

FULL PAPER

The recent development of dengue vaccine: a review

Rahadian Zainul^{1,2,3,*} | Arif Nur Muhammad Ansori^{1,4,5,6} | Ahmad Affan Ali Murtadlo^{4,5,6} | Teguh Hari Sucipto⁷ | Viol Dhea Kharisma^{4,5,6} | Muhammad Hermawan Widyandanda^{4,6} | Bayyinatul Muchtaromah⁸ | Amaq Fadholly^{1,9} | Muhammad Khalilim Jati Kusala¹⁰ | Vikash Jakhmola¹¹ | Maksim Rebezov^{12,13} | Sukma Sahadewa¹⁴ | Putu Angga Wiradana¹⁵

¹Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, Padang, Indonesia

²Center for Advanced Material Processing, Artificial Intelligence, and Biophysics Informatics (CAMPBIOINICS), Universitas Negeri Padang, Padang, Indonesia

³Postgraduate School, Universitas Airlangga, Surabaya, Indonesia

⁴Gemerasi Biologi Indonesia Foundation, Gresik, Indonesia

⁵Uttarakhand Institute of Pharmaceutical Sciences, Uttarakhand University, Dehradun, India

⁶European Virus Bioinformatics Center, Jena, Germany

⁷Division of Research and Development, Jalan Tengah, Pasuruan, Indonesia

⁸Department of Biology, Faculty of Science and Technology, Universitas Airlangga, Surabaya, Indonesia

⁹Dengue Study Group, Institute of Tropical Disease, Universitas Airlangga, Surabaya, Indonesia

¹⁰Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Brawijaya, Malang, Indonesia

¹¹Master Program of Biology, Universitas Islam Negeri Maulana Malik Ibrahim, Malang, Indonesia

¹²School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor, Indonesia

¹³Research Center for Veterinary Sciences, National Research and Innovation Agency, Bogor, Indonesia

¹⁴Department of Scientific Research, Ural State Agrarian University, Yekaterinburg, Russian Federation

¹⁵Department of Scientific Research, V. M. Gorbachev Federal Research Center for Food Systems, Moscow, Russian Federation

¹⁶Faculty of Medicine, Universitas Wijaya Kusuma Surabaya, Surabaya, Indonesia

¹⁷Research Group of Biological Health, Study Program of Biology, Faculty of Health and Science, Universitas Dharma Para, Bali, Indonesia

*Corresponding Author:

Rahadian Zainul

Email: rahadianzmsiphd@fmipa.unp.ac.id

Tel: +62 812-6138-53

Dengue fever, caused by the dengue virus, is a significant global health concern, with millions of cases reported annually. The absence of specific antiviral treatments or effective preventive measures has fuelled the urgent need for a dengue vaccine. This provides a comprehensive review of the development of a dengue vaccine, summarizing the major milestones, challenges encountered, and recent advancements in this field. This study explores various vaccine strategies employed, including live attenuated vaccines, inactivated vaccines, recombinant subunit vaccines, and viral vector-based vaccines. In addition, the manuscript discusses the clinical trials conducted to evaluate the safety and efficacy of these vaccine candidates.

KEYWORDS

Dengue; dengue virus; medicine; vaccine

Introduction

The history of dengue fever, a vector-borne disease caused by the dengue virus and transmitted to human through the bite of infected *Aedes* mosquitoes, is marked by global epidemic outbreaks and substantial

morbidity and mortality rates in tropical and subtropical regions [1-5]. According to the World Health Organization (WHO), there are approximately 390 million dengue infections worldwide each year; this may trigger the development of a vaccine to prevent the spread of virus infection [6]. The development

Development Of Dengue Vaccine World Health

Yan Bai



Development Of Dengue Vaccine World Health:

The book delves into Development Of Dengue Vaccine World Health. Development Of Dengue Vaccine World Health is an essential topic that needs to be grasped by everyone, from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Development Of Dengue Vaccine World Health, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Development Of Dengue Vaccine World Health
 - Chapter 2: Essential Elements of Development Of Dengue Vaccine World Health
 - Chapter 3: Development Of Dengue Vaccine World Health in Everyday Life
 - Chapter 4: Development Of Dengue Vaccine World Health in Specific Contexts
 - Chapter 5: Conclusion
 2. In chapter 1, this book will provide an overview of Development Of Dengue Vaccine World Health. This chapter will explore what Development Of Dengue Vaccine World Health is, why Development Of Dengue Vaccine World Health is vital, and how to effectively learn about Development Of Dengue Vaccine World Health.
 3. In chapter 2, this book will delve into the foundational concepts of Development Of Dengue Vaccine World Health. This chapter will elucidate the essential principles that need to be understood to grasp Development Of Dengue Vaccine World Health in its entirety.
 4. In chapter 3, this book will examine the practical applications of Development Of Dengue Vaccine World Health in daily life. This chapter will showcase real-world examples of how Development Of Dengue Vaccine World Health can be effectively utilized in everyday scenarios.
 5. In chapter 4, the author will scrutinize the relevance of Development Of Dengue Vaccine World Health in specific contexts. This chapter will explore how Development Of Dengue Vaccine World Health is applied in specialized fields, such as education, business, and technology.
 6. In chapter 5, the author will draw a conclusion about Development Of Dengue Vaccine World Health. This chapter will summarize the key points that have been discussed throughout the book.
- This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Development Of Dengue Vaccine World Health.

https://cmsemergencymanual.iom.int/data/book-search/Download_PDFS/biology%20chapter%2011%20assessment%20answers.pdf

Table of Contents Development Of Dengue Vaccine World Health

1. Understanding the eBook Development Of Dengue Vaccine World Health
 - The Rise of Digital Reading Development Of Dengue Vaccine World Health
 - Advantages of eBooks Over Traditional Books
2. Identifying Development Of Dengue Vaccine World Health
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Development Of Dengue Vaccine World Health
 - User-Friendly Interface
4. Exploring eBook Recommendations from Development Of Dengue Vaccine World Health
 - Personalized Recommendations
 - Development Of Dengue Vaccine World Health User Reviews and Ratings
 - Development Of Dengue Vaccine World Health and Bestseller Lists
5. Accessing Development Of Dengue Vaccine World Health Free and Paid eBooks
 - Development Of Dengue Vaccine World Health Public Domain eBooks
 - Development Of Dengue Vaccine World Health eBook Subscription Services
 - Development Of Dengue Vaccine World Health Budget-Friendly Options
6. Navigating Development Of Dengue Vaccine World Health eBook Formats
 - ePub, PDF, MOBI, and More
 - Development Of Dengue Vaccine World Health Compatibility with Devices
 - Development Of Dengue Vaccine World Health Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Development Of Dengue Vaccine World Health
 - Highlighting and Note-Taking Development Of Dengue Vaccine World Health
 - Interactive Elements Development Of Dengue Vaccine World Health

8. Staying Engaged with Development Of Dengue Vaccine World Health
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Development Of Dengue Vaccine World Health
9. Balancing eBooks and Physical Books Development Of Dengue Vaccine World Health
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Development Of Dengue Vaccine World Health
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Development Of Dengue Vaccine World Health
 - Setting Reading Goals Development Of Dengue Vaccine World Health
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Development Of Dengue Vaccine World Health
 - Fact-Checking eBook Content of Development Of Dengue Vaccine World Health
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

Development Of Dengue Vaccine World Health Introduction

Development Of Dengue Vaccine World Health Offers over 60,000 free eBooks, including many classics that are in the public domain. Open Library: Provides access to over 1 million free eBooks, including classic literature and contemporary works. Development Of Dengue Vaccine World Health Offers a vast collection of books, some of which are available for free as PDF downloads, particularly older books in the public domain. Development Of Dengue Vaccine World Health : This website hosts a vast collection of scientific articles, books, and textbooks. While it operates in a legal gray area due to copyright issues, its

a popular resource for finding various publications. Internet Archive for Development Of Dengue Vaccine World Health : Has an extensive collection of digital content, including books, articles, videos, and more. It has a massive library of free downloadable books. Free-eBooks Development Of Dengue Vaccine World Health Offers a diverse range of free eBooks across various genres. Development Of Dengue Vaccine World Health Focuses mainly on educational books, textbooks, and business books. It offers free PDF downloads for educational purposes. Development Of Dengue Vaccine World Health Provides a large selection of free eBooks in different genres, which are available for download in various formats, including PDF. Finding specific Development Of Dengue Vaccine World Health, especially related to Development Of Dengue Vaccine World Health, might be challenging as they're often artistic creations rather than practical blueprints. However, you can explore the following steps to search for or create your own Online Searches: Look for websites, forums, or blogs dedicated to Development Of Dengue Vaccine World Health, Sometimes enthusiasts share their designs or concepts in PDF format. Books and Magazines Some Development Of Dengue Vaccine World Health books or magazines might include. Look for these in online stores or libraries. Remember that while Development Of Dengue Vaccine World Health, sharing copyrighted material without permission is not legal. Always ensure you're either creating your own or obtaining them from legitimate sources that allow sharing and downloading. Library Check if your local library offers eBook lending services. Many libraries have digital catalogs where you can borrow Development Of Dengue Vaccine World Health eBooks for free, including popular titles. Online Retailers: Websites like Amazon, Google Books, or Apple Books often sell eBooks. Sometimes, authors or publishers offer promotions or free periods for certain books. Authors Website Occasionally, authors provide excerpts or short stories for free on their websites. While this might not be the Development Of Dengue Vaccine World Health full book, it can give you a taste of the author's writing style. Subscription Services Platforms like Kindle Unlimited or Scribd offer subscription-based access to a wide range of Development Of Dengue Vaccine World Health eBooks, including some popular titles.

FAQs About Development Of Dengue Vaccine World Health Books

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook's credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer web-based readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital

eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Development Of Dengue Vaccine World Health is one of the best book in our library for free trial. We provide copy of Development Of Dengue Vaccine World Health in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Development Of Dengue Vaccine World Health. Where to download Development Of Dengue Vaccine World Health online for free? Are you looking for Development Of Dengue Vaccine World Health PDF? This is definitely going to save you time and cash in something you should think about.

Find Development Of Dengue Vaccine World Health :

biology chapter 11 assessment answers

[bizhub 423 363 283 223 field service manual](#)

[biochemistry and molecular biology mayo clinic](#)

[bollywood quiz questions answers on movies bestfx](#)

[book flow in open channels k subramanya solution manual](#)

bloodstone

[biology 101 test and answers](#)

[bob langs the complete kitchen cabinetmaker revised edition shop drawings and professional methods for designing and constructing every kind of kitchen and built in cabinet](#)

[biology lab manual mader 10th edition answers](#)

[books engineering mechanics statics 5th edition solution](#)

[bn44 0438b diagram](#)

[bmw dtc codes pdf](#)

[biologi eksamen var 2011 fasit](#)

boe exam question paper

[blue pastures mary oliver](#)

Development Of Dengue Vaccine World Health :

2004 Intrepid Owner's Manual This manual has been prepared with the assistance of service and engineering specialists to

acquaint you with the operation and maintenance of your new vehicle. 2004 Dodge Intrepid Owners Manual Information within each manual has been developed by the OEM to give vehicle owners a basic understanding of the operation of their vehicle. Recommends certain ... User manual Dodge Intrepid (2004) (English - 249 pages) Manual. View the manual for the Dodge Intrepid (2004) here, for free. This manual comes under the category cars and has been rated by 1 people with an ... 2004 Dodge Intrepid Owners Manual Pdf Page 1. 2004 Dodge Intrepid Owners. Manual Pdf. INTRODUCTION 2004 Dodge Intrepid. Owners Manual Pdf Copy. 2004 Dodge Intrepid owner's manual 2004 Dodge Intrepid owners manual. 2004 Dodge Intrepid Owners Manual 2004 Dodge Intrepid Owners Manual ; Quantity. 1 sold. 1 available ; Item Number. 192958758337 ; Accurate description. 5.0 ; Reasonable shipping cost. 4.9 ; Shipping ... Dodge Intrepid (1998 - 2004) - Haynes Manuals Need to service or repair your Dodge Intrepid 1998 - 2004? Online and print formats available. Save time and money when you follow the advice of Haynes' ... 2004 dodge intrepid Owner's Manual Jul 3, 2019 — Online View 2004 dodge intrepid Owner's Manual owner's manuals .Free Download PDF file of the 2004 dodge intrepid Owner's Manual technical ... 2004 service and diagnostic manuals in PDF format Feb 12, 2011 — 2004 service and diagnostic manuals in PDF format ... The zip file contains the following six files. Each file has clickable links to it's various ... DODGE INTREPID SERVICE MANUAL Pdf Download View and Download Dodge Intrepid service manual online. dodge intrepid. Intrepid automobile pdf manual download. The NRCA Roofing Manual The NRCA Roofing Manual: Architectural Metal Flashing and Condensation and Air Leakage Control—2022. Member Price: \$195.00. Nonmember Price: \$395.00. The NRCA ... The NRCA Roofing Manual—2022 Set It contains the following four volumes: The NRCA Roofing Manual: Architectural Metal Flashing and Condensation and Air Leakage Control—2022 · The NRCA Roofing ... The NRCA Roofing Manual: Architectural Metal Flashing ... The latest volume of the NRCA Roofing Manual provides you with valuable information about the design, materials and installation techniques applicable to. The NRCA Roofing Manual: Metal Panel and SPF ... This roofing manual provides you with comprehensive information about the design, materials and installation techniques applicable to metal panel and spray ... The NRCA Roofing Manual/Architectural Metal Flashing ... The 2022 manual contains information about the design, materials and installation techniques applicable to architectural sheet-metal components and includes 60 ... NRCA Roofing Manual: Architectural Metal Flashing, ... NRCA Roofing Manual: Architectural Metal Flashing Condensation and Air Leakage Control, 2022 The 2022 manual contains information about the design, ... NRCA: Books The NRCA Roofing Manual: Architectural Metal Flashing and Condensation and Air Leakage Control - 2018. by NRCA · 4.64.6 out of 5 stars (3). NRCA Roofing Manual: Architectural Metal Flashing ... NRCA Roofing Manual provides background information regarding moisture and air leakage issues in buildings such as ventilation for steep-slope roof ... NRCA Roofing Manual: Architectural Metal Flashing, ... NRCA Roofing Manual: Architectural Metal Flashing, Condensation Control and Reroofing. 1-2 Weeks. Out of Stock. \$224.25. Add to Cart. Publisher, NRCA. Shipping ... The NRCA Roofing Manual: Architectural Metal Flashing ... The N.R.C.A Roofing Manual:

Architectural Metal Flashing, and Condensation Control, 2022 ... Shipping calculated at checkout. Style: Plain. Powertec Assembly Builds These videos show the assembly process for all of the Powertec Levergym, Strength, Racks, Cables, and Accessories. Thank you for purchasing your new Powertec equipment. To maximize the use of this equipment, please take a moment to study, understand and familiarize with the assembly instructions and follow the sequence of steps ... WORK BENCH - PowerTec Do not attempt to assemble or operate your work bench until you have read the safety instructions in this section. • Only use your work bench on a hard, dry and. POWERTEC WB-MS14 MANUAL Pdf Download Place the bench press base over the bolts that come out of the lat pulldown base. Page 21 Bolt #72 Bolt #72 Using 2 x #72 bolts, with washers each side. Please ... PowerTec WB-MS16 Manual View and Download PowerTec WB-MS16 manual online. Workbench Multi System. WB-MS16 tool storage pdf manual download. Powertec Power Rack WB-PR16 Assembly guide Powertec Power Rack WB-PR16. Assembly guide. Before starting the assembly ... When assembling the machine do not tighten the bolts and nuts until after you. User manual Powertec WB-LS16 (English - 21 pages) Manual. View the manual for the Powertec WB-LS16 here, for free. This manual comes under the category fitness equipment and has been rated by 1 people with ... powertec® - workbench Assembly instructions, be careful to follow the sequence as provided in this Manual. Important Note: Do Not fully tighten bolts until assembly has been ...