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# Stroke Revisited: Hemorrhagic Stroke

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 Springer

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## Preface

It has already been a year since the publication of the first volume of the Stroke Revisited series under the title *Volume 1: Diagnosis and Treatment of Ischemic Stroke*. As promised, the second volume has now been published under the title *Volume 2: Hemorrhagic Stroke*. I have tried to publish the second volume as early as possible with the help of the experiences gained from the previous publication. However, since it is an edited book for which manuscripts are gathered from many physicians, professors, and scientists around the world, the publication has been made much later than anticipated. I would like to apologize to readers who have shown great interest in the first volume and have waited for the second one.

As its title suggests, this book is a textbook that summarizes hemorrhagic stroke. Stroke can be largely divided into ischemic and hemorrhagic stroke. Although it is common to find books on ischemic stroke, not many books deal with hemorrhagic stroke. Even experts assume that the topic of stroke concerns ischemic stroke; this shows how the perception of hemorrhagic stroke is low while it is often misunderstood. Ischemic stroke accounts for 85% of all stroke cases, whereas hemorrhagic stroke accounts for 15%. In other words, the incidence rate of hemorrhagic stroke is less than 1/5 of that of ischemic stroke. However, since hemorrhagic stroke has a mortality of 40–50%, it has a much higher severity. Moreover, hemorrhagic stroke shares the same pathophysiology as ischemic stroke, particularly lacunar infarction caused by small vessel occlusion, and numerous patients have both types of stroke. Therefore, it is necessary to understand ischemic and hemorrhagic stroke in a comprehensive manner. Although there is no systematic classification system for hemorrhagic stroke, it is largely classified into intracerebral hemorrhage (ICH) occurring within the brain parenchyma and subarachnoid hemorrhage (SAH) occurring within the subarachnoid space surrounding the brain. In ICH, arteriolosclerosis occurs in penetrating arteries due to risk factors such as long-standing hypertension within the brain parenchyma, and these arteries rupture suddenly. In SAH, aneurysm (frequently caused by congenital defects) in large intracranial arteries bursts. Causes of two types of hemorrhagic strokes, ICH and SAH, are clearly different, and most books have explained the two diseases separately. Moreover, although healthcare systems differ in each country, ICH is often treated by physicians related to neurology while SAH is often treated by neurosurgeons, further adding to the understanding of the two diseases as separate. However, this textbook seeks to explain the following aspects of these two diseases under the classification

of hemorrhagic stroke: causes, pathophysiology, clinical manifestations, diagnosis, treatment, and prevention. As the editor of this book, I recommend readers to read this book cover to cover while understanding the overall organization of the book rather than reading certain chapters only. This will enable the readers to comprehensively understand all clinical aspects of hemorrhagic stroke while also learning the newest findings on diagnosis and treatment.

Not many textbooks deal with stroke even until today. I used two or three books during my residency and fellowship although these were not sufficient to deliver the knowledge in stroke care that improved greatly in 1990–2000. Owing to brain MRI and CT imaging, it has become possible to gain an immediate understanding of a patient's pathophysiology changing moment by moment. Nevertheless, most textbooks published previously strived to explain the outdated neurological examinations, being unable to support the advances made in the practice field. Moreover, most textbooks listed minute details about research findings that often conflicted and lacked appropriate diagrams and sufficient explanation of the core concepts. Although it would have also been true for other areas, studying stroke required great perseverance then.

With the developments of smartphones and tablets, all people around the globe are now communicating through social media and are living in a previously inexperienced wealth of information. Along with recent technological advances, textbooks that deliver medical knowledge should change to be able to deliver information in a concise yet precise way. Moreover, it is necessary to minimize the amount of contents in each chapter, use many visual diagrams to deliver concepts, refrain from listing unnecessary research findings, and deliver information while considering practice guidelines serving as standards of clinical practice nowadays. I was determined to write a textbook reflecting such changes and contacted Springer Nature. Springer Nature has been very cooperative with my requests and planned a new textbook series under the title *Stroke Revisited*. In fact, it is not easy to publish a textbook series while communicating from Korea with a publisher based in Europe due to various obstacles, including language. I would like to thank the many staff members of Springer Nature who have nevertheless helped with the publication of this book.

This textbook targets trainees, such as residents and fellows, physicians, and scholars in their early career majoring in stroke, as well as other physicians and researchers in other fields who aim to study stroke. The relatively shorter chapters concern one subject at a time whenever possible; in this regard, I have strived to organize them concisely in order for the readers to be able to read them in one sitting. I have minimized unnecessary descriptions and inserted at least one conceptual figure or diagram per chapter to aid the readers' understanding. The textbook consists of two parts as follows. Part I—General facts on hemorrhagic stroke—explains the epidemiology, classification, risk factors, and pathophysiology of hemorrhagic stroke. Part II—Diagnosis and treatment of hemorrhagic stroke—explains the latest findings in diagnosis and treatment of hemorrhagic stroke. Since most textbooks are organized according to the traditional academic formats, it is difficult to

obtain knowledge required in clinical settings. I have put my utmost efforts to deliver clinical knowledge from real clinical settings in a concise manner. Meanwhile, since this is a textbook on hemorrhagic stroke, I have strived to put together the best academic expertise and latest findings. I sincerely hope that such efforts would come across to the readers effectively.

In order to organize the textbook with full details of the newest knowledge, each chapter was written by the best medical scientists from around the world. I wholeheartedly thank all authors from around the globe who have participated in this process. I hope that this textbook will be evaluated highly and act as a good example for future textbooks.

Seoul, South Korea  
April 2018

Seung-Hoon Lee

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## Acknowledgement

Although I had an ideal model for a textbook in my brain, I rarely had an active conversation with publishers about my idea. This textbook was conceived in an e-mail proposal of the textbook after an unplanned meeting with Ms. Lauren Kim, the editor of Springer Nature. The editorial team and I have obtained manuscripts from renowned medical experts in the world and have edited the manuscripts according to the principles we have set for this textbook. Therefore, the contents of this book were completed only after tremendous efforts from the editorial team. I would like to especially thank Dr. Dong-Wan Kang as associate editor, Ms. Eun-Sun Park, and other colleagues for their enormous efforts to complete this book. In addition, I would like to thank the executive members of the publisher, Springer Nature Inc., who agreed with the philosophy behind this textbook and provided the title for this textbook series—*Stroke Revisited*. Finally, I greatly appreciate the financial and technical support of the Korean Cerebrovascular Research Institute.

Throughout my research career, I focused on publishing papers as an author and becoming a famous, prosperous scientist. I rarely thought of writing a textbook. I would like to express my love toward my wife and my kids for changing my selfish thoughts and helping me understand my responsibilities, that is, to help others and provide education to future medical doctors.

April 2018

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