官功能与修复的基础物质, 是人们天天接触的问题, 其重要性可说是人人皆知。然而, 营养代谢却是一项极其复杂的生理功能, 当机体受到疾病、创伤等损害时, 代谢改变更为复杂。机体发生了极为矛盾的改变, 一方面, 器官组织的修复与功能重建需要营养底物, 因疾病引起的代谢旺盛, 需要的能量倍增; 而另一方面, 机体因疾病损伤引起的生理功能紊乱, 出现高度的分解代谢大于合成代谢, 拒绝营养的摄入与利用。如何调控这一矛盾, 是临床营养支持获得成功的关键。自 20 世纪 80 年代, 国际上虽已开始了这一方面的研究, 并有很多的进展, 但尚未能得到圆满的解决。

危重烧伤营养支持具有显著的复杂性与困难性, 需要量与供给的力度间有着极大的差距, 大面积烧伤病员需要有大量的营养补充, 它的代谢率可以增加 100% 甚或更高, 如有感染则情况更为复杂, 代谢极其紊乱。烧伤营养与代谢的研究是临床营养支持的一高难度课题。





第三军医大学烧伤研究所自 20 世纪 60 年代即开始了这方面的研究。该所的烧伤治疗效果极为卓越，其中无疑包含了有效的营养支持。本书汇集了该所 40 余年来有关烧伤营养、代谢的研究成果与临床经验，是一部涵盖理论与实践经验总结的专著，不但对烧伤临床工作者有极大的参考价值，对其他临床营养支持工作者也是一部值得认真阅读的书籍。