CHOCOLATE

A MEDICAL DICTIONARY, BIBLIOGRAPHY, AND ANNOTATED RESEARCH GUIDE TO INTERNET REFERENCES

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Acknowledgements

The collective knowledge generated from academic and applied research summarized in various references has been critical in the creation of this book which is best viewed as a comprehensive compilation and collection of information prepared by various official agencies which produce publications on chocolate. Books in this series draw from various agencies and institutions associated with the United States Department of Health and Human Services, and in particular, the Office of the Secretary of Health and Human Services (OS), the Administration for Children and Families (ACF), the Administration on Aging (AOA), the Agency for Healthcare Research and Quality (AHRQ), the Agency for Toxic Substances and Disease Registry (ATSDR), the Centers for Disease Control and Prevention (CDC), the Food and Drug Administration (FDA), the Healthcare Financing Administration (HCFA), the Health Resources and Services Administration (HRSA), the Indian Health Service (IHS), the institutions of the National Institutes of Health (NIH), the Program Support Center (PSC), and the Substance Abuse and Mental Health Services Administration (SAMHSA). In addition to these sources, information gathered from the National Library of Medicine, the United States Patent Office, the European Union, and their related organizations has been invaluable in the creation of this book. Some of the work represented was financially supported by the Research and Development Committee at INSEAD. This support is gratefully acknowledged. Finally, special thanks are owed to Tiffany Freeman for her excellent editorial support.
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Table of Contents

FORWARD ........................................................................................................................................ 1

CHAPTER 1. STUDIES ON CHOCOLATE ...................................................................................... 3
  Overview ....................................................................................................................................... 3
  The Combined Health Information Database ............................................................................. 3
  Federally Funded Research on Chocolate ................................................................................... 4
  E-Journals: PubMed Central .......................................................................................................... 6
  The National Library of Medicine: PubMed ............................................................................... 6

CHAPTER 2. NUTRITION AND CHOCOLATE ........................................................................... 33
  Overview ....................................................................................................................................... 33
  Finding Nutrition Studies on Chocolate ....................................................................................... 33
  Federal Resources on Nutrition ..................................................................................................... 39
  Additional Web Resources ............................................................................................................ 40

CHAPTER 3. ALTERNATIVE MEDICINE AND CHOCOLATE .................................................. 45
  Overview ....................................................................................................................................... 45
  National Center for Complementary and Alternative Medicine .................................................. 45
  Additional Web Resources ............................................................................................................ 51
  General References ..................................................................................................................... 56

CHAPTER 4. DISSERTATIONS ON CHOCOLATE ....................................................................... 57
  Overview ....................................................................................................................................... 57
  Dissertations on Chocolate ........................................................................................................... 57
  Keeping Current ............................................................................................................................. 58

CHAPTER 5. CLINICAL TRIALS AND CHOCOLATE ................................................................. 59
  Overview ....................................................................................................................................... 59
  Recent Trials on Chocolate ........................................................................................................... 59
  Keeping Current on Clinical Trials ............................................................................................... 60

CHAPTER 6. PATENTS ON CHOCOLATE ................................................................................... 63
  Overview ....................................................................................................................................... 63
  Patents on Chocolate ..................................................................................................................... 63
  Patent Applications on Chocolate .................................................................................................. 172
  Keeping Current ............................................................................................................................ 202

CHAPTER 7. BOOKS ON CHOCOLATE ...................................................................................... 203
  Overview ....................................................................................................................................... 203
  Book Summaries: Federal Agencies .............................................................................................. 203
  Book Summaries: Online Booksellers ............................................................................................ 204
  The National Library of Medicine Book Index ............................................................................ 231
  Chapters on Chocolate .................................................................................................................. 232

CHAPTER 8. MULTIMEDIA ON CHOCOLATE ......................................................................... 237
  Overview ....................................................................................................................................... 237
  Video Recordings ........................................................................................................................... 237

CHAPTER 9. PERIODICALS AND NEWS ON CHOCOLATE ...................................................... 239
  Overview ....................................................................................................................................... 239
  News Services and Press Releases ............................................................................................... 239
  Newsletter Articles .......................................................................................................................... 243
  Academic Periodicals covering Chocolate .................................................................................. 244

APPENDIX A. PHYSICIAN RESOURCES .................................................................................. 247
  Overview ....................................................................................................................................... 247
  NIH Guidelines ............................................................................................................................. 247
  NIH Databases .............................................................................................................................. 249
  Other Commercial Databases ....................................................................................................... 252

APPENDIX B. PATIENT RESOURCES ....................................................................................... 253
  Overview ....................................................................................................................................... 253
FORWARD

In March 2001, the National Institutes of Health issued the following warning: "The number of Web sites offering health-related resources grows every day. Many sites provide valuable information, while others may have information that is unreliable or misleading." Furthermore, because of the rapid increase in Internet-based information, many hours can be wasted searching, selecting, and printing. Since only the smallest fraction of information dealing with chocolate is indexed in search engines, such as www.google.com or others, a non-systematic approach to Internet research can be not only time consuming, but also incomplete. This book was created for medical professionals, students, and members of the general public who want to know as much as possible about chocolate, using the most advanced research tools available and spending the least amount of time doing so.

In addition to offering a structured and comprehensive bibliography, the pages that follow will tell you where and how to find reliable information covering virtually all topics related to chocolate, from the essentials to the most advanced areas of research. Public, academic, government, and peer-reviewed research studies are emphasized. Various abstracts are reproduced to give you some of the latest official information available to date on chocolate. Abundant guidance is given on how to obtain free-of-charge primary research results via the Internet. While this book focuses on the field of medicine, when some sources provide access to non-medical information relating to chocolate, these are noted in the text.

E-book and electronic versions of this book are fully interactive with each of the Internet sites mentioned (clicking on a hyperlink automatically opens your browser to the site indicated). If you are using the hard copy version of this book, you can access a cited Web site by typing the provided Web address directly into your Internet browser. You may find it useful to refer to synonyms or related terms when accessing these Internet databases. NOTE: At the time of publication, the Web addresses were functional. However, some links may fail due to URL address changes, which is a common occurrence on the Internet.

For readers unfamiliar with the Internet, detailed instructions are offered on how to access electronic resources. For readers unfamiliar with medical terminology, a comprehensive glossary is provided. For readers without access to Internet resources, a directory of medical libraries, that have or can locate references cited here, is given. We hope these resources will prove useful to the widest possible audience seeking information on chocolate.

The Editors

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1 From the NIH, National Cancer Institute (NCI): http://www.cancer.gov/cancerinfo/ten-things-to-know.
CHAPTER 1. STUDIES ON CHOCOLATE

Overview

In this chapter, we will show you how to locate peer-reviewed references and studies on chocolate.

The Combined Health Information Database

The Combined Health Information Database summarizes studies across numerous federal agencies. To limit your investigation to research studies and chocolate, you will need to use the advanced search options. First, go to http://chid.nih.gov/index.html. From there, select the “Detailed Search” option (or go directly to that page with the following hyperlink: http://chid.nih.gov/detail/detail.html). The trick in extracting studies is found in the drop boxes at the bottom of the search page where “You may refine your search by.” Select the dates and language you prefer, and the format option “Journal Article.” At the top of the search form, select the number of records you would like to see (we recommend 100) and check the box to display “whole records.” We recommend that you type “chocolate” (or synonyms) into the “For these words:” box. Consider using the option “anywhere in record” to make your search as broad as possible. If you want to limit the search to only a particular field, such as the title of the journal, then select this option in the “Search in these fields” drop box. The following is what you can expect from this type of search:

- Bittersweet Truth About Chocolate
  

  Contact: Available from American Association of Kidney Patients. 100 South Ashley Drive, Suite 280, Tampa, FL 33602. (800) 749-2257 or (813) 233-7099.

  Summary: This brief article discusses the possibility of people on renal diets incorporating small amounts of chocolate into their diet. The author discusses the origins of chocolate; why chocolate intake must be limited (high in phosphorus and potassium); and how to wisely use chocolate treats. One recipe for Chocolate Cookie Balls is included.
Evaluation of a Dental Preventive Program for Danish Chocolate Workers


Summary: A study evaluated the development of a program to control oral occupational diseases at two Danish chocolate factories. Eighty-nine persons (80 percent of the employees) ages 19 to 61 years, participated in a 2-year study. A dental hygienist offered preventive care to the workers. Subjects received clinical prophylaxis at four visits the first year and two visits the second year. Evaluation of program outcome consisted of clinical recordings of visible plaque index (VPI), gingival bleeding (GB), calculus index (CI), and DMFS. The study recorded data on dental conditions at baseline, as well as after 12 and 24 months. After each visit, workers completed questionnaires on dental knowledge, attitudes, dental health behavior, social network activities, and perceptions of the process. The mean GB decreased from 36 percent of the teeth scored at baseline to 9 percent at 24 months and mean DS decreased from 2.3 to 0.7 percent. The proportion of workers reporting daily tooth brushing at work increased from 6 percent to 24 percent during the program and the proportion of workers using dental floss regularly increased from 24 percent to 47 percent. Network activities in terms of involvement of family members and working group members in discussions about dental diseases and prevention tended to increase, but not with statistical significance. The majority of the workers (73 percent to 81 percent) were satisfied with scaling of their teeth, fluoride treatment, instructions and advice in preventive care, and regular control of dental health status. 8 tables, 1 figure, 24 references.

Three Cheers for Chocolate


Summary: This article discusses recent research into the components of chocolate. Studies have found that the fat in chocolate is stearic acid and oleic acid, neither of which raises cholesterol levels. However, the author says, most chocolate candy contains little cocoa butter, the source of the "good" fats. In general, the darker the chocolate, the healthier it is. It is also important to remember, though, that candy bars contain ingredients other than chocolate, and chocolate itself is high in calories.

Federally Funded Research on Chocolate

The U.S. Government supports a variety of research studies relating to chocolate. These studies are tracked by the Office of Extramural Research at the National Institutes of Health. CRISP (Computerized Retrieval of Information on Scientific Projects) is a searchable database of federally funded biomedical research projects conducted at universities, hospitals, and other institutions.

Search the CRISP Web site at http://crisp.cit.nih.gov/crisp/crisp_query.generate_screen. You will have the option to perform targeted searches by various criteria, including geography, date, and topics related to chocolate.

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2 Healthcare projects are funded by the National Institutes of Health (NIH), Substance Abuse and Mental Health Services (SAMHSA), Health Resources and Services Administration (HRSA), Food and Drug Administration (FDA), Centers for Disease Control and Prevention (CDCP), Agency for Healthcare Research and Quality (AHRQ), and Office of Assistant Secretary of Health (OASH).
For most of the studies, the agencies reporting into CRISP provide summaries or abstracts. As opposed to clinical trial research using patients, many federally funded studies use animals or simulated models to explore chocolate. The following is typical of the type of information found when searching the CRISP database for chocolate:

- **Project Title: DOPAMINE POLYMORPHISMS AND SMOKING CUE-REACTIVITY**
  
  Principal Investigator & Institution: Erblich, Joel; Ruttenberg Cancer Center; Mount Sinai School of Medicine of Nyu of New York University New York, NY 10029
  
  Timing: Fiscal Year 2002; Project Start 19-SEP-2002; Project End 30-JUN-2007
  
  Summary: (provided by applicant): This 5-year K07 award application is designed to provide the applicant, whose formal training has been in clinical psychology, with the mentoring and "protected" time to pursue multidisciplinary research training spanning basic biology, genetics, behavioral sciences, epidemiology, and biostatistics. At the end of this training, the applicant will have developed sufficient expertise to be a fully established, independent investigator at the forefront of research exploring the biobehavioral links between genetic factors and smoking behavior. The proposed training includes both formal and informal didactics, as well as a complementary program of innovative research. Didactics will include completion of an MPH degree, other selected graduate course work in biology, and informal colloquia. The research project, which explores genetic factors in persistent smoking, will serve as a hands-on model of biobehavioral investigations of clinically relevant hypotheses grounded in the basic sciences. Most smokers express a strong interest in quitting, but only a small minority are successful. Accumulating evidence suggests that genetic factors play a role in this persistent smoking. In particular, research has demonstrated that smokers who carry specific polymorphisms that confer increased sensitivity to dopamine have higher levels of persistent smoking behavior. The underlying biobehavioral mechanisms linking these polymorphisms to persistent smoking are not yet known. Based on several independent lines of research, we propose to test the possibility that smokers with these polymorphisms display greater craving reactions to specific smoking cues, and perhaps appetitive cues generally, than smokers without, which may account for their higher levels of persistent smoking. To that end, a 4 year, laboratory-based study with 448 smokers (50 percent male, 50 percent female), is proposed. These healthy participants will be tested for specific polymorphisms, and their reactions to smoking cues, chocolate cues, and neutral cues will be assessed by self report and cardiovascular monitoring. In addition, they will complete questionnaires about their smoking patterns. Statistical analyses will examine relations between genotype, cue reactivity, and persistent smoking, behavior. Based on the results of that study, the applicant will begin developing and pilot testing interventions to reduce heightened reactivity among smokers with genetic vulnerability. The award is viewed as instrumental to the applicant in achieving his short-term goal of becoming an independent biobehavioral cancer control researcher, as well as his longer-term objective- to "bridge the gap" between the basic sciences and clinical applications by becoming competent in developing and testing clinically relevant "multidisciplinary" hypotheses informed by the basic biological and biobehavioral sciences.
  
  Website: http://crisp.cit.nih.gov/crisp/Crisp_Query.Generate_Screen
E-Journals: PubMed Central

PubMed Central (PMC) is a digital archive of life sciences journal literature developed and managed by the National Center for Biotechnology Information (NCBI) at the U.S. National Library of Medicine (NLM). Access to this growing archive of e-journals is free and unrestricted. To search, go to http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=Pmc, and type “chocolate” (or synonyms) into the search box. This search gives you access to full-text articles. The following is a sample of items found for chocolate in the PubMed Central database:


The National Library of Medicine: PubMed

One of the quickest and most comprehensive ways to find academic studies in both English and other languages is to use PubMed, maintained by the National Library of Medicine. The advantage of PubMed over previously mentioned sources is that it covers a greater number of domestic and foreign references. It is also free to use. If the publisher has a Web

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3 Adapted from the National Library of Medicine: http://www.pubmedcentral.nih.gov/about/intro.html.
4 With PubMed Central, NCBI is taking the lead in preservation and maintenance of open access to electronic literature, just as NLM has done for decades with printed biomedical literature. PubMed Central aims to become a world-class library of the digital age.
5 The value of PubMed Central, in addition to its role as an archive, lies in the availability of data from diverse sources stored in a common format in a single repository. Many journals already have online publishing operations, and there is a growing tendency to publish material online only, to the exclusion of print.
6 PubMed was developed by the National Center for Biotechnology Information (NCBI) at the National Library of Medicine (NLM) at the National Institutes of Health (NIH). The PubMed database was developed in conjunction with publishers of biomedical literature as a search tool for accessing literature citations and linking to full-text journal articles at Web sites of participating publishers. Publishers that participate in PubMed supply NLM with their citations electronically prior to or at the time of publication.
site that offers full text of its journals, PubMed will provide links to that site, as well as to sites offering other related data. User registration, a subscription fee, or some other type of fee may be required to access the full text of articles in some journals.

To generate your own bibliography of studies dealing with chocolate, simply go to the PubMed Web site at [http://www.ncbi.nlm.nih.gov/pubmed](http://www.ncbi.nlm.nih.gov/pubmed). Type “chocolate” (or synonyms) into the search box, and click “Go.” The following is the type of output you can expect from PubMed for “chocolate” (hyperlinks lead to article summaries):

- **“Chocolate addiction”: a preliminary study of its description and its relationship to problem eating.**
  Author(s): Hetherington MM, MacDiarmid JI.

- **A comparison of the performance of bacitracin-incorporated chocolate blood agar with chocolate blood agar plus a bacitracin disk in the isolation of Haemophilus influenzae from sputum.**

- **A dose-response effect from chocolate consumption on plasma epicatechin and oxidative damage.**
  Author(s): Wang JF, Schramm DD, Holt RR, Ensuna JL, Fraga CG, Schmitz HH, Keen CL.

- **A double-blind provocative study of chocolate as a trigger of headache.**
  Author(s): Marcus DA, Scharff L, Turk D, Gourley LM.

- **Absorption rate of methylxanthines following capsules, cola and chocolate.**
  Author(s): Mumford GK, Benowitz NL, Evans SM, Kaminski BJ, Preston KL, Sannerud CA, Silverman K, Griffiths RR.
• Acceptability of fruit purees in peanut butter, oatmeal, and chocolate chip reduced-fat cookies.  
  Author(s): Swanson RB, Munsayac LJ.  

• Acceptability of oatmeal chocolate chip cookies prepared using pureed white beans as a fat ingredient substitute.  
  Author(s): Rankin LL, Bingham M.  

• All that chocolate--but where did it come from?  
  Author(s): Redwine DB.  

• Allergic reactions to chocolate.  
  Author(s): Ghosh JS.  

• An evaluation of the gram stain and chocolate agar culture as part of a routine urine culture set-up.  
  Author(s): Boyd DE, Flournoy DJ, Hussain Qadri SM.  

• An investigation of the relationship of monsepecific urethritis corynebacteria to the other microorganisms found in the urogenital tract by means of modified chocolate agar medium.  
  Author(s): Furness G, Kamat MH, Kaminski Z, Seebode JJ.  

• An investigation of the relationship of nonspecific urethritis corynebacteria to the other microorganisms found in the urogenital tract by means of a modified chocolate agar medium.  
  Author(s): Furness G, Kamat MH, Kaminski Z, Seebode JJ.  
• **Antioxidant effects of polyphenols in chocolate on low-density lipoprotein both in vitro and ex vivo.**
  Author(s): Hirano R, Osakabe N, Iwamoto A, Matsumoto A, Natsume M, Takizawa T, Igarashi O, Itakura H, Kondo K.

• **Antioxidants in chocolate.**
  Author(s): Waterhouse AL, Shirley JR, Donovan JL.

• **Barium-impregnated chocolate fudge for the study of chewing mechanism in children.**
  Author(s): Morgan JA, Gyepes MT, Jones MH, Desilets DT.

• **Bioavailability of (-)-epicatechin upon intake of chocolate and cocoa in human volunteers.**
  Author(s): Baba S, Osakabe N, Yasuda A, Natsume M, Takizawa T, Nakamura T, Terao J.

• **Bitemarks in chocolate: a case report.**
  Author(s): McKenna CJ, Haron MI, Brown KA, Jones AJ.

• **Black holes and the chocolate cake concept.**
  Author(s): Allen A.

• **Breast milk distribution of theobromine from chocolate.**
  Author(s): Resman BH, Blumenthal P, Jusko WJ.
• **Breath hydrogen after ingestion of the bulk sweeteners sorbitol, isomalt and sucrose in chocolate.**
  Author(s): Lee A, Zumbe A, Storey D.

• **CA 125 concentrations in ovarian 'chocolate' cyst fluid can differentiate an endometriotic cyst from a cystic corpus luteum.**
  Author(s): Koninckx PR, Muyldermans M, Moerman P, Meuleman C, Deprest J, Cornillie F.

• **Caffeine and theobromine contents of ready-to-eat chocolate cereals.**
  Author(s): Caudle AG, Bell LN.

• **Calcium supplementation of chocolate: effect on cocoa butter digestibility and blood lipids in humans.**
  Author(s): Shahkhalili Y, Murset C, Meirim I, Duruz E, Guinchard S, Cavadini C, Acheson K.

• **Cannabinoid mimics in chocolate utilized as an argument in court.**
  Author(s): Tytgat J, Van Boven M, Daenens P.

• **Catechin contents of foods commonly consumed in The Netherlands. 2. Tea, wine, fruit juices, and chocolate milk.**
  Author(s): Arts IC, van De Putte B, Hollman PC.

• **Cefsulodin chocolate blood agar: a selective medium for the recovery of Haemophilus influenzae from the respiratory secretions of patients with cystic fibrosis.**
  Author(s): Smith A, Baker M.
  Source: Journal of Medical Microbiology. 1997 October; 46(10): 883-5.
• **Changes in brain activity related to eating chocolate: from pleasure to aversion.**
  Author(s): Small DM, Zatorre RJ, Dagher A, Evans AC, Jones-Gotman M.

• **Characterization and fat migration of palm kernel stearin as affected by addition of desiccated coconut used as base filling centre in dark chocolate.**
  Author(s): Ali A, Selamat J, Man YB, Suria AM.

• **Charlotte's chocolate ice cream soda.**
  Author(s): Lutter LD.

• **Chocolate allergy: a double-blind study.**
  Author(s): Maslansky L, Wein G.

• **Chocolate and acne.**
  Author(s): Mackie BS, Mackie LE.

• **Chocolate and blood pressure in elderly individuals with isolated systolic hypertension.**
  Author(s): Taubert D, Berkels R, Roesen R, Klaus W.

• **Chocolate and coronary disease.**
  Author(s): Kohn LA.
• Chocolate and heartburn: evidence of increased esophageal acid exposure after chocolate ingestion.
  Author(s): Murphy DW, Castell DO.

• Chocolate and the auto-brewery syndrome.
  Author(s): van Lieshout A.

• Chocolate as a source of tea flavonoids.
  Author(s): Arts IC, Hollman PC, Kromhout D.

• Chocolate bars contaminated with Salmonella napoli: an infectivity study.
  Author(s): Greenwood MH, Hooper WL.

• Chocolate bars in eye.
  Author(s): Scott CM, Singh J.

• Chocolate biscuits are poisonous and should be banned by the year 2000.
  Author(s): Mackay M.

• Chocolate buttons.
  Author(s): Holford IM.

• Chocolate cigarettes “recruit” children to smoking.
  Author(s): Ferriman A.