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# The Laboratory Animal Boards Study Group: A Multifaceted Tool for Preparation for the American College for Laboratory Medicine Board Examination

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Preparation for the specialty board examination for the American College of Laboratory Animal Medicine (ACLAM) is an intensive process that is facilitated by geographic regions where many people studying for the exam are located in close proximity. However, many people work at institutions that are distant from these 'study centers.' Approximately 10 y ago, the Laboratory Animal Boards Study Group (LABSG) online journal club was established to provide a forum for journal review for examination preparation. Over the years, the mission of this group has expanded to include practice examinations and practicals, questions from common resources, and summaries and questions from common laboratory animal science journals. These study aids are beneficial for those preparing for the ACLAM certification examination. They are also beneficial for those preparing for the technician and manager certification examinations offered by the American Association for Laboratory Animal Science (AALAS). This article is intended to be an introduction to the variety of study aids available through the LABSG online journal review club and the LABSG web page ([www.labsg.org](http://www.labsg.org)). It also provides details on the demographics of participants and an exploration of how this resource enhances examination preparation.

**Abbreviations:** AALAS, American Association for Laboratory Animal Science; ACLAM, American College of Laboratory Animal Medicine; CFR, Code of Federal Regulations; LABSG, Laboratory Animal Boards Study Group; NIH, National Institutes of Health; PHS, Public Health Service

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Over the past several years, concerns have been raised regarding whether the current and projected workforce of laboratory animal medicine veterinarians will be adequate to support the increasing National Institutes of Health (NIH) funding directed toward research involving the use of animals.<sup>10</sup> The Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals<sup>13</sup> requires that biomedical research institutions receiving federal funds or with a PHS assurance have an attending veterinarian with training or experience in laboratory animal medicine. It is further required that this person have direct or delegated program authority for all institutional activities involving animals. The Animal Welfare Act<sup>9</sup> and the *Guide for the Care and Use of Laboratory Animals*<sup>12</sup> make similar requirements for veterinary care within their regulatory constraints. For many people in this workforce, as well as research institutions employing them, board certification by the American College of Laboratory Animal Medicine (ACLAM) is considered the preferable standard of specialized training in laboratory animal medicine.<sup>10</sup>

Persons planning to take the ACLAM certifying examination must have either completed a minimum of 24 mo of formal training in an ACLAM-recognized training program (training program route) or 6 y of full-time experience in laboratory animal medicine (experience route).<sup>3,4,10</sup> In addition, a candidate also must be the 1st author of a scientific article that has been

published or accepted for publication by a refereed journal; the article must demonstrate application of the scientific method in the biologic sciences, physical sciences, or other scientific areas relevant to laboratory animal medicine.<sup>3,4</sup> Approximately 88% of applications received by ACLAM from 2000 to 2005 met all application criteria.<sup>8</sup>

Preparation for the ACLAM certification examination is a time-consuming and difficult process. The exam comprises 2 sections, a written section and a practical section.<sup>5</sup> The scope of information from which examination questions can be formulated is extensive. Questions regarding nearly every species are possible because nearly all are used in research.<sup>5</sup> The list of references is not fixed, and exam questions may be taken from many peer-reviewed literature sources. In addition to research methods and the veterinary sciences, a candidate must be familiar with the legal and management requirements for the many species used in research, as well as with management of the housing and support facilities for laboratory research animals.<sup>5</sup> ACLAM has prepared a role delineation document that guides the formulation of examination material and aids candidates in focusing their study efforts.<sup>7</sup> ACLAM also lists recommended preparation resources at their website.<sup>5</sup>

Preparation for the examination is often more efficient at geographic centers with multiple institutions, especially institutions with an ACLAM-approved residency or fellowship training program,<sup>6</sup> other ACLAM board-eligible veterinarians, and active ACLAM Diplomates. Study groups and journal clubs are convened easily at these institutions, allowing those in close proximity to pool their resources, learn from one another, and study together. However, many residents and ACLAM board-

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Received: 28 Oct 2005. Revision requested: 28 Feb 2006. Accepted: 28 Feb 2006.

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eligible veterinarians are not employed near such centers. These individuals have had to develop their own resources. Through networking, doing so is possible but more difficult.

Approximately 10 y ago, Dr Jodee Penner coordinated a group of people who were interested in reviewing journals articles as a group by electronic mail. Because of the difficulty in communicating with a growing group of people through email, Dr. Angela King-Herbert, a member of the original group, founded the Laboratory Animal Boards Study Group (LABSG) electronic mailing list.

Email lists facilitate online discussions among people in large groups. Instead of sending an email message to individual group members and potentially missing some members, the email is sent to an address for the list. The message is then automatically redistributed to everyone who subscribes to the list. Other examples of email lists that are currently used in laboratory animal science include the AALAS-sponsored lists CompMed and TechLink. LABSG was one of the 1st groups to use an email list to facilitate communication among people preparing for the ACLAM board examination.

LABSG was established as an online journal club. Participants were assigned 1 article a month from the common laboratory animal medicine journals, including *Laboratory Animal Science* (now *Comparative Medicine*), *Contemporary Topics in Laboratory Animal Science* (now *Journal of the American Association for Laboratory Animal Science*), and the *ILAR Journal*. Members wrote a summary and 3 to 4 relevant questions from the article that were posted to the rest of the group through the email list maintained by North Carolina State University.

Since its inception, LABSG has had several volunteer journal summary coordinators who develop the monthly assignment lists and ensure all reviews are returned. At times, numerous member volunteers have assisted the journal summary coordinators by coordinating the review of other journals such as the *Journal of the American Veterinary Medical Association*, *Nature*, *Science*, *Veterinary Pathology*, and other relevant journals.

Advertising for LABSG is solicited primarily through word of mouth, although an invitation to join is sent to the CompMed email list each fall. Membership typically averages between 50 and 70 persons. Members have included veterinarians who were starting a residency program, those who had completed their training, those following the 6-y experience route, and ACLAM Diplomates who wanted to stay current regarding the literature.

As of spring 2004, under the guidance of the summary coordinator, Dr. Stephanie Murphy, the group has completed the review of all *Laboratory Animal Science/Comparative Medicine* and *Contemporary Topics in Laboratory Animal Science/Journal of the American Association for Laboratory Animal Medicine* journal articles for the past 10 y. LABSG also completed reviews of articles from the *ILAR Journal* for the past 7 y and a wide assortment of selected articles from the *Journal of the American Veterinary Medical Association*, *Veterinary Pathology*, and other relevant journals. Dr. Murphy has also expanded the group's focus to include 'special projects' in addition to the review of journal articles. These special projects consisted of assignments from key references, such as the ACLAM 'blue book' series, the Animal Welfare Regulations, the *Guide*, and others (Table 1). For these assignments, LABSG members were asked to generate relevant review questions from the assigned materials and post these questions and their answers to the LABSG list. LABSG leadership plans to continue the journal summaries and special projects in the coming years (Table 2).

In 1998, Dr. Deb Hickman sought permission from Dr. King-

Herbert to post the compilation of LABSG journal summaries on an internet web page for archival purposes. With Dr. King-Herbert's consent and support, the LABSG webpage was established ([www.labsg.org](http://www.labsg.org)). During the early years, the webpage posted summaries of completed journals, but it also has integrated quiz software to make interactive learning possible.

In 2001, Dr. Taylor Bennett of the University of Illinois at Chicago allowed Dr. Hickman permission to digitally scan and post on the LABSG webpage all quizzes from the CL Davis Lab Animal Courses held at the university each April. The university has provided the LABSG team with the most recent quizzes after each conference, dramatically expanding the resources available for review. In addition, the presentations given annually at the North Carolina CL Davis Laboratory Animal Medicine Review will soon be included on the LABSG webpage.

Another resource available through the LABSG webpage are SuperMemo (Mapletop Software, Prague, Czech Republic) flash cards, which make use of a flash card program for personal digital assistants that tracks an individual's learning of each flash card and adjusts the interval between each viewing to facilitate learning. The software (Palm OS and other formats) can be purchased inexpensively through Mapletop Software. Ordering information and files containing flash cards for many resources are available for download on the LABSG webpage.

Members are encouraged to share additional study materials through the webpage. Recently, Dr. J P Spurlock has created audio files that can be used to drill facts by using MP3 or CD players. It is anticipated that these files will be made available before the end of 2006.

The 10th anniversary of LABSG prompted the organizational committee to evaluate the effectiveness of this resource and the populations that it serves. Analysis of the participants, board eligibility, and pass rates were performed to determine whether participation in the LABSG email list offers any advantages when preparing for ACLAM board certification. Usage of the resources available through the webpages also was characterized.

## Materials and Methods

A survey was conducted to determine the population statistics for the LABSG email list. The survey was sent to all individuals who participated in the LABSG email list between 2001 and 2006 and sought information regarding training experience. Diplomat status of current and previous members was determined by review of the fall 2005 ACLAM Membership Directory.

In order to determine whether participation in the LABSG email list had significantly increased the potential for a candidate to successfully complete the ACLAM certification examination, a list was compiled of all LABSG participants from 2000 to 2006. This list was sent to ACLAM with a request for the numbers of persons who had 1) taken 1 or both parts of the certification examination and 2) who had passed 1 or both parts of the certification examination each year from 2000 to 2005. ACLAM staff checked the list and returned the needed information without any names or identifying factors. This step was taken to protect the confidentiality of ACLAM candidates. The overall number of new diplomates per year was analyzed for a 6-y period. The number of people who passed both parts of the examination during a single test year also was analyzed to determine whether LABSG participation conferred an advantage to passing the examination on the 1st attempt. The differences between pass rate proportions for LABSG and non-LABSG participants were analyzed through proportional analysis by means of Z tests (Excel, Microsoft, Seattle, WA).

In addition to the pass rate data, webpage usage was ana-

**Table 1.** Completed special projects available at LABSG website as of 2006 Feb 01*Regulatory Documents and Guidelines*

1. Animal and Plant Health Inspection Service, US Department of Agriculture. Animal care policy manual (policies 1–29). Available from: <http://www.aphis.usda.gov/ac/polmanpdf.html>. Accessed 1/17/06.
2. Applied Research Ethics National Association (ARENA) and Office of Laboratory Animal Welfare (OLAW). 2002. Institutional animal care and use committee guidebook, 2nd ed. Bethesda (MD): OLAW.
3. American Veterinary Medical Association (AVMA) Panel on Euthanasia. 2001. Report of the AVMA panel on euthanasia. *J Am Vet Med Assoc* 218(5):669–696.
4. Committee on Guidelines for the Use of Animals in Neuroscience and Behavioral Research, Institute for Laboratory Animal Research, Division on Earth and Life Studies. 2003. Guidelines for the care and use of mammals in neuroscience and behavioral research. Washington: National Academy Press.
5. Committee on Occupational Health and Safety in the Care and Use of Nonhuman Primates, Institute for Laboratory Animal Research, Division on Earth and Life Studies, National Research Council of the National Academies. 2003. Occupational health and safety in the care and use of nonhuman primates. Washington: National Academy Press.
6. Committee on Occupational Safety and Health in Research Animal Facilities, Institute of Laboratory Animal Resources, Commission on Life Sciences, National Research Council. 1997. Occupational health and safety in the care and use of research animals. National Academy Press, Washington, DC
7. Institute of Laboratory Animal Resources, Commission on Life Sciences, National Research Council. 1996. Guide for the care and use of laboratory animals. Washington: National Academy Press.
8. Morrison AR, Evans HL, Ator NA, Nakamura RK, editors. 2002. Methods and welfare considerations in behavioral research with animals: report of a National Institutes of Health workshop. Available from: National Institute of Mental Health, Office of Communications and Public Liason, Rockville, MD.
9. Office of Laboratory Animal Welfare. 2002. Public health service policy on humane care and use of laboratory animals. Bethesda (MD): OLAW.
10. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. 1999. Biosafety in microbiological and biomedical laboratories. 4th ed. Available from: US Government Printing Office, Washington.

*Code of Federal Regulations (CFR)*

1. CFR. Title 9—Animals and Animal Products, Chapter 1—Animal and Plant Health Inspection Service, Department of Agriculture, Subchapter A—Animal Welfare. Available from: US Government Printing Office, Washington. 1-1-01 edition.
2. Food and Drug Administration. 21 CFR Chapter 1, Part 58—Good Laboratory Practice for Nonclinical Laboratory Studies. Available from: US Government Printing Office, Washington. 1-1-01 edition.
3. Environmental Protection Agency. 40 CFR Chapter 1, Part 160—Good Laboratory Practice Standards. Available from: US Government Printing Office, Washington. 1-1-01 edition.
4. Environmental Protection Agency. 40 CFR Chapter 1, Part 792—Good Laboratory Practice Standards. Available from: US Government Printing Office, Washington. 1-1-01 edition.

*ACLAM Series*

1. Bennett BT, Abee CR, Henrickson R, editors. 1995. Nonhuman primates in biomedical research: biology and management. San Diego: Academic Press.
2. Bennett BT, Abee CR, Henrickson R, editors. 1998. Nonhuman primates in biomedical research: diseases. San Diego: Academic Press.
3. Fox JG, Anderson LC, Loew FM, Quimby FW, editors. 2002. Laboratory animal medicine, 2nd ed. San Diego: Academic Press.
4. Kohn DF, Wixson SK, White WJ, Benson GJ, editors. 1997. Anesthesia and analgesia in laboratory animals. San Diego: Academic Press.
5. Manning PJ, Ringler DH, Newcomer CE, editors. 1994. The biology of the laboratory rabbit, 2nd ed. San Diego: Academic Press.

*Other Resources and References*

1. Percy DH, Barthold SW. 2001. Pathology of laboratory rodents & rabbits, 2nd ed. Ames (IA): Iowa State University Press.

**Table 2.** Pending and future LABSG special projects

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*Regulatory Documents and Guidelines*

1. Committee on Well-Being of Nonhuman Primates, National Research Council. 1998. The psychological well-being of nonhuman primates. Washington: National Academy Press.
2. Federation of Animal Science Societies. 1999. Guide for the care and use of agricultural animals in agricultural research and teaching, 1st revised ed. Savoy (IL): Federation of Animal Science Societies.
3. National Center for Research Resources (NCRR). 2000. Cost analysis and rate setting manual for animal research facilities. Bethesda (MD): NCRR Office of Science Policy and Public Liaison.
4. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. 2000. Primary containment for biohazards: selection, installation, and use of biological safety cabinets. 2nd ed. Available from: US Government Printing Office, Washington.

*Code of Federal Regulations (CFR)*

1. Food and Drug Administration. 21 CFR Chapter 1, Subchapter B—Food for Human Consumption, Part 100—General. Available from: US Government Printing Office, Washington. 1-1-01 edition.
2. Food and Drug Administration. 21 CFR Chapter 1, Part 210—Current Good Manufacturing Practice in Manufacturing, Processing, Packing, or Holding Drugs; General. Available from: US Government Printing Office, Washington. 1-1-01 edition.
3. Food and Drug Administration. 21 CFR Ch. 1, Part 211—Current Good Manufacturing Practice for Finished Pharmaceuticals. Available from: US Government Printing Office, Washington. 1-1-01 edition.
4. Food and Drug Administration. 21 CFR Cg. 1, Subchapter F—Biologics, Part 600—Biological Products: General. Available from: US Government Printing Office, Washington. 1-1-01 edition.
5. Food and Drug Administration. 21 CFR Ch. 1, Part 820—Quality System Regulation. Available from: US Government Printing Office, Washington. 1-1-01 edition.

*ACLAM Series*

1. Suckow MA, Weisbroth SH, Franklin CL, editors. 2005. The laboratory rat, 2nd ed. San Diego: Elsevier Academic Press.
2. Bennett BT, Abee CR, and Henrickson R, editors. 1998. Nonhuman primates in biomedical research: diseases. San Diego: Academic Press.
3. Fox JG, Anderson LC, Loew FM, Quimby FW, editors. 2002. Laboratory animal medicine, 2nd ed. San Diego: Academic Press.
4. Kohn DF, Wixson SK, White WJ, Benson GJ, editors. 1997. Anesthesia and analgesia in laboratory animals. San Diego: Academic Press.
5. Manning PJ, Ringler DH, Newcomer CE, editors. 1994. The biology of the laboratory rabbit, 2nd ed. San Diego: Academic Press.

*Other Resources and References*

1. Baker DG. 2003. Natural pathogens of laboratory animals: their effects on research. Washington: ASM Press.
2. Nagy A, Gertsenstein M, Vintersten K, Behringer R. 2002. Manipulating the mouse embryo: a laboratory manual, 3rd ed. Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press.
3. National Research Council. 1989. Immunodeficient rodents: a guide to their immunobiology, husbandry, and use. Washington: National Academy Press.
4. National Research Council. 2000. Definition of pain and distress and reporting requirements for laboratory animals. Proceedings of the workshop (Compass Series) held 2000 June 22. Washington: National Academy Press.
5. Silverman J, Suckow MA, Murthy S, editors. 2000. The IACUC handbook. Boca Raton (FL): CRC Press.
6. Suckow MA, Douglas FA, Weichbrod R. 2001. Management of laboratory animal care and use programs. Boca Raton (FL): CRC Press.
7. Waynforth HB, Flecknell PA. 1992. Experimental and surgical techniques in the rat, 2nd ed. San Diego: Academic Press.

*Handbook of Experimental Animal Series*

1. Hedrich HJ, Bullock G, editors. 2004. The laboratory mouse. San Diego: Elsevier Academic Press.
2. Krinke GJ, editor. 2000. The laboratory rat. San Diego: Academic Press.
3. Ostrander GK, editor. 2000. The laboratory fish. San Diego: Academic Press.
4. Wolfe-Coote S, editor. 2005. The laboratory primate. San Diego: Elsevier Academic Press.

**Table 3.** LABSG participant statistics for 2001 to 2006

Year	Total participants	Diplomates	Postdoctoral training program participants	Experiential track participants
2001	70	9	27	17
2002	57	7	26	15
2003	56	9	29	16
2004	61	10	31	15
2005	66	12	30	21
2006	59	14	26	18
Average	62	10 (16% of average total participants)	28 (45% of average total participants)	17 (27% of average total participants)

lyzed for 2005 to 2006 with server analysis software (Webalizer, Melbourne, FL). Specifically, the number of visits (requests for a page on the server for the 1st time) and sites (unique IP addresses or hostnames making requests) were compared to determine the approximate number of unique visitors to the website. However, it was not possible to obtain a specific count of exact unique hits as many computer servers assign rotating IP addresses for security protection. Although the software tracks unique IP addresses, each person might be represented by multiple IP addresses. As directed in the instructions provided with the server analysis software, unique hits were estimated by subtracting the number of file transfers from the total numbers of requests. This process allows estimation of unique requests because repeat requests typically have cached copies of requested pages on the computer and therefore file transfers are not needed. However, if a unique user is accessing the webpage from multiple computers, this figure would not be a reliable indicator, therefore necessitating the use of this number as an estimate only.

## Results

A total of 144 people were identified as current and previous LABSG participants from 2001 to 2006. Contact information was not available for 18 people. The remaining 126 participants were contacted by email for the survey of training program history, 98 participants (77%) responded. Analysis of these responses on a yearly basis showed that LABSG membership consistently included an average of 10 current diplomates (16%; Table 3). The average annual number of LABSG participants who had completed or were currently enrolled in an ACLAM-recognized postdoctoral training program was 28 (45%; Table 3). The average annual number of participants who indicated that they were progressing through the experiential eligibility option was 17 (27%; Table 3).

Comparison of the new ACLAM diplomates (those who passed all or part of the examination in a given year) who were LABSG participants versus non-LABSG participants showed that those participating in the LABSG email list were 13% more likely to achieve ACLAM diplomate status. This difference was not statistically significant ( $P = 0.079576$ ;  $\alpha = 0.05$ ). Comparison of the diplomates that passed both parts of the examination or only the practical in a given year showed that non-LABSG participants were 9% and 13% more likely to pass both parts of the examination or only the practical, respectively, but the differences were statistically insignificant ( $P = 0.824519$  and  $0.980986$ , respectively). There was no significant difference ( $P = 0.58737$ ) in the number of LABSG versus non-LABSG candidates who passed the written portion of the exam. When comparing the various pass rates, it should be noted that LABSG participation only denotes persons who are participating in the journal review. The remainder of the resources provided by LABSG (for example, slide sets, quiz sets, journal and book archives) are available in an unrestricted format.

Analysis of the server access data showed that the heaviest usage of the LABSG webpage occurs in the 6 mo preceding the ACLAM examination. During January 2005 to June 2005, an average of 4114 unique IP addresses accessed the webpage on a monthly basis. From August 2005 to December 2005, this average decreased to 1174 unique IP addresses per month. This number cannot be used to determine actual use, as most servers assign a unique IP address whenever a computer is attached to their network, artificially inflating the number of 'unique' hits. In addition, it is common for people to access the webpage from work and from home. Therefore 1 person can be represented as at least 2 'unique' users.

An analysis of the requests received by the server minus the files that were transferred showed that 32% of the monthly users are return users who have accessed the webpage previously and have files cached. If the average monthly number of unique IP addresses is assumed to be approximately 4000, then 1280 of those visitors have cached files on their computer, suggesting usage beyond the LABSG email list membership (which ranges from 60 to 70 members annually).

## Discussion

Although participating in the online LABSG journal club does not confer a special advantage to passing the ACLAM examination, analysis of the server statistics also illustrates that the web-based resources are being used by many other people who are not participating in the LABSG online journal club. The online journal club and the web-based resources are a valuable opportunity for persons who are not geographically located near others with interest in such a resource.

The value of the LABSG webpage as a centralized location for study materials is not only limited to veterinarians preparing for the ACLAM examination. AALAS has established multiple certification levels for management and husbandry staff:<sup>1,2</sup> Assistant Laboratory Animal Technician (ALAT), Laboratory Animal Technician (LAT), Laboratory Animal Technologist (LATG), and Certified Manager of Animal Resources (CMAR). Preparation for these certification examinations requires review of AALAS manuals and many other resources (Table 4). Many of these resources have been summarized for LABSG and are available to nonveterinarians for review at the LABSG website.

Many mock ACLAM board exams are available on the East Coast and in the Midwest. The collaboration of resource preparation for the LABSG webpage led to the creation of a LABSG mock board exam coalition. One examination is authored by representatives of multiple sites within the United States and Asia. This examination is given at all participating sites, along with other local material to which the sites have access. All coalition exam materials, past and present, are posted at the LABSG webpage after the final coalition exam event.<sup>11</sup> Information on future coalition mock exam events, other mock exams, and relevant courses is also available on the LABSG email list and at the LABSG webpage.<sup>11</sup>

**Table 4.** Recommended resources for AALAS certification examinations<sup>1,2</sup> that have study aids available through the LABSG webpage

Assistant Laboratory Animal Technician (ALAT)	<ol style="list-style-type: none"><li>1. Code of Federal Regulations (CFR). Title 9—Animals and Animal Products, Chapter 1—Animal and Plant Health Inspection Service, Department of Agriculture, Subchapter A—Animal Welfare. Available from: US Government Printing Office, Washington; 1-1-01 edition.</li><li>2. Institute of Laboratory Animal Resources, Commission on Life Sciences, National Research Council. 1996. Guide for the care and use of laboratory animals. Washington: National Academy Press.</li></ol>
Laboratory Animal Technician (LAT)	<p>All of the above, plus the following:</p> <ol style="list-style-type: none"><li>1. Office of Laboratory Animal Welfare. 2002. Public Health Service policy on humane care and use of laboratory animals. Bethesda (MD): National Institutes of Health.</li><li>2. Food and Drug Administration. 21 CFR Chapter 1, Part 58—Good Laboratory Practice for Nonclinical Laboratory Studies. Available from: US Government Printing Office, Washington; 1-1-01 edition.</li><li>3. Environmental Protection Agency. 40 CFR Chapter 1, Part 160—Good Laboratory Practice Standards. Available from: US Government Printing Office, Washington; 1-1-01 edition.</li><li>4. Environmental Protection Agency. 40 CFR Chapter 1, Part 792—Good Laboratory Practice Standards. Available from: US Government Printing Office, Washington; 1-1-01 edition.</li><li>5. AVMA Panel on Euthanasia, American Veterinary Medical Association. 2001. 2000 report of the AVMA panel on euthanasia. <i>J Am Vet Med Assoc</i> 218(5):669–696.</li></ol>
Laboratory Animal Technologist (LATG)	<p>All of the above, plus the following:</p> <ol style="list-style-type: none"><li>1. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. 1999. Biosafety in microbiological and biomedical laboratories. Available from: US Government Printing Office, Washington; 4th ed.</li><li>2. Committee on Occupational Safety and Health in Research Animal Facilities, Institute of Laboratory Animal Resources, Commission on Life Sciences, National Research Council. 1997. Occupational health and safety in the care and use of research animals. Washington: National Academy Press.</li><li>3. <b>National Center for Research Resources (NCRR). 2000. Cost analysis and rate setting manual for animal research facilities. Available from: NCRR Office of Science Policy and Public Liaison, Bethesda, MD.</b></li></ol>
Certified Manager of Animal Resources (CMAR)	<p>All of the above, plus the following:</p> <ol style="list-style-type: none"><li>1. <b>Suckow MA, Douglas FA, Weichbrod R. 2001. Management of laboratory animal care and use programs. Boca Raton (FL): CRC Press.</b></li><li>2. <b>National Institutes of Health (NIH) Vivarium Design Policy and Guidelines, NIH, 1996. Available from: <a href="http://orf.od.nih.gov/PoliciesAndGuidelines/DesignPolicy/vivtoc.htm">http://orf.od.nih.gov/PoliciesAndGuidelines/DesignPolicy/vivtoc.htm</a></b></li><li>3. Applied Research Ethics National Association (ARENA) and Office of Laboratory Animal Welfare (OLAW). 2002. Institutional animal care and use committee guidebook. 2nd ed. Bethesda (MD): OLAW.</li><li>4. US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. 1999. Biosafety in microbiological and biomedical laboratories. 4th ed. Available from US Government Printing Office, Washington.</li></ol>

Bolded references are pending review by the LABSG online journal club participants.

LABSG recently celebrated its 10th anniversary in fall 2004. We are pleased to share how much it has grown and how much it has to offer veterinarians preparing for the ACLAM certification examination and others preparing for specialty certifications. We plan to continue the special projects, expand the webpage, and continue the mission to assist candidates in preparing for the ACLAM certification examination. New material and new LABSG members are always welcome. Everyone is free to use the resources and participate within LABSG, through both the email list and the website. For instructions on how to join, visit the LABSG webpage at [www.labsg.org](http://www.labsg.org).

### Acknowledgments

The authors would like to thank the ACLAM Board of Directors and the Executive Director, Mel Balk, for providing numerical information on applicants applying for the ACLAM certifying exam from 2000 to 2005.

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2. **American Association for Laboratory Animal Science.** 2006. Certified Manager Animal Resources (CMAR) Handbook [Internet]. Memphis: AALAS; c1995-2006 [cited 27 Feb 2006]. Available from: [http://www.aalas.org/pdf/CMAR\\_Hanbook.pdf](http://www.aalas.org/pdf/CMAR_Hanbook.pdf).
3. **American College of Laboratory Animal Medicine.** 2005. ACLAM: By-laws [Internet]. [cited 27 Feb 2006]. Available from: [http://www.aclam.org/aclam\\_bylaws.html](http://www.aclam.org/aclam_bylaws.html).
4. **American College of Laboratory Animal Medicine** [Internet]. 2005. Certification: Application Process [cited 27 Feb 2006]. Available from: [http://www.aclam.org/cert\\_applic.html](http://www.aclam.org/cert_applic.html).
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6. **American College of Laboratory Animal Medicine** [Internet]. 2005. Certification: Training Programs in Laboratory Animal Medicine [cited 27 Feb 2006]. Available from: [http://www.aclam.org/cert\\_trng\\_prog.html](http://www.aclam.org/cert_trng_prog.html).
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9. **Code of Federal Regulations.** 2001. Title 9—Animals and Animal Products, Chapter 1—Animal and Plant Health Inspection Service, Department of Agriculture, Subchapter A—Animal Welfare. Available from: US Government Printing Office; 1-1-01 edition.

10. **Committee on Increasing Veterinary Involvement in Biomedical Research, Institute for Laboratory Animal Research, Division of Earth and Life Studies, National Research Council of the National Academies.** 2004. National need and priorities for veterinarians in biomedical research. Washington (DC): National Academy Press.
11. **Laboratory Animal Boards Study Group.** 2005. Welcome to the LABSG Web Page [Internet]. [cited 27 Feb 2006]. Available from: <http://www.labsbg.org>.
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13. **Office of Laboratory Animal Welfare.** 2002. Public Health Service policy on human care and use of laboratory animals. Bethesda (MD): National Institutes of Health.