

NC STATE UNIVERSITY RESIDENCY PROGRAM IN VETERINARY CLINICAL PHARMACY

The College of Veterinary Medicine, North Carolina State University, is offering a residency program in Veterinary Clinical Pharmacy Practice. Minimum qualifications include graduation from an accredited College of pharmacy and a current North Carolina Pharmacy License in good standing. The selection of residents is made on the basis of academic achievement, career objectives, letters of recommendation, and pertinent experience. This residency is a Post-Graduate Year One (PGY1) residency.

I. Objectives

- A. To provide non-degree postdoctoral education in veterinary clinical pharmacy and therapeutics.
- B. To prepare the resident for eligibility and certification by the Society of Veterinary Hospital Pharmacists (SVHP) as a Diplomate of the International College of Veterinary Pharmacy.
- C. To build a working knowledge and skill set in preparing high quality, safe, effective, and legally acceptable compounded preparations for animal patients.
- D. To provide experience in designing a clinical pharmacology research project; undertaking research, investigation, and publication of the findings.
- E. To build a working knowledge of the regulatory aspects of drug use in animals and instill a strong sense of ethical responsibility in decision making regarding veterinary drug use.

II. Justification for clinical education

- A. A pharmacist's responsibility for providing patients with high-quality pharmaceutical care extends beyond the human species. Although colleges of pharmacy and licensing boards have focused almost exclusively on human pharmacotherapy, society and regulatory agencies expect an equally competent quality of pharmaceutical care and products to be provided for non-human family members and livestock. Veterinarians are well-schooled in providing quality care and products to animal patients, but few pharmacists are. Any pharmacist encountering veterinary patients, should be equipped with a working knowledge of veterinary pharmacotherapy and develop a clinically and legally sound algorithm for processing veterinary prescriptions. Because this curriculum is currently non-existent in the pharmacy profession, a specialty-training residency is urgently needed to prepare pharmacists to participate in the veterinary care team. Academic veterinary centers, drug companies, compounding pharmacies, and regulatory agencies have all expressed interest in hiring graduates from a veterinary clinical pharmacy residency program. Annual demand in these careers would approach 1-3 per year for academics (SVHP), 1-2 per year in veterinary specialty referral practices, 1-2 per year in colleges of pharmacy, 1-2 per year in captive animal non-profit organizations (zoos, aquariums, animal shelters, wildlife sanctuaries) 1-2 per year in regulatory departments (FDA), and 2-3 per year in commercial markets (veterinary pharmaceutical industry, compounding pharmacy industry), and 1-2 per year in professional organization councils (Pharmacy Compounding Accreditation Board, American College of Veterinary Pharmacy, International Academy of Compounding Pharmacists) . Historically, this residency has attracted 20-25 qualified applicants per year. This is the third established residency program in Veterinary Pharmacy for pharmacists and is currently in its third year (2012). The first veterinary pharmacy was established at Auburn University in 1989, which is not currently active, and the second at the University of California Davis, now in the 8th year of the program (2012).

The Veterinary Clinical Pharmacy Residency Program is designed to address these needs and provide non-degree postdoctoral education in veterinary pharmacy. Traditional PGY1 pharmacy residency programs are one year in duration, therefore this residency program will be a one-year program. Completion of the residency will fulfill the experiential requirement to be eligible to take the exam and be certified by SVHP as Diplomate, International College of Veterinary Pharmacy (DICVP). Successful completion of the residency will result in a Residency Certificate.

The program utilizes the facilities and faculty of the Veterinary Health Complex, College of Veterinary Medicine, North Carolina State University. A large clinical case load exists at the Veterinary Health Complex (VHC) to support a multitude of pharmacy services, including inpatient chart review, outpatient dispensing, nutritional support, sterile and non-sterile compounding, cytotoxic agent preparation, clinical drug study design and monitoring, drug information research, pharmacy consult for the practicing referral community, and drug utilization review including adverse drug event and medication error monitoring and reporting. The NC State College of Veterinary Medicine is currently ranked 3rd in the nation (out of 28 schools), and the NC State VHC Pharmacy has established a national and local reputation for providing outstanding veterinary pharmacy services and continuing education to veterinary practitioners, pharmacists, and pet owners. At least two Pharmacy Compounding Accreditation Board (PCAB) accredited compounding pharmacies are located in the Research Triangle Area, and these pharmacies would also potentially serve as rotation/training sites for these residents.

III. Residency Program: Courses of activities

A. Duration

This will be a one year residency program. A Certificate of Residency will be awarded to candidates successfully completing the program. Residents will be asked to work a minimum of 40 hours per week. Time off for sick leave and/or vacation will be according to established university policy (i.e. 2 working days/month). Hours may be extended as required for travel to externship sites or rotations in the field. Salary for this residency is consistent with other residency stipends at the College of Veterinary Medicine and is \$30,000 annually at the time of this printing. The benefits package accompanying this stipend is valued at an additional \$5,400. Residents also receive 11 paid holidays in addition to the 24 days of annual and sick leave.

B. General Scope and Nature of Training

In the first four months, residents will spend most of their time in the Veterinary Health Complex under the direct supervision of the two Veterinary Clinical Pharmacists and incidental mentoring by faculty service clinicians. Residents will spend approximately 50% of their time in clinical practice activities, rotating on each of the clinical specialty services, participating and leading clinical rounds in small and large animal clinics, and performing drug utilization review on hospitalized patients. Residents will spend at least two full weeks in each of the subspecialty areas of soft tissue and orthopedic surgery, internal medicine, behavior medicine, cardiology, dermatology, neurology, oncology, and ophthalmology, equine medicine and surgery, and exotic animal medicine. The remaining 50% commitment will be in the clinical pharmacy or clinical pharmacology laboratory precepting and rounding with pharmacy student externs and veterinary students; providing drug information; preparing sterile and non-sterile compounds and chemotherapeutic agents; designing, implementing and monitoring clinical drug studies; and participating in clinical pharmacy activities. Experiential rotations at other colleges of veterinary medicine (e.g. Exotic Animal Practice at the University of Florida

College of Veterinary Medicine) are also available during this residency. The resident will also spend time in the Pharmacology Laboratory at NCSU CVM learning basic analytical techniques (HPLC) or in vitro assays to assess drug potency and stability. An independent study consisting of a 4 module veterinary pharmacotherapy course covering drug information resources, anatomy and physiology, regulatory issues, and food animal therapy will be completed by the resident during the first month of the residency. Optional activities also include rotations at veterinary private practices, the United States Pharmacopeial Convention, the Food and Drug Administration, and other areas of interest to the individual candidate. Candidates are expected to produce a comprehensive portfolio describing the clinical activities and insights gained in each of these rotation experiences.

Starting no later than the beginning of the third month, residents will select a specialty area of emphasis based on their own interests and career goals. A research topic will be selected and the following nine months will be tailored to develop skills around that area. The research topic will be submitted to faculty mentors for approval by the end of the third month. Project proposal must be robust and of sufficient quality for acceptance by editorial boards of all major peer-reviewed medical journals. The resident must be first author on the final manuscript. Project results will also be presented at the annual House Officer's Seminar, and the annual meeting of the Society of Veterinary Hospital Pharmacists, both in poster format as well as a formal presentation. Project will also be eligible for presentation in the NC State Annual Research Forum. During the next four months, the resident will spend time at NCSU CVM and other approved sites to fulfill requirements necessary to complete this research project.

Throughout the residency, the candidate will accumulate a working knowledge of veterinary pharmacy legal and regulatory processes. While the majority of this learning will occur incidentally during daily dispensing activities, supplemental learning may be accomplished at any approved external sites such as veterinary pharmaceutical companies, the North Carolina Board of Pharmacy and Veterinary Medical Boards, the Pharmacy Compounding Accreditation Board, the United States Pharmacopeia, the Food and Drug Administration, the NC Department of Agriculture, and Animal Plant Health Inspection Service.

From the 3rd month on, the resident will spend time developing special interests and skills. The resident will also be involved in mentoring rotating pharmacy students and conducting clinical pharmacy rounds and leading a monthly Journal Club.

C. Time Line

Applications for the residency program are open in October of the year prior to the residency year and positions awarded by April 15 of the residency year. The residency training period begins on or about July 15 each year and ends on or about July 14 the following year. Residents in their first four months will start in the Inpatient/Outpatient pharmacy at the VHC, College of Veterinary Medicine, North Carolina State University, learning pharmacy operations, veterinary specific sterile and non-sterile compounding, cytotoxic drug preparation, and drug information. Students will learn the veterinary formulary and attend weekly rounds given by the Veterinary Health Complex., in both small and large animal services as well as several elective rounds in a subspecialty of their choice (ophthalmology, cardiology, oncology, etc.). Students will additionally select a drug information topic and learn how to critically evaluate peer-reviewed evidence. The topic will then be either presented orally at pharmacy rounds or Internal Medicine rounds or written up and submitted for publication to a peer reviewed journal. Students will identify an area of research interest by the end of the 3rd month. Topics will be highly flexible and based on the specific interests of the individual resident. Starting in the 5th

month of the residency program the student will learn the basic research techniques necessary to complete their research project. This will be done at the pharmacology/pharmacokinetics laboratory at NCSU CVM. Here students can learn a variety of analytical techniques (HPLC) to assess drug and metabolite concentrations or several in vitro cell culture models to assess drug efficacy. Alternatively, if their area of interest is involving drug manufacturing or compounding of formulations they will have the opportunity to develop these skills in the pharmaceutical laboratory at one of the North Carolina Schools of Pharmacy (The University of North Carolina at Chapel Hill, Campbell University or Wingate University). In the following 7-9 months the resident will design, perform and do data analysis on their research topic. They will write up results in abstract form for submission to the Annual Research Forum at NCSU, and will also present these findings in the form of a House Officer's seminar as do all NCSU CVM house officers, as well as at the annual meeting of the Society of Veterinary Hospital Pharmacists. Projects are also eligible for presentation at the annual NC State Research Forum. Research projects will also be written up for submission to and potential publication by a peer reviewed journal.

D. Knowledge and skills

The Pharm. D. level candidate will be provided with information and experience to apply their considerable skills in medical treatment of disease conditions, therapeutic regimen design, clinical trials, drug distribution and regulation, pharmaceuticals, pharmacology, kinetics, drug information sources and services, etc. in the provision of pharmaceutical services for animal patients.

Graduates of this program will have a unique combination of skills. Their knowledge of drug marketing, quality assurance, and clinical trial design, tempered with their veterinary experience will make them valuable assets to the veterinary pharmaceutical industry, regulatory agencies, colleges of pharmacy, and colleges of veterinary medicine.

IV. Structure and Organization

Residents will be supervised directly by Gigi Davidson, BSPH, DICVP, Director of Clinical Pharmacy at the NCSU CVM VHC Pharmacy and the senior faculty clinician during specialty service rotations. Others who will participate significantly in the resident's instruction will include Daniel Aber, BSPH, veterinary clinical pharmacist, who will oversee skills development in inpatient and outpatient veterinary pharmaceutical and compounded preparation dispensing to residents. Dr. Mark Papich, Professor of Pharmacology at NCSU CVM will oversee the clinical pharmacological and clinical drug research skills development for the resident. At the time of writing, the residency advisory committee consists of Steve Marks, DVM, DACVIM (Small Animal Internal Medicine), Teresa DeFrancesco, DVM, DACVIM (Cardiology and Critical Care), and Jennifer Davis, DVM, PhD, DACVIM, DACVCP (Equine Internal Medicine, Veterinary Clinical Pharmacology).

Graduate students in the Clinical Pharmacology service will oversee research design, methodology, statistical analysis and analytical chemistry techniques of residents.

The resident will have desk space and computer access at the VHC main pharmacy. Analytical equipment, chemicals and other required instrumentation to complete their research project will be available in either the Pharmacy or the Pharmacology laboratory at NCSU CVM.

V. Faculty participating in the proposed program

In addition to the faculty mentioned above, residents will be mentored at times by all clinical faculty at the NCSU CVM VHC as well as faculty from the surrounding colleges of pharmacy.

VI. Process of evaluation

Residents will be evaluated based on several criteria. Requirements that must be met before a resident can receive a Certificate of Residency for the program include: 1) Satisfactory completion of all rotations, 2) Satisfactory completion of the research project, 3) Satisfactory completion of the externships, 4) Determination that all requirements have been met by the Director of Clinical Pharmacy Services. Attendance is mandatory for the entire program. Poor attendance will be grounds for dismissal. Residents must complete all requirements in order to obtain a Certificate. VHC policy will be followed in cases where dismissal is required for any resident.

VII. Certification

The specific academic requirements and conditions needed to complete the residency and obtain a certificate include:

- 1) Demonstration of competent knowledge and skills in:
 - dispensing veterinary pharmaceuticals to a variety of species
 - preparation of sterile dosage forms including IV fluids, TPN, chemotherapy, unit doses
 - compounding of sterile and non-sterile pharmaceutical preparations for use in veterinary medicine
 - performing drug utilization review for veterinary patients
- 2) Demonstration of competence in:
 - Location/evaluation/critical assessment of drug information in the veterinary literature
 - extrapolation of available drug information to the veterinary patient where appropriate
 - clinical consulting
- 3) Satisfactory completion of clinical rotations and completion of portfolio documenting therapeutic plans for a minimum of 5 disease states in each of the following specialties:
 - Small Animal Internal Medicine
 - Neurology
 - Dermatology
 - Cardiology
 - Ophthalmology
 - Oncology
 - Small Animal Orthopedic surgery
 - Small Animal Soft Tissue Surgery
 - Large Animal Internal Medicine
 - Large Animal Orthopedic Surgery
 - Large Animal Soft Tissue Surgery
 - Exotic Animal PracticeOther specialty rounds (e.g. Behavior medicine, Wellness, Food Animal Medicine and Surgery)
- 4) Preparation, completion and submission of a research project showing proficiency in:

-strength of hypothesis

-research design

-methodology

-statistical analysis

-scientific writing

5) Demonstration of competence in legal, regulatory and ethical issues including:

-drug use in food animal species

-preparation and disposition of compounded preparations in animal species

-pharmaceutical waste and disposal

-monitoring and disposition of controlled substances

-drug prohibitions in performance animals

6) Demonstration of competence and effectiveness in teaching skills including:

-leading rounds and journal club with pharmacy student externs

-leading rounds and journal club with veterinary students and house officers

-presenting continuing education and scientific seminars to all faculty, staff and students of the VHC and other veterinary health care sectors.

Budget:

First Year Resident Salary 30,000

 Plus Benefits 5,400

One Year Total 35,400

Contact Persons:

Gigi Davidson, BSpH, DICVP

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Application Process:

Beginning in October of the year preceding, applicants can follow this link to the application process:

http://www.fis.ncsu.edu/hr/job_applicants/

Application materials include:

Application

Curriculum vitae

3 letters of recommendation

Transcripts (accredited schools of pharmacy)

Letter of interest

VETERINARY PHARMACY RESIDENCY PROGRAM

July 15 through July 14

<u>Month</u>	<u>General Duties</u>	<u>Monthly Rotations</u>	<u>Projects</u>
1	Pharmacy	Inpatient/Outpatient	Operational proficiency Completion of 4-Module Independent Study Journal Club and Rounds with pharmacy students
2	Pharmacy (Compounding)	Various Services	Portfolio Explore research topic
3	Pharmacy (Sterile)	Various Services	Portfolio Finalize research topic
4	Services	Various	Portfolio Research project
5	Services	Various	Portfolio Research project
6	Services	Various	Portfolio Research project
7	Research	Research	Research
8	Research	Research	Research
9	Data analysis	Statistician/Librarian	Write-up results
10	Externship	Externship	Outside agency
11	SVHP Meeting	SVHP presentation	Poster, PowerPoint, Presentations
12	Pharmacy	Wrap up/Competency assessment	Residency Completion