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California RVT Examination Study Guide 2017

Version 2.0 - updated November 2016

Contains all the laws and regulations included in the

California Veterinary Technician Examination Test Plan

Introduction

The California Registered Veterinary Technicians Association has created this Study Guide to assist candidates for the California Veterinary Technician Examination (CVTE).

Starting on March 1, 2014, all candidates seeking initial licensure as an RVT in California are required to take and pass two examinations, the Veterinary Technician National Examination (VTNE) and the CVTE. The VTNE is administered by the American Association of Veterinary State Boards (AAVSB). Detailed information regarding the VTNE can be found at the AAVSB's website, www.aavsb.org. The CVTE is an examination on the laws and regulations governing the practice of RVTs in California. The exam consists of 50 questions administered on computer. This Study Guide contains all the laws and regulations included in the CVTE Examination Plan, as of the date of publication.

The Examination Plan includes the content areas on the exam and the percentage and number of items on the exam for each content area. All questions on the CVTE must be referenced to the sections of the laws and regulations included in the Examination Plan.

Questions about the examinations can be directed to the appropriate agencies or to

CaRVTA info@carvta.org

CVTE Veterinary Medical Board: vmb@dca.ca.gov, 1-866-229-0170

VTNE AAVSB: www.aavsb.org

Examination Appeal Process (California Code of Regulations Sec. 2020)

(a) Within forty-five (45) days after the date notice of the results of the examination has been given to the applicant, an applicant who was unsuccessful in the California state board examination or the registered veterinary technician examination may appeal to the Board.

(b) The appeal shall be submitted in writing to the Board's principal office; and it shall state the specific reasons for such appeal.

(c) The executive officer to the Board may deny an appeal requesting a review of an examination that is not accompanied by information supporting the reasons for such request or is not filed within the appeal period stated in subsection (a).

(d) Only appeals concerning the format of the examination, computer grading errors or conditions at the examination site will be considered by the Board.

Please Note: The information contained in the Study Guide is accurate as of the date of publication, November 2016. Candidates are encouraged to review the Candidate Information Bulletin to review the Examination Plan to be sure they have the most current information.

The Bulletin can be downloaded here: https://candidate.psiexams.com/catalog/fti_agency_license_details.jsp?fromwhere=findtest&testid=1045

THE EXAMINATION PLAN

Content area	% on Exam	# items on Exam
1. Authorized Medical Practices 1A. Routine 1B. Emergency	46% 24%	23 12
2. Radiation Safety	20%	10
3. Reporting	6%	3
4. Rabies	4%	2
Total	100%	50

Authorized Medical Practices **1A. Routine 46% -- This content area assesses the candidates' knowledge of the laws pertaining to general procedures performed in practice. (23 items)**	
BUSINESS AND PROFESSIONS CODE	
1	BPC 4825.1 Definitions of terms
2	BPC 4826 Practice of veterinary medicine, surgery, or dentistry
3	BPC 4826.2 Care and Treatment of Restricted Animals
4	BPC 4827 Excepted Practices
5	BPC 4836.1 Administration of drugs by RVTs
6	BPC 4840 Authorized services by technicians
7	BPC 4840.2 Unauthorized practices
CALIFORNIA CODE OF REGULATIONS	
8	CCR 2034 Animal Health Care Tasks Definitions
9	CCR 2035 Duties of Supervising Veterinarian - Section (c) only
10	CCR 2036 Animal Health Care Tasks for RVTs
Authorized Medical Practices **1B. Emergency 24% -- This content area assesses the candidates' knowledge of the laws pertaining to the treatment of life-threatening conditions. (12 items)**	
BUSINESS AND PROFESSIONS CODE	
11	BPC 4840.5 Emergency Aid
12	BPC 4840.6 Liability for emergency care
CALIFORNIA CODE OF REGULATIONS	
13	CCR 2069 Emergency Animal Care
2. Radiation Safety 20% -- This content area assesses the candidates' knowledge of the laws pertaining to safe radiographic practices. (10 items)	
BUSINESS AND PROFESSIONS CODE	
14	BPC 4840.7 Operations of radiographic equipment; Training records
RADIATION SAFETY GUIDE	
15	Appendix C RSG Section 2 Competency and Training of Veterinary Radiographers
16	Appendix C RSG Section 3 Personnel Monitoring
17	Appendix C RSG Section 4 Occupational Dose Equivalent Limits
18	Appendix C RSG Section 6 Veterinary Radiographer Protective Apparel
19	Appendix C RSG Section 7 Veterinary Radiographer Responsibilities
3. Reporting 6% -- This content area assesses the candidates' knowledge of the laws pertaining to reporting illegal activities. (3 items)	
BUSINESS AND PROFESSIONS CODE	
20	BPC 4830.5 Report of animal abuse or cruelty
21	BPC 4830.7 Duty to report animal abuse or cruelty; Immunity from civil liability
4. Rabies 4% -- This content area assesses the candidates' knowledge of the laws and regulations regarding rabies vaccinations. (2 items)	
HEALTH AND SAFETY CODE	
22	HSC 121575-121710 Rabies Control and Vaccinations
23	Title 17, CCR 2651 Approved Canine Rabies Vaccine
24	Title 17, CCR 2606 - 2606.8 Preventative medical service, Reportable diseases and condition, specific diseases and conditions
25	California Compendium of Rabies Control and Prevention - CA Dept of Public Health (2012)

PART I: GENERAL PRACTICE

1A. AUTHORIZED MEDICAL PRACTICES—ROUTINE:

This content area assesses the candidate's knowledge of the laws pertaining to general procedures performed in practice (23 items).

Business & Professions Code

Section 4825.1—Definition of Terms:

These definitions shall govern the construction of this chapter as it applies to veterinary medicine.

(a) "Diagnosis" means the act or process of identifying or determining the health status of an animal through examination and the opinion derived from that examination.
(b) "Animal" means any member of the animal kingdom other than humans, and includes fowl, fish, and reptiles, wild or domestic, whether living or dead.
(c) "Food animal" means any animal that is raised for the production of an edible product intended for consumption by humans. The edible product includes, but is not limited to, milk, meat, and eggs. Food animal includes, but is not limited to, cattle (beef or dairy), swine, sheep, poultry, fish, and amphibian species.
(d) "Livestock" includes all animals, poultry, aquatic and amphibian species that are raised, kept, or used for profit. It does not include those species that are usually kept as pets such as dogs, cats, and pet birds, or companion animals, including equines.

Section 4826—Practice of Veterinary Medicine, Surgery, or Dentistry:

A person practices veterinary medicine, surgery, and dentistry, and the various branches thereof, when he or she does any one of the following:

(a) Represents himself or herself as engaged in the practice of veterinary medicine, veterinary sur-gery, or veterinary dentistry in any of its branches.
(b) Diagnoses or prescribes a drug, medicine, appliance, application, or treatment of whatever na-ture for the prevention, cure, or relief of a wound, fracture, bodily injury, or
(c) Administers a drug, medicine, appliance, application, or treatment of whatever nature for the prevention, cure, or relief of a wound, fracture, bodily injury, or disease of animals, except where the medicine, appliance, application, or treatment is administered by a registered veterinary technician or a veterinary assistant at the direction of and under the direct supervision of a li-censed veterinarian subject to Article 2.5 (commencing with Section 4832) or where the drug, including, but not limited to, a drug that is a controlled substance, is administered by a regis-tered veterinary technician or a veterinary assistant pursuant to Section 4836.1. However, no person, other than a licensed veterinarian, may induce anesthesia unless authorized by regula-tion of the board.
(d) Performs a surgical or dental operation upon an animal.
(e) Performs any manual procedure for the diagnosis of pregnancy, sterility, or infertility upon live-stock or *Equidae*.

(f) Uses any words, letters, or titles in such connection or under such circumstances as to induce the belief that the person using them is engaged in the practice of veterinary medicine, veteri-nary surgery, or veterinary dentistry. This use shall be *prima facie* evidence of the intention to represent himself or herself as engaged in the practice of veterinary medicine, veterinary sur-gery, or veterinary dentistry.

4826.2 - Care and Treatment of Restricted Animals

Notwithstanding any other provision of law, a veterinarian, registered veterinary technician, or a veterinary assistant working under the supervision of a veterinarian, may provide veterinary care and treatment for any animal restricted pursuant to Section 2118 of the Fish and Game Code. A veterinarian, registered veterinary technician, or a veterinary assistant working under the supervision of a veterinarian, may lawfully possess one or more of the animals only for the period of time that, in his or her judgment, veterinary care and treatment are necessary. No veterinarian, registered veterinary technician, or veterinary assistant working under the supervision of a veterinarian, has a duty to advise law enforcement if he or she becomes aware that one or more of the animals is possessed in the state. For the purposes of this section, "veterinary care and treatment" does not include boarding when no veterinary care or treatment is required.

Section 4827 – Excepted Practices

Nothing in this chapter prohibits any person from:

(a) Practicing veterinary medicine as a bona fide owner of one's own animals. This exemption applies to the following:

(1) The owner's bona fide employees.

(2) Any person assisting the owner, provided that the practice is performed gratuitously.

(b) Lay testing of poultry by the whole blood agglutination test. For purposes of this section, “poultry” means flocks of avian species maintained for food production, including, but not limited to, chickens, turkeys, and exotic fowl.

(c) Making any determination as to the status of pregnancy, sterility, or infertility upon livestock, equine, or food animals at the time an animal is being inseminated, providing no charge is made for this determination.

(d) Administering sodium pentobarbital for euthanasia of sick, injured, homeless, or unwanted domestic pets or animals without the presence of a veterinarian when the person is an employee of an animal control shelter and its agencies or humane society and has received proper training in the administration of sodium pentobarbital for these purposes.

Section 4836.1—Administration of Drugs by RVTs:

(a) Notwithstanding any other provision of law, an RVT or a veterinary assistant may administer a drug, including, but not limited to, a drug that is a controlled substance, under the direct or indi-rect supervision of a licensed veterinarian when done pursuant to the order, control, and full pro-fessional responsibility of a licensed veterinarian. However, no person, other than a licensed veterinarian, may induce anesthesia unless authorized by regulation of the board.

(b) Prior to authorizing a veterinary assistant to obtain or administer a controlled substance by the order of a supervising veterinarian, the licensee manager in a veterinary practice shall conduct a background check on that veterinary assistant. A veterinary assistant who has a drug- or alco-hol-related felony conviction, as indicated in the background check, shall be prohibited from ob-taining or administering controlled substances.

(c) Notwithstanding subdivision (b), if the Veterinary Medical Board, in consultation with the Board of Pharmacy, identifies a dangerous drug, as defined in Section 4022, as a drug that has an es-tablished pattern of being diverted, the Veterinary Medical Board may restrict access to that drug by veterinary assistants.

(d) For purposes of this section, the following definitions apply:

(1) *"Controlled substance"* has the same meaning as that term is defined in Section 11007 of the Health and Safety Code.

(2) *"Direct supervision"* has the same meaning as that term is defined in subdivision (e) o Sec-tion 2034 of Title 16 of the California Code of Regulations.

(3) *"Drug"* has the same meaning as that term is defined in Section 11014 of the Health and Safety Code.

(4) *"Indirect supervision"* has the same meaning as that term is defined in subdivision (f) of Sec-tion 2034 of Title 16 of the California Code of Regulations.

(e) This section shall become inoperative on the later of January 1, 2015, or the date Section 4836.2 becomes operative, and, as of January 1 next following that date, is repealed, unless a later enacted statute, that becomes operative on or before that date, deletes or extends the dates on which it becomes inoperative is repealed.

Section 4840—Authorized Services by Technicians:

(a) Registered veterinary technicians and veterinary assistants are **approved to perform** those an-imal health care services prescribed by law under the supervision of a veterinarian licensed or authorized to practice in this state.

(b) Registered veterinary technicians may perform animal health care services on those animals impounded by a state, county, city, or city and county agency pursuant to the direct order, writ-ten order, or telephonic order of a veterinarian licensed or authorized to practice in this state.

(c) Registered veterinary technicians may apply for registration from the federal Drug Enforcement Administration that authorizes the direct purchase of sodium pentobarbital for the performance of euthanasia as provided for in subdivision (d) of Section 4827 without the supervision or authorization of a licensed veterinarian.

Section 4840.2—Unauthorized Practices:

Registered veterinary technicians and veterinary assistants **shall not perform** the following health care services:

(a) Surgery.
(b) Diagnosis and prognosis of animal diseases.
(c) Prescribing of drugs, medicine, and appliances.

California Code of Regulations

Section 2034—Animal Health Care Tasks Definitions:

For purposes of the rules and regulations applicable to animal health care tasks for RVTs and unregis-tered

assistants, contained in the article, the term:

(a) *"Veterinarian"* means a California licensed veterinarian.
(b) *"RVT"* means a registered veterinary technician certified by the Board.
(c) *"Unregistered assistant"* means any individual who is not an RVT or a licensed veterinarian.
(d) *"Supervisor"* means a California licensed veterinarian or if a job task so provides an RVT.
(e) *"Direct Supervision"* means: (1) the supervisor is physically present at the location where animal health care job tasks are to be performed and is quickly and easily available; and (2) the animal has been examined by a veterinarian at such time as good veterinary medical practice requires consistent with the particular delegated animal health care job task.
(f) *"Indirect Supervision"* means: (1) that the supervisor is not physically present at the location where animal health care job tasks are to be performed, but has given either written or oral in-structions ("direct orders") for treatment of the animal patient; and (2) the animal has been ex-amined by a veterinarian at such times as good veterinary medical practice requires, consistent with the particular delegated animal health care task and the animal is not anesthetized as de-fined in Section 2032.4.
(g) *"Animal Hospital Setting"* means all veterinary premises which are required by Section 4853 of the Code to be registered with the Board.
(h) *"Administer"* means the direct application of a drug or device to the body of an animal by injec-tion, inhalation, ingestion, or other means.
(i) *"Induce"* means the initial administration of a drug with the intended purpose of rendering an an-imal unconscious.

Section 2035 (c) only—Duties of Supervising Veterinarian:

(c) The supervising veterinarian shall have examined the animal patient prior to the delegation of any animal health care task to either an RVT or unregistered assistant. The examination of the ani-mal patient shall be conducted at such time as good veterinary medical practice requires consistent with the particular delegated animal health care task.

Section 2036—Animal Health Care Tasks for RVTs:

(a) Unless specifically so provided by regulation, an RVT **shall not perform** the following functions or any other activity which represents the practice of veterinary medicine or requires the know-ledge, skill, and training of a licensed veterinarian:
   1. Surgery;
   2. Diagnosis and prognosis of animal diseases;
   3. Prescription of drugs, medicines or appliances.

(b) An RVT **may perform** the following procedures only **under the direct supervision** of a licensed veterinarian:
   1. Induce anesthesia;
   2. Apply casts and splints;
   3. Perform dental extractions;
   4. Suture cutaneous and subcutaneous tissues, gingiva and oral mucous membranes;
   5. Create a relief hole in the skin to facilitate placement of an intravascular catheter.

(c) An RVT **may perform** the following procedures **under indirect supervision** of a licensed veter-inarian:
   1. Administer controlled substances.

(d) Subject to the provisions of subsection(s) (a), (b), and (c) of this section, an RVT **may perform** animal health care tasks **under the direct or indirect supervision** of a licensed veterinarian. The degree of supervision by a licensed veterinarian over an RVT shall be consistent with standards of good veterinary medical practices.

1B. AUTHORIZED MEDICAL PRACTICES—EMERGENCY:

This content area assesses the candidate's knowledge of the laws pertaining to the treatment of life-threatening conditions (12 items).

Business & Professions Code

Section 4840.5—Emergency Aid:

Under conditions of an emergency, an RVT may render such lifesaving aid and treatment as may be prescribed under regulations adopted by the board pursuant to Section 4836. Such emergency aid and treatment if rendered to an animal patient not in the presence of a licensed veterinarian may only be continued under the direction of a licensed veterinarian. "Emergency" for the purpose of this section, means that the animal has been placed in a life-threatening condition where immediate treatment is necessary to sustain life.

Section 4840.6—Liability for Emergency Care:

Any RVT registered in this state, who in good faith renders emergency animal health care at the scene of the emergency, or his or her employing veterinarian or agency authorized under Section 4840.9, shall not be liable for any civil damages as the result of acts or omissions by a registered veterinary technician rendering the emergency care. This section shall not grant immunity from civil damages when the registered veterinary technician is grossly negligent.

California Code of Regulations

Section 2069—Emergency Animal Care:

Emergency animal care rendered by an RVT: Under conditions of an emergency as defined in Section 4840.5, an RVT may render the following lifesaving aid and treatment to an animal:

1) Application of tourniquets and/or pressure bandages to control hemorrhage.
2) Administration of pharmacological agents to prevent or control shock, including parenteral fluids, shall be performed after direct communication with a licensed veterinarian or veterinarian au-thorized to practice in this state. In the event that direct communication cannot be established, the RVT may perform in accordance with written instructions established by the employing vet-erinarian. Such veterinarian shall be authorized to practice in this state.
3) Resuscitative oxygen procedures.
4) Establishing open airways including intubation appliances but excluding surgery.
5) External cardiac resuscitation.
6) Application of temporary splints or bandages to prevent further injury to bones or soft tissues.
7) Application of appropriate wound dressings and external supportive treatment in severe burn cases.
8) External supportive treatment in heat prostration cases.

PART 2: RADIATION SAFETY

2. RADIATION SAFETY:

This content area assesses the candidate's knowledge of the laws pertaining to safe radiographic pro-cedures. (10 items)

Business & Professions Code

Section 4840.7—Operations of Radiographic Equipment; Training Records:

a) A registered veterinary technician who has been examined by the board in the area of radiation safety and techniques may operate radiographic equipment under the indirect supervision of a licensed veterinarian.
b) A veterinary assistant who has been trained in the area of radiation safety and techniques may operate radiographic equipment under the direct supervision of a registered veterinary techni-cian or a licensed veterinarian.
c) The responsible managing licensee of a veterinary premises shall maintain records of the train-ing described in paragraph (1). A veterinary assistant for whom records of this training do not exist shall not operate radiographic equipment.
d) The training records described in paragraph (2) shall be made available to the board upon re-quest and at the time of any inspection of the veterinary premises.

Radiation Safety Guide

Section 2—Competency and Training of Veterinary Radiographers:

According to Section 4840.7 of the California Veterinary Medicine Practice Act, a RVT who has been examined by the Veterinary Medical Board in the area of radiation safety and techniques may operate radiographic equipment under indirect supervision of a licensed veterinarian.

An unregistered assistant may operate radiographic equipment under the direct supervision of an RVT or a licensed veterinarian.

Section 3—Personnel Monitoring:

Personnel monitoring equipment (devices): Personnel monitoring equipment consists of devices de-signed to be worn or carried for the purpose of measuring the radiation dose received by an individual in the course of employment, education, or training.

Personnel monitoring equipment/devices include: film badges, thermolumnescent dosimeters (TLD), pocket dosimeters, and ring or wrist badges [see CFR Section 20.1003 and CCR Section 30100 (m)].

Film and TLD badges are the most commonly used radiation monitoring devices by the veterinary profession. Personnel monitoring may be performed either on a monthly or quarterly basis.

Location of personnel monitoring equipment (devices): A monitoring device must be worn at the thy-roid level on the collar outside the apron. Also if the fluoroscopy is used, an additional ring or wrist band must be worn.

Section 4—Occupational Dose Equivalent Limits:

Compliance with occupational exposure requirements [Maximum Permissible Dose equivalent (MPD)]

The essential goal of radiation safety is to **prevent injury from exposure** to ionizing radiation. For this reason, CFR 20, Section 20.1201, establishes the following annual or yearly occupational dose equivalent limits:

- Whole body (total effective dose equivalent): 5 rems.
- Skin and extremities (shallow dose equivalents): 50 rems.
- Lens of the eye (eye dose equivalent): 15 rems.

The regulations distinguish the following:

- Occupational dose equivalent limits for adults (persons over 18 years of age).
- Occupational dose equivalent limits for persons under 18 years of age (may receive 10% of the adult occupational dose limits). This is one reason why young people should not be allowed to work in the x-ray room.
- Dose equivalent limits for general population.
- Radiation dose to an embryo/fetus (prenatal radiation exposure).

Section 6—Veterinary Radiographer Protective Apparel:

The operator shall not stand in the beam but be well away from the tube and animal during X-raying [Section 30314(b), Title 17, CCR].

It is the veterinary radiographer's responsibility to require that all individuals unnecessary to the radiographic examination leave the x-ray room prior to an exposure.

Anyone in the x-ray room at the time of exposure **must be behind a protective barrier or must wear a protective apron** of preferably 0.5 mm lead-equivalent but not less than 0.25 mm lead-equivalent.

Lead-impregnated leather or vinyl is used to make aprons and gloves worn by those individuals who must remain in the x-ray room when an exposure is made.

The **minimum requirement** for both aprons and gloves is 0.25 millimeters of lead equivalent. However, gloves and aprons constructed of 0.5 millimeters of lead-equivalent are available and thus provide greater protection to the radiographer and assistants. A label stating the lead equivalent thickness can be found on the hem of the apron and in the cuff of the glove.

Aprons and gloves must be evaluated periodically for tears and cracks to avoid radiation penetration. This evaluation can be accomplished by x-raying the gloves or aprons using a cassette and making a routine exposure. Recommended exposure factors are: 85 kVp, 10 milliampere-seconds (mAs), 40-inch focal-film distance.

Proper storage of aprons and gloves prolongs their lives and effectiveness. Aprons should be hung without creases to prevent cracking. Gloves should be stored so that liners can dry.

Gloves and aprons are designed to protect the wearer from scatter radiation only. They do not reduce the primary x-ray beam enough to provide sufficient protection.

The **reduction in exposure** that results from placing 0.25 mm lead-equivalent apron material in a primary x-ray beam of 100kVp is 60% compared to 0.50 mm lead-equivalent apron material that attenuates the beam by 85%.

Section 7—Veterinary Radiographer Responsibilities:

Veterinary radiographers are responsible for adhering to all of the following radiation safety procedures:

1) **Increase or maximize the distance** between the operator and the source of radiation.
    a. The intensity of the primary x-ray beam, scatter radiation, and leakage from the x-ray tube diminishes rapidly as the distance between the operator and the source of radi-ation increase (approximately by the square of the relative distances).
    b. If an operator can increase his or her distance from radiation sources by a factor of two, his or her exposure would be reduced to one-fourth of the original amount (four being the square of two). If the distance factor could be tripled, the exposure would be reduced to one-ninth of the original amount (nine being the square of three).
    c. When taking radiographs of large animals, use cassette holders to reduce the assis-tant's exposure to radiation.
2) **Use chemical and mechanical restraints** whenever possible to eliminate the need for hold-ing a patient during the radiographic exposure.
    a. Mechanical restraining devices and positioning aids available to veterinary radiog-raphers include vinyl or foam covered sandbags, foam wedges, plastic or foam troughs, plastic head braces and mouth specula, rope, gauze, tape, Velcro straps, etc. Proper utilization not only helps reduce radiation exposure to veterinary radiog-raphers but also helps to improve radiographic quality by preventing patient motion.
3) **Use general anesthesia** when total immobility and complete relaxation of the animal patient is required for accurate positioning.
    a. In all cases, the decision to use anesthetic and tranquilizing agents rests with the at-tending veterinarian.
    b. Tranquilizers may calm the animal patient sufficiently to allow some types of me-chanical restraining devices to be used.
4) **Use appropriate protective devices**, such as gloves, aprons, and protective goggles, as well as fixed or mobile barriers such as walls or movable leaded Plexiglas shields.
    a. Mobile lead Plexiglas shield that can be positioned in the examination room between the source of radiation and the assistant can cut radiation exposure significantly.
    b. Lead-glass goggles offer considerable protection to the lens of the eye.
5) **Reduce** the duration and amount of exposure.
    a. Rare-earth screens can reduce patient dose and the exposure to the personnel from between two and five times without any loss of image quality compared to older cal-cium tungstate screens. From the standpoint of radiation safety, intensifying screens of this type are highly advantageous.
    b. Use a film type proper for screen emittance. For example, blue-light-emitting screens should not be used with green sensitive film and vice versa. Such a film/screen mis-match will result in image degradation and increased radiation exposure.
    c. Low-absorption cassette fronts (such as Bakelite or carbon fiber reinforced plastic) offer minimum filtration of the x-rays passing through the cassette and can aid in keeping patient dose at a minimum.
    d. Use high kVp techniques that are appropriate for the body part being x-rayed, permit-ting the veterinary radiographer to lower the mAs settings and decrease radiation levels. Kilovoltage determines the penetrating ability (quality) of the x-ray beam whereas mAs determines the amount (quantity) of x-radiation.

e. The x-ray imaging process starts with the normal x-ray machine, the animal patient, and the x-ray cassette arranged in the usual positions. The difference is that the digi-tal cassette contains a reusable phosphor plate, which is sensitive to x-rays but not light. Once the plate has been exposed, it is fed into a laser computer reader, which captures the image in a digital format. The reader then resets the plate ready for re-use. The phosphor plates are expensive but can be reused several thousand times; they are also more x-ray sensitive than film, allowing a slightly lower radiation dose to be used. The advantages of this process over film developing are the elimination of the expensive film, the absence of toxic developing chemicals and the speed. Within 30 seconds, the image is visible, so if the image needs to be repeated for technical reasons this can be done immediately. The radiographer orientates the im-age on the monitor according to established protocols and can alter the contrast and grey scale (a process known as "*windowing*").
f. The company that supplies the digital equipment should provide information on the recommended receptor exposure factors to ensure diagnostic images with the lowest possible dose for each particular examination.
g. It is important for each veterinary practice to set up quality assurance systems to rou-tinely monitor factors including clinical exposure constancy and imaging system sen-sitivity.
h. Digital radiography systems may have different x-ray energy responses to film screen systems. Therefore, the technical exposure factors should be different for that used for film screen systems.
i. For existing systems that have been upgraded to use digital radiography or comput-ed radiography, the existing exposure protocols should be adjusted to reflect a 30%–50% reduction in mAs and/or exposure time. Each image, whether produced on film or soft copy display, should ideally have an associated number to indicate the level of exposure to the detector. Currently all computed radiography systems have a sen-sitivity index which is related to detector exposure, however, digital radiography sys-tems are generally not supplied with this feature. Once computed radiography and digital radiography are in use, the constancy of applied exposure factors should be monitored on a regular basis.

6) **Plan radiographic procedures** carefully and avoid unnecessary retakes.
   a. Every examination that must be repeated results in doubling the radiation received by the patient and by personnel. Retakes represent one of the biggest causes of ex-cessive and unnecessary radiation exposure to veterinary radiographers.

3. REPORTING:

This content area assesses the candidate's knowledge of the laws pertaining to reporting illegal activities. (3 items)

Business & Professions Code

Section 4830.5—Report of Animal Abuse or Cruelty:

Whenever any licensee under this chapter has reasonable cause to believe that a dog has been injured or killed through participation in a staged animal fight, as prescribed in Section 597b of the Penal Code, it shall be the duty of the licensee to promptly report the same to the appropriate law enforcement authorities of the county, city, or city and county in which the same occurred.

No licensee shall incur any civil liability as a result of making any report pursuant to this section or as a result of making any report of a violation of Section 596, subdivision (a) or (b) of Section 597, or Section 597b, 597f, 597g, 597n, or 597.5 of the Penal Code.

Section 4830.7—Duty to Report Animal Abuse or Cruelty; Immunity from Civil Liability:

Whenever any licensee under this chapter has reasonable cause to believe an animal under its care has been a victim of animal abuse or cruelty, as prescribed in Section 597 of the Penal Code, it shall be the duty of the licensee to promptly report it to the appropriate law enforcement authorities of the county, city, or city and county in which it occurred. No licensee shall incur any civil liability as a result of making any report pursuant to this section or as a result of making any report of a violation of subdivisions (a), (b), and (c) of Section 597 of the Penal Code.

PART 4: RABIES

4. RABIES:

This content area assesses the candidate's knowledge of the laws and regulations regarding rabies vaccinations (2 items)

Health & Safety Code

SECTIONS 121575-121710 - Rabies Control and Vaccination

121575. "Rabies," as used in this chapter, includes rabies, and any other animal disease dangerous to human beings that may be declared by the department as coming under this chapter. 121580. "Quarantine," as used in this chapter, means the strict confinement, upon the private premises of the owner, under restraint by leash, closed cage, or paddock, of all animals specified in the order of the department.

121585. "Rabies area" shall mean any area not less than a county as determined by the director within a region where the existence of rabies constitutes a public health hazard, as found and declared by the director. A region shall be composed of two or more counties as determined by the director. The status of an area as a rabies area shall terminate at the end of one year from the date of the declaration unless, not earlier than two months prior to the end of the year, it is again declared to be a rabies area in the manner provided in this section. If however, the director at any time finds and declares that an area has ceased to be a rabies area its status shall terminate upon the date of the declaration.

121595. Whenever any case of rabies is reported as existing in any county or city, the department shall make, or cause to be made, a preliminary investigation as to whether the disease exists, and as to the probable area of the state in which the population or animals are endangered.

121600. If upon the investigation the department finds that rabies exists, a quarantine shall be declared against all animals as are designated in the quarantine order, and living within the area specified in the order.

121605. Following the order of quarantine the department shall make or cause to be made a thorough investigation as to the extent of the disease, the probable number of persons and animals exposed, and the area found to be involved.

121610. The department may substitute for the quarantine order regulations as may be deemed adequate for the control of the disease in each area.

121615. All peace officers and boards of health shall carry out the provisions of this chapter.

121620. During the period for which any quarantine order is in force any officer may kill or in his or her discretion capture and hold for further action by the department any animal in a quarantine area, found on public highways, lands, and streets, or not held in restraint on private premises as specified in this chapter.

121625. Any proper official within the meaning of this chapter may examine and enter upon all private premises for the enforcement of this chapter.

121630. Except as provided in Sections 121705 and 121710, every person who possesses or holds any animal in violation of the provisions of this chapter is guilty of an infraction, punishable by a fine not exceeding one thousand dollars ($1,000).

121635. For the purpose of providing funds to pay expenses incurred in connection with the eradication of rabies, the rabies treatment and eradication fund is continued in existence in each county or city in this state.

121640. All money collected for dog license taxes shall be deposited to the credit of this fund with the treasurer of the county or city; but funds now collected from any dog tax may continue to be collected and used for other purposes specified by local ordinances.

121645. Upon the determination by the department that rabies exists in any county or city, a special dog license tax shall immediately become effective, unless a dog tax is already in force the funds from which are available for the payment of expenditures in accordance with this chapter.

121650. This tax shall be levied as follows: An annual tax of one dollar and fifty cents ($1.50) for each male, two dollars and fifty cents ($2.50) for each female, and one dollar and fifty cents ($1.50) for each neuter dog. It shall be collected by the proper authority at the same time and in the same manner as other taxes are collected; except that at the first collection the proportion of the annual tax as corresponds to the number of months the tax has been in operation plus one year advance payment shall be collected.

121655. After this dog license tax has been established in a county or city, it shall be continued in force until an order has been issued by the department declaring that county, or the portion of that county as may be deemed advisable, to be free from rabies or further danger of its spread.

121660. One half of all fines collected by any court or judge for violations of this chapter shall be placed to the credit of the rabies treatment and eradication fund of the county or city where the violation occurred.

121665. Whenever it becomes necessary in the judgment of the department, to enforce this chapter in any county or city, the department may institute special measures of control to supplement the efforts of the local authorities in any county or city whose duties are specified in this chapter.

121670. All expenditures incurred in enforcing the special measures shall be proper charges against the special fund referred to in this chapter, and shall be paid as they accrue by the proper authorities of each county or city where they have been incurred; but all expenditures that may be incurred after the issuance of the order establishing the tax and before the first collection of the tax, shall be paid as they accrue from the general fund of the county or city.

121675. All expenditures in excess of the balance of money in this fund shall likewise be paid as they accrue from the general fund. All money thus expended from the general fund shall be repaid from the special fund when the collections from the tax have provided the money.

121680. Notwithstanding any other provision of this chapter a guide dog serving a blind master shall not be quarantined, in the absence of evidence that he or she has been exposed to rabies, unless his or her master fails: (a) To keep him or her safely confined to the premises of the master. (b) To keep him or her available for examination at all reasonable times.

121685. Notwithstanding any other provision of this chapter, a dog used by any state, county, city, or city and county law enforcement agency shall not be quarantined after biting any person if the bite occurred while the dog was being used for any law enforcement purpose. The law enforcement agency shall make the dog available for examination at any reasonable time. The law enforcement agency shall notify the local health officer if the dog exhibits any abnormal behavior.

121690. In rabies areas, all of the following shall apply:

(a) Every dog owner, after his or her dog attains the age of four months, shall no less than once every two years secure a license for the dog as provided by ordinance of the responsible city, city and county, or county. License fees shall be fixed by the responsible city, city and county, or county, at an amount not to exceed limitations otherwise prescribed by state law or city, city and county, or county charter.

(b)

(1) Every dog owner, after his or her dog attains the age of three months or older, shall, at intervals of time not more often than once a year, as may be prescribed by the department, procure its vaccination by a licensed veterinarian with a canine antirabies vaccine approved by the department and administered according to the vaccine label, unless a licensed veterinarian determines, on an annual basis, that a rabies vaccination would endanger the dog's life due to disease or other considerations that the veterinarian can verify and document. The responsible city, county, or city and county may specify the means by which the dog owner is required to provide proof of his or her dog's rabies vaccination, including, but not limited to, by electronic transmission or facsimile.

(2) A request for an exemption from the requirements of this subdivision shall be submitted on an approved form developed by the department and shall include a signed statement by the veterinarian explaining the inadvisability of the vaccination and a signed statement by the dog owner affirming that the owner understands the consequences and accepts all liability associated with owning a dog that has not received the canine antirabies vaccine. The request shall be submitted to the local health officer, who may issue an exemption from the canine antirabies vaccine.

(3) The local health officer shall report exemptions issued pursuant to this subdivision to the department.

(4) A dog that is exempt from the vaccination requirements of this section shall be considered unvaccinated.

(5) A dog that is exempt from the vaccination requirements of this section shall, at the discretion of the local health officer or the officer's designee, be confined to the premises of the owner, keeper, or harborer and, when off the premises, shall be on a leash the length of which shall not exceed six feet and shall be under the direct physical control of an adult. A dog that is exempt from the provisions of this section shall not have contact with a dog or cat that is not currently vaccinated against rabies.

(c) All dogs under four months of age shall be confined to the premises of, or kept under physical restraint by, the owner, keeper, or harborer. Nothing in this chapter and Section 120435 shall be construed to prevent the sale or transportation of a puppy four months old or younger.

(d) A dog in violation of this chapter and any additional provisions that may be prescribed by a local governing body shall be impounded, as provided by local ordinance.

(e) The governing body of each city, city and county, or county shall maintain or provide for the maintenance of a pound system and a rabies control program for the purpose of carrying out and enforcing this section.

(f)

(1) Each city, county, or city and county shall provide dog vaccination clinics, or arrange for dog vaccination at clinics operated by veterinary groups or associations, held at strategic locations throughout each city, city and county, or county. The vaccination and licensing procedures may be combined as a single operation in the clinics. No charge in excess of the actual cost shall be made for any one vaccination at a clinic. No owner of a dog shall be required to have his or her dog vaccinated at a public clinic if the owner elects to have the dog vaccinated by a licensed veterinarian of the owner's choice.

(2) All public clinics shall be required to operate under antiseptic immunization conditions comparable to those used in the vaccination of human beings.

(g) In addition to the authority provided in subdivision (a), the ordinance of the responsible city, city and county, or county may provide for the issuance of a license for a period not to exceed three years for dogs that have attained the age of 12 months or older and have been vaccinated against rabies or one year for dogs exempted from the vaccination requirement pursuant to subdivision (b). The person to whom the license is

issued pursuant to this subdivision may choose a license period as established by the governing body of up to one, two, or three years. However, when issuing a license pursuant to this subdivision, the license period shall not extend beyond the remaining period of validity for the current rabies vaccination and, if a dog is exempted from the vaccination requirement pursuant to subdivision (b), the license period shall not extend beyond one year. A dog owner who complies with this subdivision shall be deemed to have complied with the requirements of subdivision (a).

(h) All information obtained from a dog owner by compliance with this chapter is confidential to the dog owner and proprietary to the veterinarian. This information shall not be used, distributed, or released for any purpose, except to ensure compliance with existing federal, state, county, or city laws or regulations.

121695. Nothing in this chapter and Section 120435 is intended or shall be construed to limit the power of any city, city and county, or county in its authority in the exercise of its police power or in the exercise of its power under any other provisions of law to enact more stringent requirements, to regulate and control dogs within the boundaries of its jurisdiction.

121700. Rabies vaccines for animal use shall not be supplied to other than a veterinary biologic supply firm, a person licensed to practice veterinary medicine under Chapter 11 (commencing with Section 4800) of Division 2 of the Business and Professions Code, or a public agency.

121705. Any person who willfully conceals information about the location or ownership of an animal subject to rabies, that has bitten or otherwise exposed a person to rabies, with the intent to prevent the quarantine or isolation of that animal by the local health officer is guilty of a misdemeanor. Any person who violates this section is guilty of a misdemeanor.

121710. Any person who, after notice, violates any order of a local health officer concerning the isolation or quarantine of an animal of a species subject to rabies, that has bitten or otherwise exposed a person to rabies or who, after that order, fails to produce the animal upon demand of the local health officer, is guilty of a misdemeanor, punishable by imprisonment in the county jail for a period not to exceed one year, or by fine of not less than one hundred dollars ($100), nor more than one thousand dollars ($1,000) per day of violation, or by both fine and imprisonment.

Title 17, CCR 2651 Approval of Canine Rabies Vaccines

(a) In order for a canine rabies vaccine to be approved for use in California, it shall adhere to the following requirements:

(1) Meet Animal and Plant Health Inspection Service (APHIS) standards for sterility and safety. Evidence of product conformance to APHIS Standards will be demonstrated by the United States Department of Agriculture (USDA) product licensing; and

(2) If an inactivated vaccine, it shall have a minimal relative potency (RP) at vaccination of at least 2.0 as determined by the National Institute of Health (NIH)Test for potency or if a modified live virus (MLV) vaccine it shall meet USDA potency Requirements; and

(3) Demonstrate an immunity duration of three or more years based on an immunity duration challenge study conducted in conformity with section 2652; and

(4) Comply with the origin and integrity of Rabies Vaccine Virus Requirements in section 2653.

Title 17, CCR 2606-2606.8 Preventative Medical Service, Reportable Diseases and Condition, Specific Diseases and Conditions

2606. Rabies, Animal.

(a) Reporting. Any person having knowledge of the whereabouts of an animal known to have or suspected of having rabies shall report the facts immediately to the local health officer. The health officer shall likewise be notified of any person or animal bitten by a rabid or suspected rabid animal. In those areas declared by the Director of the State Department of Health Services to be rabies areas (See Section 121585, California Health and Safety Code) the local health officer shall be notified when any person is bitten by an animal of a species subject to rabies, whether or not the animal is suspected of having rabies.

(b) Isolation. Any rabid animal, clinically suspected rabid animal, or biting animal shall be isolated in strict confinement as follows:

(1) Isolation of Rabid Animals or Clinically Suspected Rabid Animals. Any rabid animal or clinically suspected rabid animal shall be isolated in strict confinement under proper care and under the observation of a licensed veterinarian, in a pound, veterinary hospital, or other adequate facility in a manner approved by the local health officer, except where such responsibility has been delegated to a comparable officer by the governing body, and shall not be killed or released for at least 10 days after the onset of symptoms suggestive of rabies, with the exception that such animals may be sacrificed with permission of the local health officer for the purpose of laboratory examination for rabies using the fluorescent rabies antibody (FRA) test in an approved public health laboratory.

(2) Isolation of Biting Animals. At the discretion of the local health officer any animal which bites or otherwise exposes a person shall be isolated in strict confinement in a place and manner approved by the local health officer and observed for at least 14 days (dogs and cats 10 days) after the day of infliction of the bite, with the exception that the following alternative to the 10 day isolation of dogs and cats is permitted -- dogs or cats which have been isolated in strict confinement under proper care and under observation of a licensed veterinarian, in a pound, veterinary hospital, or other adequate facility in a manner approved by the local health officer, may be released from isolation by the local health officer after five days of veterinary observation if upon conducting a thorough physical examination on the fifth day or more after infliction of the bite, the observing veterinarian certifies that there are no clinical signs or symptoms of any disease. Notwithstanding the foregoing provisions, a local health officer may authorize, with permission of the owner and other legal restrictions permitting, the euthanasia of a biting animal for the purpose of laboratory examination for rabies using the fluorescent rabies antibody (FRA) test in an approved public health laboratory.

(3) Isolation of Biting Animals in Officially Declared Rabies Areas. In officially declared rabies areas (see Section 121585, California Health and Safety Code) the isolation described in paragraph (2) above shall be mandatory for any animal of a species subject to rabies that has bitten or otherwise exposed a person, with the exception of rodents (members of the order Rodentia) and rabbits and hares (members of the order Lagomorpha).

(4) Laboratory Examination of Rabid Animals, Clinically Suspected Rabid Animals or Biting Animals Which Die or Have Been Killed. If any rabid animal, clinically suspected rabid animal or biting animal dies or has been killed, adequate specimens shall be obtained and examined in a public health laboratory approved by the department. No person shall destroy or allow to be destroyed the brain of an animal of a species subject to rabies that has bitten or otherwise exposed a person before the destruction of such brain has been authorized by the local health department; provided, however, that the provisions of this paragraph (4) shall not apply to rodents (members of the order Rodentia) and rabbits or hares (members of the order Lagomorpha).

(c) Animal Contacts. Any animal of a species subject to rabies which has been bitten by a known rabid or suspected rabid animal or has been in intimate contact with a rabid or suspected rabid animal shall be quarantined in a place and manner approved by the local health officer, except where such responsibility has been delegated to a comparable officer by the local governing body, for a period of six months or destroyed, with the exception that the following alternatives are permitted in the case of dogs and cats as follows:

(1) If a dog over one year of age has been vaccinated against rabies within 36 months but not less than 30 days with a rabies vaccine of a type approved by the Department for a maximum immunity duration of at least 36 months, the dog may be revaccinated immediately (within 48 hours) in a manner prescribed by the Department and quarantined in a place and manner approved by the local health officer for a period of 30 days following revaccination.

(2) If a dog under one year of age has been vaccinated against rabies within 12 months but not less than 30 days with a rabies vaccine of a type approved by the Department, the dog may be revaccinated immediately (within 48 hours) in a manner prescribed by the Department and quarantined in a place and a manner approved by the local health officer for a period of 30 days.

(3) If a cat has been vaccinated within one year but not less than 30 days with an annual type feline rabies vaccine or if a cat has been vaccinated under one year of age with a 36-month type of feline rabies vaccine within 12 months but not less than 30 days, the cat may be revaccinated immediately (within 48 hours) in a manner prescribed by the Department and quarantined in a place and manner approved by the local health officer for a period of 30 days following revaccination.

(4) If a cat over one year of age has been vaccinated against rabies and has been vaccinated within 36 months and more than 30 days with a 36-month type feline rabies vaccine, the cat may be revaccinated immediately (within 48 hours) in a manner prescribed by the Department and quarantined in a place and manner approved by a local health officer for a 30-day period following revaccination.

2606.2. Rabies Quarantine. If rabies is known to exist within an area, the local health officer may establish a rabies quarantine and shall define the boundaries of the quarantine area and specify the animals subject to quarantine, and all such animals within the quarantined area shall be kept in strict confinement upon the private premises of the owner, keeper or harborer at all times until the quarantine is terminated by the local health officer

2606.4. Officially Declared Rabies Areas.

(a) Administration and Enforcement. For purposes of administration and enforcement of Section 121690, California Health and Safety Code, in officially declared rabies areas, the following shall apply:

(1) Licensing and Vaccination Procedure. The vaccination of dogs four months of age or older as required by subdivision (b), Section 121690, California Health and Safety Code, shall be held a requisite to licensing as required under subdivision (a) therein. Completion of the licensing procedure consists of issuance of a license tag or a vaccination tag bearing the license data and shall be carried out only after presentation of a current valid official vaccination certificate. Current copies of the Compendium of Canine Rabies Vaccines approved by the Department, together with the maximum immunity duration periods prescribed by the Department for each type product, are available upon request from the Veterinary Public Health Unit, Infectious Disease Section, California Department of Health Services, 2151 Berkeley Way, Berkeley, California, 94704, telephone (415) 540-2391.

(2) Vaccination Certificates. Official vaccination certificates must show:

(A) the name, address and telephone number of the dog's owner;

(B) the description of the dog, including breed, color, age, and sex;

(C) the date of immunization;

(D) the type of rabies vaccine administered;

(E) the name of the manufacturer; and

(F) the lot number of the vaccine used. Such certificates shall bear the signature of the veterinarian administering the vaccine or a signature authorized by him, and in addition such certificate shall be stamped, printed, or typed with his name, address and telephone number for legibility, with the exception that at dog vaccination clinics conducted pursuant to Section 121690(f) of the Health and Safety Code, vaccination certificates approved by the local health officer may be used provided that the specific clinic is identified upon the vaccination certificate and records are maintained containing the information specified under items (E) and (F) above.

(3) Interval Permitted for Procurement of License. The vaccination of dogs four months of age against rabies as required under subdivision (b), Section 121690, California Health and Safety Code, and the license required by subdivision (a) of said section shall be procured not later than 30 days after the dog attains the age of four months. The license renewal shall be procured not later than 60 days after expiration of the previously issued license. (4) Rabies Control Activities Reporting. During such time as a county is under official declaration as a rabies area, each local official responsible for the various phases of local dog or rabies control within each city, county and city or cities, or county shall make quarterly rabies control activities reports to and on forms furnished by the Department. Such reports shall be submitted to the Department by the local officials responsible for the various phases of local dog or rabies control through the local health officer so as to reach the Department not later than 30 days following each quarter.

(b) Vaccination of Dogs Against Rabies. Dogs shall be considered to be properly vaccinated for the purposes of Section 121690, California Health and Safety Code, when injected at four months of age or older with an approved canine rabies vaccine and revaccinated in accordance with the following conditions:

(1) Primary Immunization. Primary immunization shall be defined as the initial inoculation of an approved canine rabies vaccine administered to young dogs between the ages of 4 to 12 months.

(2) Minimum Age for Rabies Vaccination. The minimum age for which rabies immunization of dogs shall be accepted for purposes of dog-owner compliance with requirements for rabies vaccination and for purposes of issuance of dog licenses (See Section 2606.4(a)(1)) is 4 months.

(3) Revaccination Intervals. Dogs shall be revaccinated one year (12 months) after the primary immunization with an approved type of rabies vaccine. Dogs receiving vaccination after primary immunization or any dog receiving its initial rabies vaccination over 12 months of age shall be revaccinated thereafter at least once every three years (36 months) with an approved type rabies vaccine.

(c) Issuance of Dog Licenses. In no instances shall a dog license be issued for a period beyond the date upon which revaccination is due except, following primary immunization in a local jurisdiction which is on a fixed one-year licensing period, a license may be issued for a period beyond the revaccination date if early revaccination cannot be required in accordance with subdivision (d). (d) Notwithstanding the rabies revaccination intervals specified in Section 2606.4(b)(3) above, local authorities may require revaccination prior to issuance of a license provided that revaccination against rabies in no instance shall be required sooner than one year (12 months) following a primary immunization or sooner than 2 years (24 months) following a vaccination of dogs vaccinated over one year (12 months) of age.

2606.6. Importation of Dogs. All dogs four months of age or older imported into this State for any purpose shall be accompanied by a certificate issued by a licensed veterinarian, stating that the dog or dogs have been vaccinated against rabies within 30 months of the date of importation of the dogs vaccinated over 12 months of age or within 12 months for dogs vaccinated under 12 months of age with a canine rabies vaccine of a type approved by the Department for an immunity duration of at least 36 months.

2606.8. Skunk Rabies.

(a) Due to the presence of rabies in skunks in California and in many other states, and the resultant hazard to the public health of rabies developing in skunks kept as pets, no person shall:

(1) trap or capture skunks for pets,
(2) trap, capture or hold skunks in captivity for sale, barter, exchange or gift,
(3) transport skunks from or into the state except as provided under (b) below.
(b) The importation of skunks into California or the exportation of skunks from the State is prohibited except by permit from the California Department of Health Services to a recognized zoological garden or a research institution.

California Compendium of Rabies Control and Prevention
California Department of Public Health Veterinary Public Health Section, 2012

Introduction

This publication of the California Department of Public Health (CDPH) provides information on rabies to California's public health officials, medical professionals, practicing veterinarians, animal control officers, and other parties concerned with rabies control in the State. The recommendations contained herein are reviewed and updated on a periodic basis to reflect the current status of rabies and rabies prevention activities in California. Updates are based on current rabies research and scientific literature, rabies prevention guidelines published by the federal Advisory Committee on Immunization Practices (ACIP)1, 2 and by the National Association of State Public Health Veterinarians3 , California state statute and regulations, and established rabies control practices and procedures. Recommendations by state and federal experts and existing standards of practice outlined in this document are intended to provide guidance to individuals and agencies involved with rabies prevention and control in California. Except for statutes and regulations specifically cited, the information contained in this document are recommendations provided for informational purposes only and are not intended to be regulatory in effect.

Part I - ANIMAL RABIES CONTROL

A. Principles of rabies control

1. Human rabies prevention Human rabies can be prevented by a) eliminating exposure to rabies virus, b) providing appropriate rabies pre-exposure prophylaxis, and c) prompt local treatment of bite wounds combined with appropriate rabies post-exposure prophylaxis. Human rabies pre- and post exposure prophylaxis are addressed in Part II of the Compendium.

2. Domestic animal rabies control The California Health and Safety Code (HSC), §121690, mandates that the governing body of each city, city and county, or county maintain or provide a rabies control shelter system and a rabies control program. The primary components of a rabies control program for companion animals are: immunization and licensing; stray animal control; reporting, investigation, and isolation of animals involved in bite incidents; and public education.

3. Wild animal rabies control Rabies virus is maintained in populations of wild animals and occasionally spills over into domestic animals and humans. In California, skunks and bats comprise over 90 percent of animal rabies cases reported each year. Prevention and control of rabies in bats and terrestrial mammals pose considerable challenges. It is generally not possible or desirable to control rabies by reducing the size of wild carnivore or bat populations. Selective population reduction may be attempted in terrestrial rabies outbreaks of limited geographic scope, but these efforts can be labor and resource intensive and provide effective control only until immigration or reintroduction of the incriminated species. Immunization of wildlife by widespread distribution of vaccine-impregnated oral baits has shown variable success toward arresting the propagation of rabies in raccoons and coyotes in other states. The effectiveness of oral rabies vaccination programs has not been demonstrated for skunks and such programs would be infeasible for bats. Principles of rabies prevention should focus on excluding wild animals from areas of human and domestic animal habitation and activity, and avoidance of contact with possibly rabid wild animals. Public education on the risks of rabies transmission from wild animals is paramount to effective disease prevention.

B. Rabies control methods for domestic and confined animals

1. **Animal bite reporting (Title 17, California Code of Regulations [CCR], §2606)** The local health officer or designee shall be immediately notified of any person or animal bitten by or potentially exposed to a rabid or suspected rabid animal. In addition, the local health officer or designee shall be notified when any person is bitten by a mammal. Potential human rabies exposures are then evaluated and rabies post-exposure prophylaxis (PEP) recommendations made.

2. **Isolation of biting animals (17 CCR §2606)**

(a) General considerations

Dogs, cats, and ferrets that bite a human or another dog, cat, or ferret are subject to isolation and observation, or euthanasia and testing. If the bite is judged by the local health officer to be unusual or to represent an increased risk for rabies (e.g., unprovoked attacks, bites to the face, or considerable deep tissue damage), the animal should be euthanized and tested immediately. The National Association of State Public Health Veterinarians recommends that if an animal under isolation develops clinical signs suggestive of rabies, the animal should be humanely euthanized and the head submitted for rabies testing through the local public health laboratory.3 Any unclaimed or stray animal that bites a human may be euthanized and the head promptly submitted to the local public health laboratory for rabies testing. Protocols for submitting samples for rabies testing are available from the local public health laboratory. Rabies or other immunizations should not be administered to a dog, cat, or ferret during isolation because adverse reactions may be misinterpreted as clinical signs of rabies.

(b) Dogs and cats (17 CCR §2606(b)(2))
Domestic dogs and cats that bite or otherwise expose humans must be isolated in strict confinement and in compliance with the local health officer's isolation order. The biting dog or cat must be either a) observed daily for signs of rabies for ten (10) days following the exposure date, regardless of the animal's vaccination status, or b) euthanized immediately and tested for rabies in a public health laboratory. If an isolated dog or cat is healthy at the end of the ten-day period, there is no risk of a rabies exposure from the original bite wound.

(c) Ferrets

It is illegal in California to possess a ferret as a pet (California Fish and Game Code [FGC] §2118). Nevertheless, bites from these animals occur. If a ferret bites a human in California, it should be isolated in strict confinement and in compliance with the local health officer's isolation order. The biting ferret should be either a) observed daily for signs of rabies for ten (10) days following the exposure date, regardless of the animal's vaccination status, or b) euthanized immediately and tested for rabies in a public health laboratory. Biting ferrets should be confiscated by the animal control agency and isolations conducted under the direction of the local health officer in an animal control shelter or veterinary hospital. If an isolated ferret is healthy at the end of the ten-day period, there is no risk of a rabies exposure from the original bite wound. Because pet ferrets are illegal in California, any ferret isolated for a human bite should be reported to the California Department of Fish and Game for disposition following the isolation.

(d) Other domestic and nondomestic species

The incubation period, clinical presentation, and pre-clinical period of rabies virus shedding are well described only for dogs, cats, and ferrets. The period in which other domestic, non-domestic, and wild animals shed rabies virus prior to showing clinical signs of rabies is generally not known. Biting wild, nondomestic, or domestic animals other than dogs, cats, and ferrets should not be isolated for observation but should be euthanized and tested for rabies immediately. While isolation of biting animals other than dogs, cats, and ferrets is not recommended for the reasons given above, local health officers have the prerogative to forego euthanasia and testing in rare special circumstances. If the biting animal has a comprehensive and reliable history that precludes opportunity for exposure to rabies virus, and the risk of rabies in the biting animal is judged by the health officer to be acceptably low, the health officer may institute a prolonged (30-day) isolation of the biting animal. Under the care of a physician, the bite victim could be started immediately on rabies PEP. This special allowance can be considered due to the low risk for exposure, the reliable efficacy of rabies PEP, and the low incidence of serious adverse reactions with that treatment.

3. Isolation of animals exposed to rabies (17 CCR §2606)

Any animal bitten by, scratched by, or having direct contact with a wild mammal (especially bats and skunks) that is not available for rabies testing should be regarded as having been exposed to rabies.

(a) Dogs, cats, and ferrets

Dogs, cats, and ferrets that are currently vaccinated should be revaccinated immediately and placed in strict isolation for 30 days. While isolation provisions are at the discretion of the local health officer, “strict isolation” must preclude contact between the isolated animal and other animals and the public. Any other dogs, cats, or ferrets for which contact with the bitten animal cannot be absolutely prevented during the isolation period should be held to the same restrictions for the entire isolation period.

Ferrets must be confiscated by the animal control agency and isolation conducted under the direction of the health officer in an animal control shelter or veterinary hospital. Because ferrets are illegal to possess as pets in California, any ferret must be reported to the California Department of Fish and Game for disposition following the isolation. Unvaccinated dogs, cats, and ferrets exposed to a rabid or suspect rabid animal should be euthanized immediately.3 An alternative to euthanasia is immediate vaccination of the animal and placement in strict isolation for six months (180 days). Euthanasia is strongly recommended for unvaccinated juvenile animals due to their higher susceptibility to rabies infection. Protocols for the post-exposure vaccination of previously unvaccinated animals have
not been validated, and there is evidence that the use of vaccine alone in a post-exposure setting may not prevent the disease.

(b) Livestock

All livestock species--horses, cattle, sheep, goats, llamas/alpacas, swine--are susceptible
to rabies infection. Cattle and horses are the livestock species most frequently diagnosed with rabies. Unvaccinated livestock bitten by or exposed to a rabid or suspect rabid animal should be euthanized. If the animal is slaughtered within seven days after
being exposed, the tissues may be consumed without risk of infection, provided liberal
portions of the exposed area are discarded. However, the slaughtered animal cannot be
sold commercially as a source of food; federal (United States Department of Agriculture
[USDA]) meat inspectors are required to reject for slaughter any animal known to have
been exposed to rabies within the past eight months. Neither tissue nor milk from a rabid animal should be used for human or animal consumption. However, because heat
inactivates rabies virus, persons who inadvertently drink pasteurized milk or eat fully
cooked meat from an animal subsequently identified as rabid are not considered to have been exposed to rabies. An alternative to euthanizing exposed livestock is to vaccinate the animal immediately with an approved vaccine and to place it in strict isolation for six months during which time the animal may not be transported, sold, or slaughtered unless approved by the local health officer and the California Department of Food and Agriculture. Livestock that are currently vaccinated should receive a rabies booster immediately and be placed in strict isolation for 30 days. In general, an isolation order for the entire herd is not indicated unless the animals have been held in close confinement that would allow for multiple animals exposed to the same rabies source (e.g., a wild animal). It is unusual to have more than one rabid animal in a herd. In such cases, it is more likely that multiple animals were exposed by a single rabid wild animal or dog than that rabies virus was transmitted from herbivore to herbivore. Animals in a herd where a rabies death has occurred should be examined immediately for evidence of bite exposures.

(c) Wild, nondomestic, and other mammals

Wild, nondomestic, and other mammals bitten by or exposed to a rabid or suspect rabid
animal should be euthanized immediately.

4. Animal rabies vaccination

(a) Rabies vaccine administration (HSC §121690, §121700)

Animal rabies vaccines are restricted for sale to licensed veterinarians, biological
supply companies, and government agencies that conduct rabies control programs.
All animal rabies vaccines are restricted to use by, or under the supervision of, a
California-licensed veterinarian. The level of supervision shall be consistent with

Title 16, CCR, §2034-2036.5 of the California Veterinary Medicine Practice Act. The veterinarian whose signature is on the rabies certificate retains legal responsibility that the person administering the vaccine is appropriately trained in vaccine storage, handling, administration, and management of adverse events. Rabies vaccines should be administered in accordance with the specifications of the vaccine product label or package insert. Rabies vaccine should be administered in a new, sterile needle and syringe. The re-use of cleaned and sterilized needles and syringes is strongly discouraged. Single use of the needle and syringe is consistent with vaccine manufacturers' recommendations.

(b) Accidental human exposure to rabies vaccine

Accidental human inoculation may occur during administration of an animal rabies vaccine. Such exposure to inactivated rabies vaccine does not constitute a risk for rabies infection.

(c) Contraindications and adverse events

There are no absolute contraindications to administration of rabies vaccine to appropriate species. Veterinarians should, if possible, postpone vaccinating animals that are ill or immunocompromised to ensure a robust immune response. There is no epidemiologic association between a particular licensed vaccine product and adverse events, including vaccine failure. Adverse reactions to vaccination should be reported to the USDA, Center for Veterinary Biologics (http://www.aphis.usda.gov/animal_health/vet_biologics/vb_adverse_event.shtml, Tel: 800-752-6255, e-mail: CVB@usda.gov). Beginning in the 1990s, an association between the administration of certain vaccines, including rabies, and the development of cancer (sarcoma) in some cats was identified. However, this risk appears to be extremely low (1-2 cases per 10,000 vaccinated cats). The public health implications of rabies in domestic cats outweigh the low risk of a sarcoma developing at a vaccination site. To facilitate management of vaccine-associated sarcomas, to avoid injection of multiple vaccines at a single site (a putative risk factor for sarcoma formation), and to aid in documenting vaccine placement, the American Association of Feline Practitioners recommends that rabies vaccine be administered subcutaneously on the right hind limb distal to the stifle joint.

(d) Canine rabies vaccination (HSC §121690; 17 CCR §2606.4, §2606.6)

The owner of every dog over the age of four months shall ensure that the dog is vaccinated for rabies by a licensed veterinarian and will secure a license for the pet as provided by local city or county ordinance. A current rabies vaccination certificate must accompany dogs over four months of age entering the state. Dogs less than four months of age must be confined at home or kept under close leash supervision by the owner when off property. Twenty-eight days after primary vaccination peak rabies antibody level is reached and a dog is considered currently vaccinated for one year. Regardless of the age of the dog at primary vaccination, a booster vaccination should be given one year later. All vaccines approved for use in dogs in California follow a three-year booster schedule thereafter. There are no laboratory or epidemiologic data to support the annual or biennial administration of three-year vaccines following the initial immunization series. Because a rapid anamnestic response is expected, a dog is considered currently vaccinated immediately after receiving a booster vaccination. An animal that is overdue for a rabies booster should be vaccinated as soon as possible and the three-year booster schedule re-established.3 Only canine rabies vaccines licensed by USDA and approved by the California Department of Public Health (CDPH) can be used in the California Rabies Control Program (17 CCR §2651). The rabies vaccines currently approved for use in California are listed in Part III of the Compendium.

(e) Feline rabies vaccination

Vaccination of domestic cats for rabies is not mandated by California statute. However, because cats are the domestic species that is most frequently reported as rabid in the United States, feline rabies vaccination is

required by some local ordinances and is strongly recommended for all cats. A USDA-licensed feline rabies vaccine should be administered according to the vaccine label instructions (see Part III of the Compendium). Cats are considered currently vaccinated from 28 days to one year following primary vaccination, and 1, 3, or 4 years following booster vaccinations, depending on the vaccine used.

(f) Ferret rabies vaccination

It is illegal in California to possess a ferret as a pet (FGC §2118). Nevertheless, owners of illegally kept ferrets may occasionally seek veterinary care (California Business and Professional Code §4826.2). As a public health measure, veterinarians should vaccinate ferrets against rabies using a USDA-licensed rabies vaccine administered according to vaccine label instructions (see Part III of the Compendium). Ferrets are considered currently vaccinated from 28 days to one year following primary vaccination, and for one year following each booster.3

(g) Livestock rabies vaccination

Routine vaccination of all livestock against rabies is economically inpractical. However, vaccination of horses and livestock with a USDA-licensed vaccine (see Part III of the Compendium) should be considered in areas where wildlife rabies is highly endemic, for valuable individual animals, for horses kept in boarding stables or racetracks or traveling interstate, and for animals having frequent contact with humans (e.g., petting zoos).

(h) Wildlife and non-domestic rabies vaccination

No rabies vaccines are licensed for use in animal species other than dogs, cats, cattle, horses, sheep, and ferrets in the U.S. The effectiveness of rabies vaccination in other species is unknown. Because of their susceptibility to rabies, wild carnivores and bats should not be kept as pets.3 Bats and certain species of carnivores may not enter California without an importation permit from CDPH (17 CCR §30070-86) and are subject to a 90–day rabies quarantine upon importation into California. Carnivores and bats must be housed in a manner that precludes direct contact with the public.3 Due to the special rabies risk, the trapping, transport, sale, and exchange of skunks in California is prohibited (17 CCR §2606.8). Zoos and research institutions may establish vaccination programs intended to protect valuable animals, but these programs do not substitute for appropriate preventive measures to protect humans.

The effectiveness of rabies vaccination in the progeny of domestic dogs or cats bred to wild animals (e.g., wolf-dog hybrids, civet-cat hybrids) is unknown. Complete rabies vaccine challenge and viral shedding studies have not been conducted for these animals. There is no definitive evidence that the vaccine is protective in these animals. Vaccination may afford some rabies protection to the animal; however, there are no rabies vaccines currently licensed for use in wild animals or in domestic-wild animal hybrids. Vaccination of these animals is considered an extra-label use of a biologic.

State law does not prohibit the use of rabies vaccines in domestic-wild animal hybrids. However, it is illegal to license domestic-wild canine hybrids as “dogs” under the California Rabies Control Program because they are considered wild animals (14 CCR §671(c)(2)(K)). A rabies vaccine certificate issued for a vaccinated hybrid must identify the animal as a "domestic-wild animal hybrid." Local jurisdictions may institute domestic dog-wolf hybrid permitting programs and issue such permits in order to identify these animals in the community (HSC §121695). Canine or feline hybrids previously vaccinated are nonetheless considered “unvaccinated” for purposes of isolation/ observation in the event of a bite incident or contact with a rabid or suspect rabid animal. All hybrids are considered "wild animals" under these circumstances and managed according to sections 2(d) and 3(c) in this Compendium.

(i) Canine licensing and vaccination procedure (17 CCR §2606.4)

The vaccination of all dogs four months of age or older is required for licensure. Completion of the licensing procedure consists of issuing a license tag or vaccination tag bearing the license data only after presentation of a current valid official rabies

vaccination certificate. Official rabies vaccination certificates must contain the following information:
(a) name, address, and telephone number of the dog's owner;
(b) description of the dog, including breed, color, age, and sex;
(c) date of immunization;
(d) type of rabies vaccine administered;
(e) name of the manufacturer, product, and lot number of the rabies vaccine used.
Each certificate must bear the signature of the veterinarian administering the vaccination or a signature authorized by him or her. The certificate must be stamped, printed, or typed with the vaccinating veterinarian's name, address, and telephone number.

(j) Rabies immunization exemptions (HSC §121690)
A veterinarian may request from the local health officer an exemption from rabies vaccination for a dog for which the veterinarian determines that vaccination would endanger the dog's life because of disease or other considerations. If approved by the local health officer, the exempted dog may be issued a license but is considered unvaccinated and confined to the premises of the owner. Licensure of an exempted dog may not extend beyond one year; at or before the end of the one-year license period, the dog must be vaccinated for rabies or a request for vaccination exemption must be resubmitted to and reapproved by the local health officer.

(k) Rabies serologic testing
Serologic evidence of rabies neutralizing antibodies in an animal is not a substitute for current rabies vaccination in managing rabies exposures or determining the need for booster vaccinations. Serum antibody titer is a measure of the animal's response to vaccine or infection and not a reliable indicator of protection. Elevated serologic titers do not necessarily indicate protection from rabies, nor do low or undetectable serologic titers reflect absence of protection. An ability to measure and interpret all the immunologic factors that play a role in protecting against rabies is not well developed.

6. Actual cost" rabies vaccination clinics (HSC §121690)

Each city, city and county, or county shall provide or arrange for canine rabies vaccination clinics in the community. No charge in excess of the actual cost may be made for vaccination administration. The CDPH establishes the actual cost that vaccination clinics may charge. Fees in excess of the CDPH-established actual cost require cost documentation and prior approval by CDPH. Procedures and forms to request approval are available in the California Rabies Control
Program Public Vaccination Clinic Manual (http://www.cdph.ca.gov/HealthInfo/discond/Pages/rabies.aspx).

PART II – HUMAN RABIES PREVENTION

A. Rabies post-exposure prevention

Prevention of rabies following a possible exposure to rabies virus consists of two fundamental components: immediate cleaning and medical attention of the site of virus deposition, and post-exposure prophylaxis (PEP)-

-administration of human rabies immune globulin (HRIG) and rabies vaccine. Persons who have transdermal or mucous membrane contact with saliva or nervous tissue from a confirmed rabid animal, whether by bite or other means, should begin rabies PEP immediately. Persons exposed to a suspected rabid animal should begin PEP if rabies testing of the animal is not immediately available. To appropriately manage potential human exposure to rabies, the risk of infection must be accurately assessed. It is important to remember that rabies PEP is a medical urgency, not a medical emergency. With the exception of direct inoculation of rabies virus into the central nervous system (e.g., severe bite to the head that penetrates the neurocranium), there is time for information to be assembled and the risk to be rationally assessed. Nevertheless, decisions regarding PEP should not be delayed. Extensive field experience from many parts of the world indicates that prompt wound treatment, passive immunization, and vaccination are uniformly effective in preventing development of clinical rabies when administered appropriately. However, rabies has developed in humans when recommended preventive protocols were not performed completely or correctly. Rabies PEP can be effective when initiated any time prior to onset of clinical disease. There have been many instances in which rabies PEP was not initiated until months after exposure due to delays in recognition of the exposure. Although onset of clinical rabies typically occurs between 60 and 90 days following exposure, incubation periods of one year or more have been reported. PEP
should not be denied solely because a prolonged period of time has elapsed since the exposure event.

1. **Rabies exposure**

Rabies exposure is defined as transdermal or mucous membrane contact with saliva--or, rarely, nervous tissue--from a rabid animal. A break in the cutaneous barrier that permits virus access= to subdermal tissue may be created concomitant with (e.g., classic animal bite) or prior to (e.g., open wounds, abrasions, or scratches) deposition of saliva or contact with nervous tissue. Contact with other tissues (e.g. skin, hair, blood), secretions (e.g., skunk spray), or excretions (e.g., urine, feces) of a rabid animal does not constitute an exposure. Rabies virus is inactivated by exposure to ultraviolet radiation and by desiccation, though the exact time required to render the virus inactive varies according to environmental conditions. Dried saliva or neurologic tissue is generally considered noninfectious. Scenarios for secondary exposure or "contact-transfer" of rabies virus (e.g, dog bites a skunk and then licks a human) are hypothetical and very unlikely to transmit rabies.

2. **Assessment of rabies exposure**

Anti-rabies biologics are generally safe and in ready supply. Nevertheless, PEP should be allocated judiciously and reserved for individuals for whom exposure to rabies virus is likely. Decisions on PEP are ultimately made by the exposed individual and his/her health care provider, following a thorough assessment of the exposure incident and consultation with public health officials. No single set of criteria can determine the appropriateness of PEP for all situations. PEP decisions should be based on as much information about the exposure incident as can be assembled in a timely fashion. Factors that should be considered in PEP decisions include: species of biting animal, the physical and mental health of the biting animal, whether the bite was provoked, the severity of the bite, whether immediate wound care was implemented, the availability of the biting animal for isolation/observation or euthanasia/testing, and the bite victim's personal anxiety about rabies. Concerns about the bite victim's pre-existing medical conditions or ability to pay should never preclude initiation of PEP for an exposure incident in which PEP would be otherwise indicated (See Sections D and E).

Bats represent an important reservoir for rabies that deserves special consideration. Epidemiologic data suggest that transmission of rabies virus from bats can occur from very minor or even unrecognized bites. The limited injury inflicted by a bat bite (in contrast to wounds caused by carnivores) and equivocal recall of recognized exposure can hinder a health-care provider's ability to assess the risk of rabies resulting from an encounter with a bat.

Between 2000 and 2009, 18 human cases of rabies were identified in the U.S. with natural exposure to a bat variant virus. For only seven of these patients was a definite bat bite known; eight had known bat contact but no apparent bite, and for three no known contact with a bat was identified during the case investigation.

In all instances where a human is possibly exposed to a bat, the bat in question should be safely collected, if possible, and tested for rabies. Rabies PEP is recommended for all persons who experience a bite, scratch, or mucous membrane contact with a bat, unless the bat is available for testing and is negative for evidence of rabies. Rabies PEP may be appropriate even when a bite, scratch, or mucous membrane contact is not apparent if there is reasonable probability that such exposure might have occurred.

Rabies PEP should be considered when direct contact between a bat and a human has occurred, unless the exposed person can be certain that a bite, scratch, or mucous membrane exposure did not occur. In instances in which an apparently healthy bat is found indoors and there is no history of bat-human contact, the likely effectiveness of rabies PEP must be balanced against the low risk that such exposures appear to present. In this setting, rabies PEP can be considered for persons who were in the same room as the bat and are uncertain whether a bite or direct contact occurred (e.g., a sleeping person awakens to find a bat in the room or an adult witnesses a bat in the room with a previously unattended child, mentally disabled person, or intoxicated person) and rabies cannot be ruled out by testing the bat. Rabies PEP would not be warranted for other household members.

3. Local treatment of wounds

Immediate and thorough washing of any bite or scratch wound with soap and water is an indispensable measure in preventing rabies. Animal experiments have shown that simple loca lwound cleaning and irrigation can markedly reduce the likelihood of rabies. Victims of animal bites should consult with their health care provider; medical or surgical attention, a tetanus toxoid booster, and antibiotic prophylaxis may be indicated independent of the assessed risk of rabies transmission.

4. Passive immunization

Human Rabies Immune Globulin (HRIG) is administered only once, at the beginning of rabies PEP, to previously unvaccinated persons to provide immediate antibodies until the patient responds to rabies vaccination by actively producing antibodies. If HRIG is not given with the first dose of vaccine, it can be given up to Day 7 of the vaccine series. After Day 7, HRIG should be avoided due to possible interference with the developing vaccine immune response. HRIG is administered at a dose of 20 IU/kg body weight for all age groups. No more than the recommended dose of HRIG should be used due its potential to partially suppress active immunization. As much as possible of the calculated dose of HRIG should be infiltrated into the subcutaneous tissue and/or muscle around the wound site(s). Any remaining amount of HRIG should be administered intramuscularly at an anatomic site distant from vaccine administration.

HRIG should never be administered in the same syringe or at the same anatomical site as vaccine and should never be administered in the gluteal area unless that is the site of exposure. In the absence of a bite or other known site of virus introduction, the full dose of HRIG should be administered at a site distant from vaccine administration (e.g., contralateral deltoid). Regardless of the interval between exposure and initiation of PEP, both HRIG and vaccine should be administered for both bite and nonbite exposures in persons not previously rabies immunized.

5. Active immunization

Human Diploid Cell Vaccine (HDCV) or Purified Chick Embryo Cell Vaccine (PCEC) is administered in conjunction with HRIG at the beginning of postexposure treatment. A regimen of four 1-ml doses of HDCV or PCEC is given intramuscularly. The first dose should be given as soon as possible following an exposure (Day 0), with subsequent doses given on Days 3, 7, and 14. Vaccine should always be administered intramuscularly in the deltoid (lateral aspect of the upper arm). For pediatric patients, vaccine may be administered intramuscularly in the anterolateral aspect of the thigh. Rabies vaccine should never be

administered in the gluteal region, as this may result in lower, possibly inadequate neutralizing antibody levels.

Rabies PEP should always include both vaccine and HRIG except in persons who have previously received complete immunization regimens (pre- or post-exposure prophylaxis) with a cell culture vaccine, or persons previously vaccinated with another type of vaccine who have documentation of adequate rabies virus neutralization antibody titers. These persons should immediately receive two 1-ml booster doses of HDCV or PCEC vaccine administered intramuscularly on Days 0 and 3.

Because antibody response has been universally satisfactory in persons receiving the currently recommended rabies PEP schedule, routine post-treatment serologic testing is not recommended. Verification of adequate neutralizing antibody levels by serologic testing may be indicated. Immunosuppressive agents should not be administered during rabies PEP unless they are essential for the treatment of other conditions.

B. Pre-exposure prophylaxis

Persons at frequent risk of exposure to rabies virus should consider pre-exposure prophylaxis (PreEP). Occupations considered to be in the "frequent risk" category include veterinarians, animal handlers, animal control officers, laboratory workers potentially exposed to rabies virus, and others who have frequent contact with mammals likely to have rabies. PreEP might be considered for other persons who are likely to come into contact with potentially rabid animals, such as wild mammal rehabilitators and persons traveling to foreign countries where canine rabies is endemic.

1. Primary or pre-exposure vaccination

Three 1.0 ml injections of HDCV or PCEC are administered intramuscularly in the deltoid (lateral aspect of the upper arm) on days 0, 7, and 21 or 28. Multiple studies have documented development of rabies antibodies that meet or exceed recommended neutralizing titers (>0.5 IU/ ml) in all persons vaccinated according to this regimen. Persons who are immunosuppressed due to medication or illness should postpone PreEP if possible. Immunosuppressed persons who are at risk of rabies exposure can be vaccinated and should have their antibody titers measured following completion of the regimen.

2. Booster vaccination

Routine rabies booster vaccination is not indicated for any pre-immunized group. The need for booster vaccination should be individually assessed based on current rabies antibody levels and the person's risk of exposure to rabies virus. Persons classified as having "frequent risk" (see B above) should have a serum sample tested for rabies antibody every two years--or every six months for persons working with rabies virus in a laboratory setting--following PreEP. If the titer is less than complete neutralization at 1:5 by the Rapid Fluorescent Focus Inhibition Test RFFIT), the person should receive a single booster dose of rabies vaccine.

Several laboratories offer RFFIT testing at a cost of approximately $35-$45 per sample. Instructions for submission of samples and pricing are available by calling the numbers below. (RFFIT testing may also be available through other laboratories.)

The Rabies Laboratory
Kansas State University
Manhattan, KS 66502
(785) 532-4483 Phone
(785) 532-4474 Fax
http://www.vet.ksu.edu/depts/dmp/service/rabies/index.htm
Maryland State Rabies Laboratory
Maryland Department of Health
201 W. Preston Street Baltimore, MD 21201
(410) 767-6177 Phone http://www.dhmh.state.md.us/labs

Atlanta Health Associates, Inc.
309 Pirkle Ferry Road, Suite D300 Cumming, GA 30040
(770) 205-9091, (800) 717-5612 Phone
(770) 205-9021 Fax
http://www.atlantahealth.net

C. Rabies immunizing products available in the United States

1. Human rabies vaccine stimulates an active immune response including production ofneutralizing antibodies. These antibodies develop in approximately 7-10 days and usually persist for at least 2 years. The two vaccines currently available in the U.S. are considered equally efficacious and safe when used as indicated. The 1.0 ml dose of either HDCV or PCEC can be used for PEP or PreEP.

(a) Human Diploid Cell Vaccine (HDCV) - Imovax® Rabies

HDCV is prepared from the Pitman-Moore rabies virus strain grown in MRC-5 human diploid cell culture. The vaccine is concentrated by ultrafiltration and inactivated with beta-propiolactone. A single-dose vial containing lyophilized vaccine is reconstituted with diluent to a volume of 1.0 ml just before administration. Imovax® Rabies is manufactured and distributed by Sanofi Pasteur, Inc. (phone 800-VAC-CINE [800-822-2463], http://www.vaccineplace.com/products).

(b) Purified Chick Embryo Cell Culture (PCEC) - RabAvert®

PCEC is prepared by growing the Flury LEP fixed-virus strain in primary culture of chicken embryonic fibroblasts. The virus is inactivated with beta-propiolactone, and further processed with zonal centrifugation in a sucrose density-gradient to separate thefinal product from media and cell culture antigens. The vaccine is then lyophilized afteraddition of a stabilizer solution. RabAvert® is manufactured and distributed by ChironVaccines (phone 800-CHI-RON8 [800-244-7668], http://www.rabavert.com/).

2. Rabies Immune Globulin - Human (HRIG) provides immediate passive immunity that endures for only a limited time (half-life of approximately 21 days).

Imogam® Rabies-HT, HyperRabTM S/D

Human rabies immune globulin (HRIG) is available from Sanofi Pasteur, Inc., (Imogam® Rabies-HT; phone 800- VAC-CINE [800-822-2463], http://www.vaccineplace.com/products), and Talecris Biotherapeutics, Inc., (HyperRabTM S/D; phone 800-243-4153, http://www.talecrispi.info/).

HRIG is an antirabies gamma globulin concentrated by cold ethanol fractionation from plasma of hyperimmunized human donors. Rabies neutralizing antibody content is standardized to 150 international units (IU) per ml. HRIG is supplied in 2 ml and 10 ml vials for pediatric and adult use, respectively. Imogam® Rabies-HT is heat treated but has no preservatives. It must be administered within an hour once the seal is broken. Both HRIG preparations are considered equally efficacious and safe when used as indicated.

D. Adverse reactions to rabies immunizing products

1. Vaccine

Local reactions such as pain, erythema, and swelling or itching at the injection site were reported in approximately 30-75 percent of patients receiving HDCV or PCEC. Mild systemic reactions such as headache, malaise, dizziness, muscle aches, nausea, and abdominal pain have been reported in 5-50 percent of recipients. Anaphylactic, encephalitic, or neuroparalytic events have been rarely reported.

2. HRIG

Local pain and tenderness at the injection site commonly occur following receipt of HRIG. A majority of recipients also experience mild systemic symptoms such as low grade fever and headache. No serious adverse events such as hypersensitivity or immune complex disease have been associated with HRIG. HyperRabTM and Imogam® Rabies-HT undergo multiple viral clearance procedures during preparation. There is no evidence that hepatitis B virus, human immunodeficiency virus, or other bloodborne pathogens have ever been transmitted by commercially available HRIG in the U.S.

3. Management of adverse reactions

Once initiated, rabies PEP should not be interrupted or discontinued because of local or mild systemic adverse reactions to rabies vaccine. Usually such reactions can be successfully managed with non-steroidal anti-inflammatory and antipyretic agents (e.g., ibuprofen or acetaminophen). For more severe reactions, consideration should be given to switching to another product. When a person with a history of hypersensitivity must be given rabies vaccines, pre-medication with antihistamines may be considered; epinephrine should be readily available to counteract anaphylactic reactions, and the person should be carefully observed immediately after administration. Systemic anaphylactic or neuroparalytic reactions occurring during the administration of rabies
vaccines, though rare, pose a serious dilemma for the attending physician. A patient's risk of developing rabies must be carefully considered before deciding to discontinue vaccination. The use of corticosteroids in the treatment of life-threatening neuroparalytic reactions carries the risk of inhibiting the development of active immunity to rabies. It is especially important in these cases that the patient’s serum be tested for rabies antibodies following vaccination. All serious systemic, neuroparalytic, or anaphylactic reactions to a rabies vaccine should be reported to the Vaccine Adverse Event Reporting System (VAERS) via a 24-hour toll-free telephone number (800- 822-7967).

4. Precautions and contraindications

a. Immunosuppression

Persons with compromised immune function—whether by pre-existing medical condition (e.g., neoplasia) or exogenous immunosuppressives (e.g., corticosteroids)—may fail to develop complete and protective immunity after vaccination. Patients who are immunosuppressed should postpone PreEP if possible and consider avoiding activities for which rabies PreEP is indicated. Immunosuppressed persons for whom PreEP is critical should have their antibody titers checked following completion of the vaccine series. Failure to seroconvert after the third dose should be managed in consultation with appropriate public health officials. Immunosuppressive agents should not be administered during rabies PEP unless essential for the treatment of other conditions.

b. Pregnancy

Because of the potential consequences of inadequate treatment of a rabies exposure, pregnancy is not considered a contraindication to rabies PEP. No increased incidence of abortion, premature births, or fetal abnormalities has been associated with rabies vaccination. If the risk of exposure to rabies is substantial, PreEP might also be indicated

during pregnancy. Rabies vaccine given to a nursing mother does not affect the safety of breastfeeding for either mother or infant, and breastfeeding is not a contraindication to rabies vaccine.

c. Antimalarials

Concurrent use of antimalarial drugs may interfere with the immune response to rabies vaccination. In one study of persons undergoing PreEP with an intradermal rabies vaccine, individuals who were concurrently taking chloroquine had a lower geometric mean titer of anti-rabies antibodies at all test points compared to persons who were not taking antimalarials. Nevertheless, all study subjects had serum antibody titers that exceeded the threshhold that is considered adequate for protection (complete neutralization at 1:5 on RFFIT). Data are not available as to whether this same immunosuppressive effect occurs with other antimalarial drugs or with rabies PreEP using an intramuscular vaccine.

d. Allergies

Persons who have a history of serious hypersensitivity to rabies vaccine should be revaccinated with caution.

6. Cost

Coverage for rabies immunization, for both PreEP and PEP, varies among health insurance plans. Options are available to persons in need of PEP who are uninsured or otherwise cannot afford treatment.

a. Rabies vaccine (CPT Codes 90675/90676, and 90460/90461 or 90471/90472) and HRIG (CPT Codes 90375/90376 and 96372) are covered for Medi-Cal eligible persons. Eligibility may need to be determined by emergency certification request at the county welfare office.

b. For individuals who are ineligible for Medi-Cal, have annual income at or below 200 percent of the federal poverty level, and reside in participating counties, the cost of rabies PEP may be covered through the California County Medical Services Program.

c. Both rabies vaccine manufacturers have patient assistant programs that provide medications to uninsured or underinsured patients. To be eligible, patients must be indigent, uninsured, ineligible for Medicare or Medi-Cal, have household income below federal poverty level, and the attending physician must waive all fees associated with treatment. Eligibility requirements differ between companies and they should be contacted directly to discuss whether a patient is eligible for their program. Sanofi Pasteur's Indigent Patient Program (providing Imogam® Rabies-HT and Imovax® Rabies) is administered through the National Organization for Rare Disorders. Information is available by telephone (877-798-8716) or e-mail (nnadiq@ rarediseases.org). Information on Novartis Pharmaceuticals' Patient Assistance Program for RabAvert® is available at 800-277-2254 or http://www.patientassistancenow.com/ info/programstoaccessmedicines/patientassistanceinformation.jsp.

Part III.
California Department of Public Health
Compendium of U. S. Licensed Animal Rabies Vaccines - 2012, and Their Application in Animals Under the California Rabies Control Program

- continued –

Product Name	Produced By	Marketed By	For Use In	Dosage/Route*	Minimum Age at Primary Vaccination	Booster Recommendation
A) MONOVALENT – INACTIVATED						
CONTINUUM RABIES	Intervet Inc. License No. 165A	Intervet Inc.	**Dogs**	1 ml SC	3 months	1 year later & triennally
			Cats	1 ml SC	12 weeks	1 year later & quadrennially
DEFENSOR 1	Zoetis License No. 189	Zoetis	**Dogs**	**NOT APPROVED FOR USE IN CALIFORNIA**		
			Cats	1 ml SC	3 months	Annually
DEFENSOR 3	Zoetis License No. 189	Zoetis	**Dogs**	1 ml IM or SC	3 months	1 year later & triennially
			Cats	1 ml SC	3 months	1 year later & triennially
			Sheep	2 ml IM	3 months	Annually
			Cattle	2 ml IM	3 months	Annually
NOBIVAC 1	Merck Animal Health License No. 189	Intervet Inc.	**Dogs**	**NOT APPROVED FOR USE IN CALIFORNIA**		
			Cats	1 ml SC	3 months	Annually
NOBIVAC 3 CA	Merck Animal Health License No. 189	Intervet Inc.	**Dogs**	1 ml IM or SC	3 months	1 year later & triennially
			Cats	1 ml SC	3 months	1 year later & triennially
			Sheep	2 ml IM	3 months	Annually
			Cattle	2 ml IM	3 months	Annually
EQUI-RAB	Merck Animal Health License No. 165A	Intervet Inc.	Horses	1 ml IM	4 months	Annually
RABVAC 1	Boehringer Ingelheim Vetmedica, Inc. License No. 112	Boehringer Ingelheim Vetmedica, Inc.	**Dogs**	**NOT APPROVED FOR USE IN CALIFORNIA**		
			Cats	1 ml IM or SC	3 months	Annually
RABVAC 3	Boehringer Ingelheim Vetmedica, Inc. License No. 112	Boehringer Ingelheim Vetmedica, Inc.	**Dogs**	1 ml IM or SC	3 months	1 year later & triennially
			Cats	1 ml IM or SC	3 months	1 year later & triennially
			Horses	2 ml IM	3 months	Annually
RABVAC 3 TF	Boehringer Ingelheim Vetmedica, Inc. License No. 112	Boehringer Ingelheim Vetmedica, Inc.	**Dogs**	1 ml IM or SC	3 months	1 year later & triennially
			Cats	1 ml IM or SC	3 months	1 year later & triennially
			Horses	2 ml IM	3 months	Annually
PRORAB-1	Intervet Inc. License No. 165A	Intervet Inc.	**Dogs**	**NOT APPROVED FOR USE IN CALIFORNIA**		
			Cats	1 ml IM or SC	3 months	Annually
			Sheep	2 ml IM	3 months	Annually
IMRAB 3	Merial, Incorporated License No. 298	Merial, Incorporated	**Dogs**	1 ml IM or SC	3 months	1 year later & triennially
			Cats	1 ml IM or SC	12 weeks	1 year later & triennially
			Sheep	2 ml IM or SC	12 weeks	1 year later & triennially
			Cattle	2 ml IM or SC	12 weeks	Annually
			Horses	2 ml IM or SC	12 weeks	Annually
			Ferrets	1 ml SC	12 weeks	Annually
IMRAB 3 TF	Merial, Incorporated License No. 298	Merial, Incorporated	**Dogs**	1 ml IM or SC	3 months	1 year later & triennially
			Cats	1 ml IM or SC	12 weeks	1 year later & triennially
			Ferrets	1 ml SC	12 weeks	Annually
IMRAB Large Animal	Merial, Incorporated License No. 298	Merial, Incorporated	Cattle	2 ml IM or SC	3 months	Annually
			Horses	2 ml IM or SC	3 months	Annually
			Sheep	2 ml IM or SC	3 months	1 year later & triennially
IMRAB 1	Merial, Incorporated	Merial, Incorporated	**Dogs**	**NOT APPROVED FOR USE IN CALIFORNIA**		

Part III.
California Department of Public Health
Compendium of U. S. Licensed Animal Rabies Vaccines - 2012, and Their Application in Animals Under the California Rabies Control Program

- continued –

	License No. 298		Cats	1 ml SC	12 weeks	Annually
IMRAB 1 TF	Merial, Incorporated License No. 298	Merial, Incorporated	**Dogs** Cats	**NOT APPROVED FOR USE IN CALIFORNIA** 1 ml SC	12 weeks	Annually
Product Name	Produced By	Marketed By	For Use In	Dosage/Route*	Minimum Age at Primary Vaccination	Booster Recommendation
B) MONOVALENT- RABIES GLYCOPROTEIN, LIVE CANARY POX VECTOR						
PUREVAX Feline Rabies	Merial, Incorporated License No. 298	Merial, Incorporated	Cats	1 ml SC	8 weeks	Annually
C) COMBINATION - INACTIVATED RABIES						
CONTINUUM DAP-R	Intervet Inc. License No. 165A	Intervet Inc.	Dogs	1 ml SC	3 months	1 year later & triennially
CONTINUUM Feline HCP-R	Intervet Inc. License No. 165A	Intervet Inc.	Cats	1 ml SC	12 weeks	1 year later & triennially
EQUINE POTOMAVAC + IMRAB	Merial, Incorporated License No. 298	Merial, Incorporated	Horses	1 ml IM	3 months	Annually
D) COMBINATION – RABIES GLYCOPROTEIN, LIVE CANARY POX VECTOR						
PUREVAX FELINE 3/ RABIES	Merial, Incorporated License No. 298	Merial, Incorporated	Cats	1 ml SC	8 weeks	Annually
PUREVAX FELINE 4/ RABIES	Merial, Incorporated License No. 298	Merial, Incorporated	Cats	1 ml SC	8 weeks	Annually

ROUTES AND SITES OF INOCULATION IN DOGS: Approved canine vaccines must be administered to dogs according to the manufacturer's recommendations either intramuscularly (IM) or subcutaneously (SC). Administration via other sites or routes may reduce effectiveness or be unsafe. For species other than dogs, refer to the vaccine label.

Adapted from the Compendium of Animal Rabies Prevention and Control, 2011, National Association of State Public Health Veterinarians, Incorporated
Rev. 10/15/13, 12/31/13

* Intramuscularly (IM)
Subcutaneously (SC)