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Preface: Vaccinology and Immunology: Current Knowledge, New Discoveries, and Future Directions xi
Amy E.S. Stone and Philip H. Kass

Recent Advances in Vaccine Technologies 231
Michael James Francis

This article discusses some recent advances in vaccine technologies with particular reference to their application within veterinary medicine. It highlights some of the key inactivated/killed approaches to vaccination, including natural split-product and subunit vaccines, recombinant subunit and protein vaccines, and peptide vaccines. It also covers live/attenuated vaccine strategies, including modified live marker/differentiating infected from vaccinated animals vaccines, live vector vaccines, and nucleic acid vaccines.

Another Look at the “Dismal Science” and Jenner’s Experiment 243
John A. Elllis

The follow-up to Jenner’s experiment, routine vaccination, has reduced more disease and saved more vertebrate lives than any other iatrogenic procedure by orders of magnitude. The unassailability of that potentially provocative cliché has been ciphered in human medicine, even if it is more difficult in our profession. Most public relations headaches concerning vaccines are a failure to communicate, often resulting in overly great expectations. Even in the throes of a tight appointment schedule remembering and synopsizing (for clients), some details of the dismal science can make practice great again.

Veterinary Oncology Immunotherapies 257
Philip J. Bergman

The ideal cancer immunotherapy agent should be able to discriminate between cancer and normal cells, be potent enough to kill small or large numbers of tumor cells, and be able to prevent recurrence of the tumor. Tumor immunology and immunotherapy are among the most exciting and rapidly expanding fields; cancer immunotherapy is now recognized as a pillar of treatment alongside traditional modalities. This article highlights approaches that seem to hold particular promise in human clinical trials and many that have been tested in veterinary medicine.

Adverse Reactions to Vaccination: From Anaphylaxis to Autoimmunity 279
Laurel J. Gershwin

Vaccines are important for providing protection from infectious diseases. Vaccination initiates a process that stimulates development of a robust
and long-lived immune response to the disease agents in the vaccine. Side effects are sometimes associated with vaccination. These vary from development of acute hypersensitivity responses to vaccine components to local tissue reactions that are annoying but not significantly detrimental to the patient. The pathogenesis of these responses and the consequent clinical outcomes are discussed. Overstimulation of the immune response and the potential relationship to autoimmunity is evaluated in relation to genetic predisposition.

Vaccines in Shelters and Group Settings

Richard A. Squires

Dogs and cats entering animal shelters are at high risk of acquiring one or more contagious infectious diseases. Such animals may be severely stressed, exhausted, and unwell, as well as malnourished and parasitized. The typically high throughput of shelter animals, many of them young and of unknown vaccination status, plays a role. Vaccines are a crucially important part of the management approach to limiting morbidity, mortality, and spread of infection. Guidelines for the use of vaccines in shelters have been published and are reviewed and discussed in this article.

Prevention of Feline Injection-Site Sarcomas: Is There a Scientific Foundation for Vaccine Recommendations at This Time?

Philip H. Kass

Recently published guidelines have made specific vaccine recommendations purported to potentially reduce the incidence of feline injection-site sarcomas (FISS). These recommendations have largely been based on experimental models of inflammation under different vaccine formulations. In none of these studies did sarcomas occur. It is scientifically untenable to address FISS risk based on propensity of vaccines to elicit differential inflammatory responses if none of those responses led to sarcoma development. Although the recommendations may ultimately be found to be prescient and valid, it will take considerable additional research before this can happen. Until then, such guidelines must be regarded with skepticism.

The Microbiota Regulates Immunity and Immunologic Diseases in Dogs and Cats

Ian R. Tizard and Sydney W. Jones

The complex commensal microbiota found on body surfaces controls immune responses and the development of allergic and inflammatory diseases. New genetic technologies permit investigators to determine the composition of the complex microbial populations found on these surfaces. Changes in the microbiota (dysbiosis) as a result of antibiotic use, diet, or other factors thus influence the development of many diseases in the dog and cat. The most important of these include chronic gastrointestinal disease; respiratory allergies, such as asthma; skin diseases, especially atopic dermatitis; and some autoimmune diseases.
There are many autoimmune diseases that are recognized in domestic animals. The descriptions of diseases provide examples of the magnitude of immune targets and the variable nature of autoimmune diseases. Other autoimmune diseases that are recognized in dogs, cats, and horses include immune-mediated thrombocytopenia, VKH (Vogt-Koyanagi-Harada) ocular disease (dogs), and Evans syndrome (which includes both immune-mediated anemia and immune-mediated thrombocytopenia).