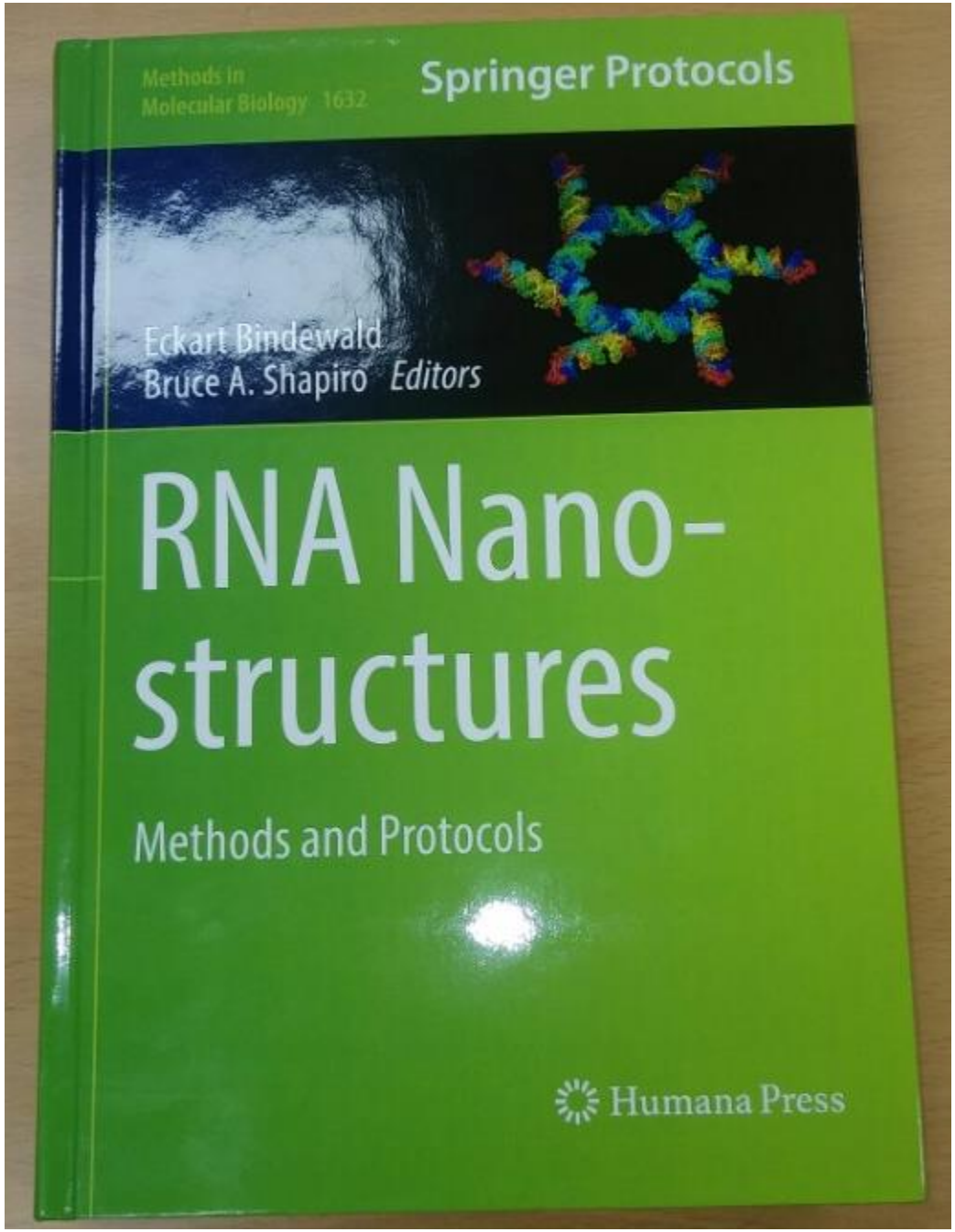
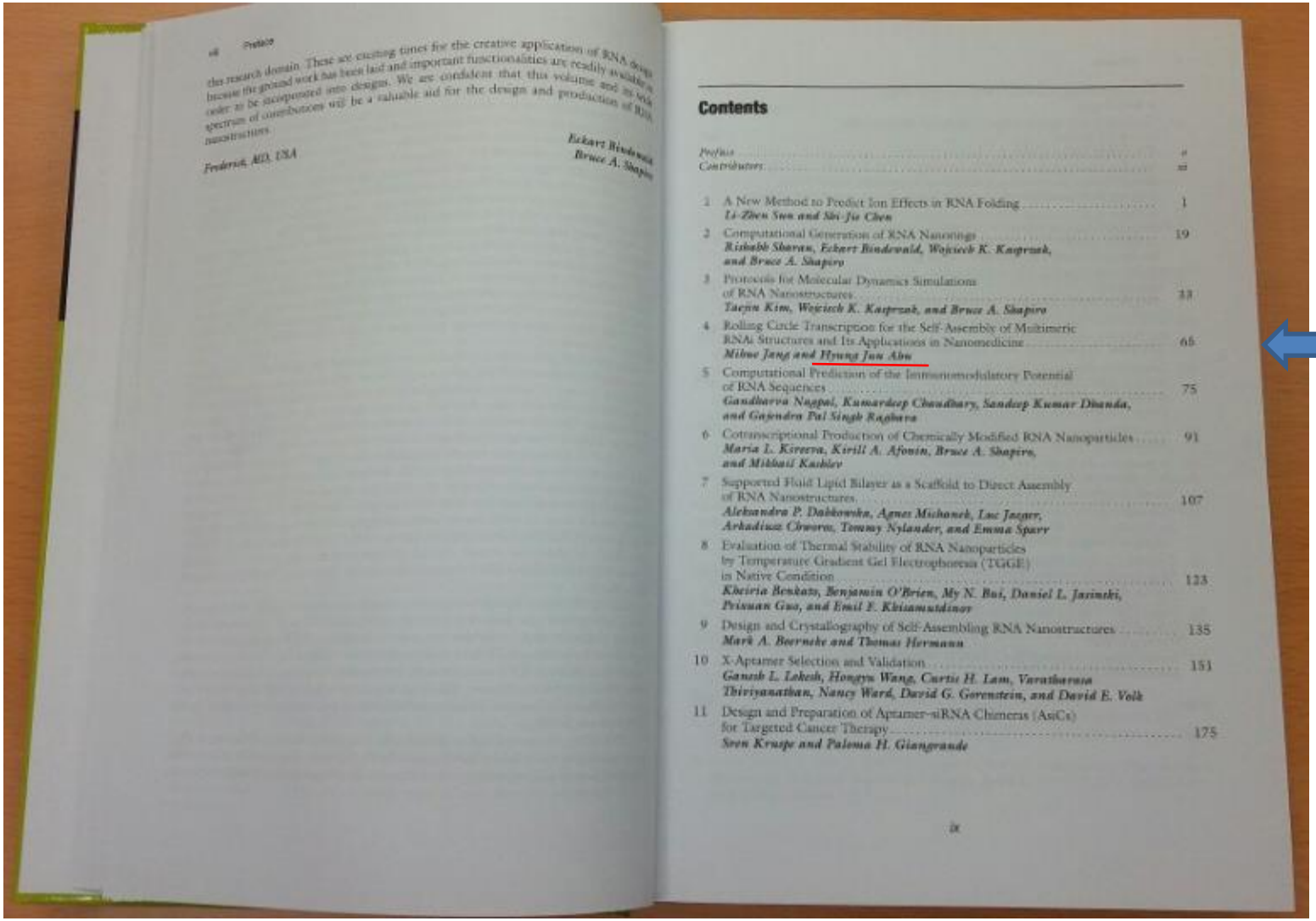


저서 표지

본 저서의 4장 담당 저자
안형준

목차



viii Preface

the research domain. These are exciting times for the creative application of RNA design because the ground work has been laid and important functionalities are readily available in order to be incorporated into designs. We are confident that this volume and its wide spectrum of contributors will be a valuable aid for the design and production of RNA nanostructures.

Frederick, MD, USA — *Eckart Bindewald, Bruce A. Shapiro*

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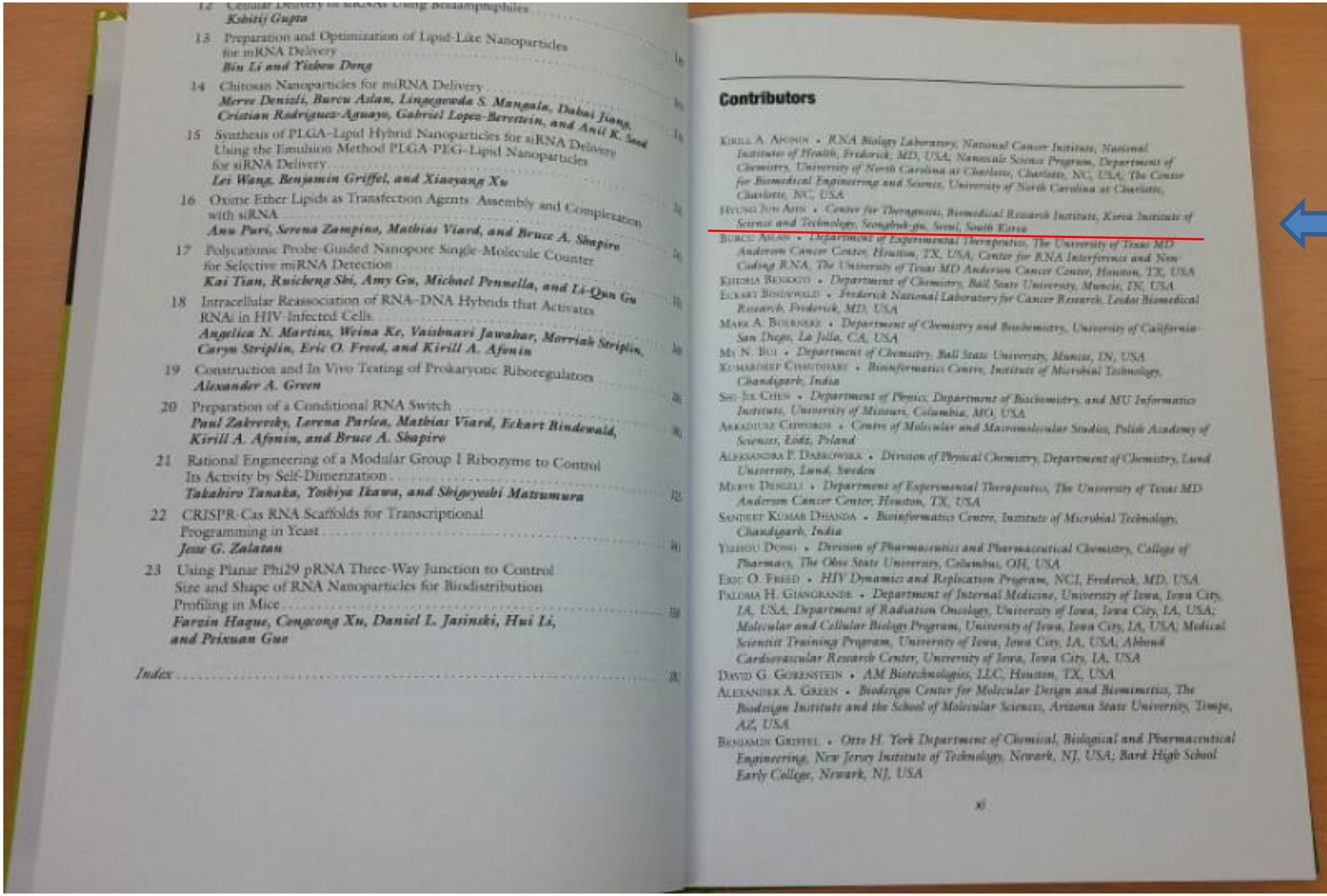

Contributors

KIRILL A. AFONIN • *RNA Biology Laboratory, National Cancer Institute, National Institutes of Health, Frederick, MD, USA; Nanoscale Science Program, Department of Chemistry, University of North Carolina at Charlotte, Charlotte, NC, USA; The Center for Biomedical Engineering and Science, University of North Carolina at Charlotte, Charlotte, NC, USA*

HYUNG JUN AHN • *Center for Theragnosis, Biomedical Research Institute, Korea Institute of Science and Technology, Seongbuk-gu, Seoul, South Korea*

BURCU ASLAN • *Department of Experimental Therapeutics, The University of Texas MD Anderson Cancer Center, Houston, TX, USA; Center for RNA Interference and Non-Coding RNA, The University of Texas MD Anderson Cancer Center, Houston, TX, USA*

KHEDRIA BENKATO • *Department of Chemistry, Ball State University, Muncie, IN, USA*

ECKART BINDEWALD • *Frederick National Laboratory for Cancer Research, Leidos Biomedical Research, Frederick, MD, USA*

MARK A. BOERNEKE • *Department of Chemistry and Biochemistry, University of California San Diego, La Jolla, CA, USA*

MY N. BUI • *Department of Chemistry, Ball State University, Muncie, IN, USA*

KUMARDEEP CHAUDHARY • *Bioinformatics Centre, Institute of Microbial Technology, Chandigarh, India*

SHI-JIE CHEN • *Department of Physics, Department of Biochemistry, and MU Informatics Institute, University of Missouri, Columbia, MO, USA*

ARKADIUSZ CHWOROS • *Centre of Molecular and Macromolecular Studies, Polish Academy of Sciences, Łódź, Poland*

ALEKSANDRA P. DABROWSKA • *Division of Physical Chemistry, Department of Chemistry, Lund University, Lund, Sweden*

MERVE DENIZLI • *Department of Experimental Therapeutics, The University of Texas MD Anderson Cancer Center, Houston, TX, USA*

SANDEEP KUMAR DHANDA • *Bioinformatics Centre, Institute of Microbial Technology, Chandigarh, India*

YIZHOU DONG • *Division of Pharmaceutics and Pharmaceutical Chemistry, College of Pharmacy, The Ohio State University, Columbus, OH, USA*

ERIC O. FREED • *HIV Dynamics and Replication Program, NCI, Frederick, MD, USA*

PALOMA H. GIANGRANDE • *Department of Internal Medicine, University of Iowa, Iowa City, IA, USA; Department of Radiation Oncology, University of Iowa, Iowa City, IA, USA; Molecular and Cellular Biology Program, University of Iowa, Iowa City, IA, USA; Medical Scientist Training Program, University of Iowa, Iowa City, IA, USA; Abboud Cardiovascular Research Center, University of Iowa, Iowa City, IA, USA*

DAVID G. GORENSTEIN • *AM Biotechnologies, LLC, Houston, TX, USA*

ALEXANDER A. GREEN • *Biodesign Center for Molecular Design and Biomimetics, The Biodesign Institute and the School of Molecular Sciences, Arizona State University, Tempe, AZ, USA*

BENJAMIN GRIFFEL • *Otto H. York Department of Chemical, Biological and Pharmaceutical Engineering, New Jersey Institute of Technology, Newark, NJ, USA; Bard High School Early College, Newark, NJ, USA*

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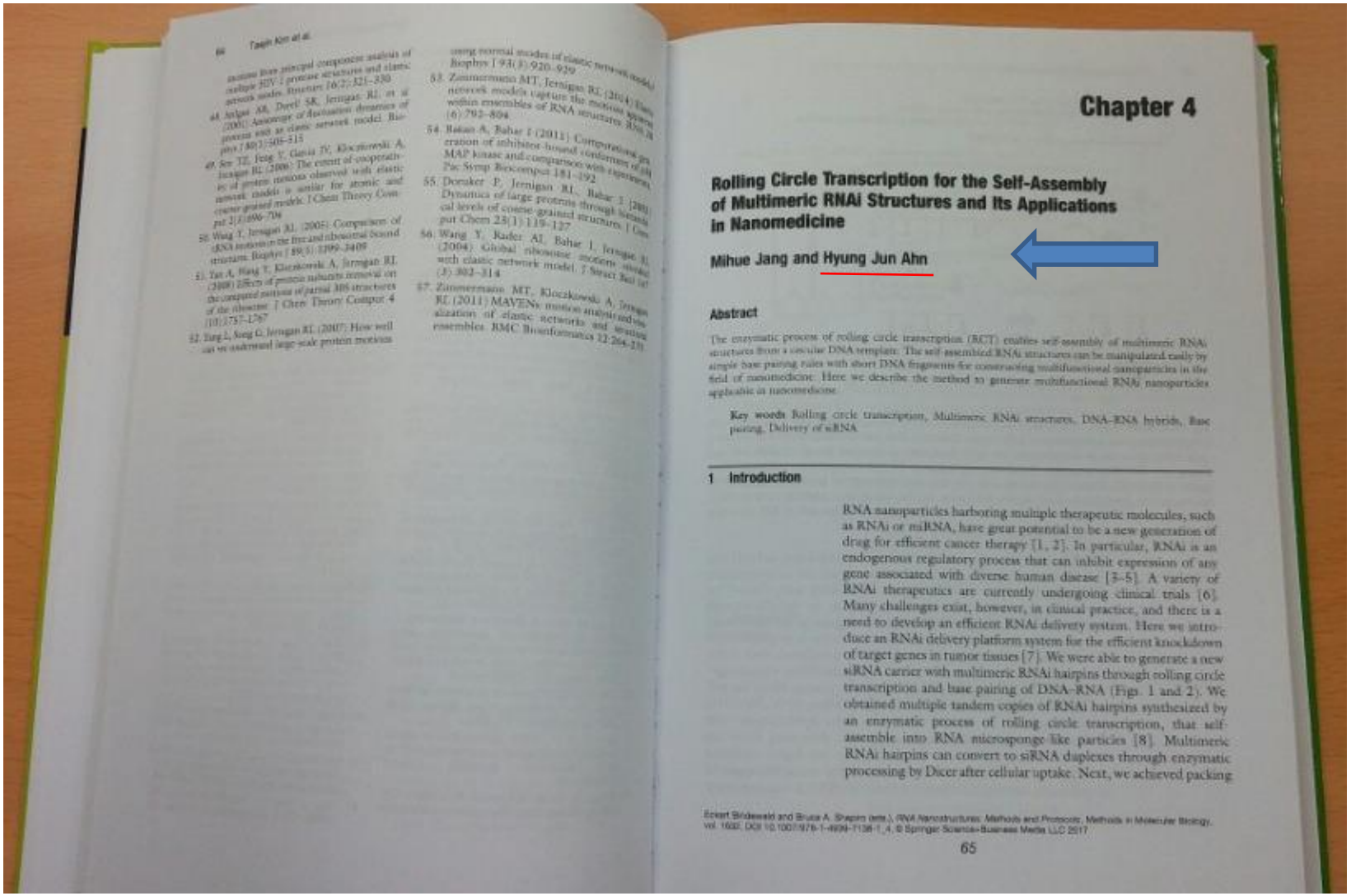
명시

4장 표지



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Chapter 4

Rolling Circle Transcription for the Self-Assembly of Multimeric RNAi Structures and Its Applications in Nanomedicine

Mihue Jang and Hyung Jun Ahn

Abstract

The enzymatic process of rolling circle transcription (RCT) enables self-assembly of multimeric RNAi structures from a circular DNA template. The self-assembled RNAi structures can be manipulated easily by simple base pairing rules with short DNA fragments for constructing multifunctional nanoparticles in the field of nanomedicine. Here we describe the method to generate multifunctional RNAi nanoparticles applicable in nanomedicine.

Key words Rolling circle transcription, Multimeric RNAi structures, DNA–RNA hybrids, Base pairing, Delivery of siRNA

1 Introduction

RNA nanoparticles harboring multiple therapeutic molecules, such as RNAi or miRNA, have great potential to be a new generation of drug for efficient cancer therapy [1, 2]. In particular, RNAi is an endogenous regulatory process that can inhibit expression of any gene associated with diverse human disease [3–5]. A variety of RNAi therapeutics are currently undergoing clinical trials [6]. Many challenges exist, however, in clinical practice, and there is a need to develop an efficient RNAi delivery system. Here we introduce an RNAi delivery platform system for the efficient knockdown of target genes in tumor tissues [7]. We were able to generate a new siRNA carrier with multimeric RNAi hairpins through rolling circle transcription and base pairing of DNA–RNA (Figs. 1 and 2). We obtained multiple tandem copies of RNAi hairpins synthesized by an enzymatic process of rolling circle transcription, that self-assemble into RNA microsponge like particles [8]. Multimeric RNAi hairpins can convert to siRNA duplexes through enzymatic processing by Dicer after cellular uptake. Next, we achieved packing

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