Wildlife Rehabilitators of North Carolina

NEWSLETTER FOR WILDLIFE REHABILITATORS OF NORTH CAROLINA

Secrets Of Medical Math by Mark Pokras, DVM
(Reprinted with permission from The NWRA, from Wildlife Rehabilitation, Vol. 6, 1987)

INTRODUCTION

1. One cubic centimeter (cc) = one milliliter (ml)

2. SID = once daily   QID = four times daily
   BID = twice daily   q6hr = once every 6 hours
   TID = three times daily   q3d = once every 3 days

3. Rough Equivalents:

   15 drops = 1 ml   1 pound (lb) = 450 gm
   1 tsp   = 4-5 ml   1 quart   = 1 liter (well, almost)
   1 Tbsp   = 15 ml   1 cc weighs 1 gm
   1 fluid ounce = 30 ml   1 ounce   = 30 gm
              1 teacup full = 4 fluid ounces   = 120 ml
              1 glass full = 8 fluid ounces   = 240 ml
   15 grains (gr) = 1 gram (gm)   1 grain   = 65 milligrams (mg)
   1 kilogram   = 2.2 lbs.   1 pound = 0.45 kg (a tad less
   1000 ml   = 1 kilogram (weight)   than ½ kg)

4. Metric Prefixes
   kilo   = 1000

Next General Meeting of WRNC:

Where: APS of Orange County in Mebane, NC

When: Sat, January 12, 2002, at 12 noon

Directions: Take exit 154 (Mebane Oaks Rd) off I-40/I-85 and proceed south approx 6 miles on Mebane Oaks Rd. Turn left on Nicks Rd. APS will be 0.5 miles on the left.

milli = one one-thousandth (1/1000)
centi = one one-hundredth (1/100)

5. Fractions and Decimals

½	= 0.5	¼	= 0.25
¾	= 0.75	1/10	= 0.1
1/100	= 0.01		

6. Routes of Administration (how you are going to give a drug)
    IV = intravenous (in a vein)
    IM = intramuscular
    SQ = subcutaneous (under the skin)
    IP = intraperitoneal (in the abdominal cavity)
    IC = intracardiac (in the heart)
    A collective term sometimes used for all these routes that go through the skin is *parenteral*
    PO = per os = by mouth
    gavage = by stomach tube
    inhalation = drugs inhaled as a gas or a fine mist
    topical = local application = drugs painted, sprayed or otherwise applied to skin or mucous membranes

7. Solutions (some liquid medications come this way).
    If you remember that one ml (of water) weighs 1 gm or 1000 mg, you won't have any trouble figuring these out for yourself.
    1% solution = 10 mg/ml
    10 % solution = 100 mg/ml

The basic units which you must understand in order to do medical calculations are the *liter* and the *gram*. The *liter* is a unit of volume for liquids. A liter is defined as a cube of water 10 centimeters (about 4 inches) on a side. Now, if we want to find the volume of a cube, we must multiply the length of one side by the length of the second side by the length of the third side. For our liter, this would mean multiplying 10 cm x 10 cm x 10 cm. The answer, then, is that the liter contains 1000 cubic centimeters (cc). We also know that a liter of water weighs 1000 grams or 1 kilogram.

Ah-ha!! 1000 cc weighs 1000 gm, therefore 1 cc weighs 1 gram. So a gram is the weight of a cube of water 1 centimeter on a side – or about ½ inch by ½ inch by ½ inch.

Many drugs come in units of milligrams. There are 1000 milligrams in one gram... so a milligram is a very tiny amount of material. (For those with a mathematical bent, you have probably already figured that there are 1000 x 1000 milligrams in a liter – that's one million!)

PROBLEMS

1. Your veterinarian tells you to give a Red-tailed Hawk 25 milligrams (mg) of ampicillin twice daily. You look at the bottle and it says that it holds a liquid which contains 100 mg per cc. How much of this liquid do you give your patient?
OK, No problem; we want 25 mg, and 1 ml contains 100 mg. That means that ½ ml contains half of a hundred, or 50 mg; and a quarter of a ml contains 25 mg – just what we want to give the red-tail – 1/4 ml BID.

CONTINUING EDUCATION

IWRC 24th Annual Conference in Lake Buena Vista, Florida, November 14-17th.

A Basic 1AB Skills Seminar will be held Nov 13th & 14th, prior to the Conference. The following IWRC Advanced Skills Seminars will also be offered:

Wound Management	Nov 13th
Avian Physical Therapy	Nov 13th
Initial Care/Physical Exam	Nov 14th
Wildlife Information Services	Nov 13th & 14th
Project Wild Facilitator Training	Nov 14th

NWRA's annual symposium and 20th year anniversary will be held in St. Louis, Missouri on March 5-9th, 2002.
Field trips and seminars offered on the 4th.

Carolina Raptor Center is planning the annual rehabilitation seminar for early February 2002. Please contact CRC if you want to be on the mailing list for information.

Wildlife Care Center of Virginia is holding their annual "Call of the Wild" Conference November 10-11th in Harrisonburg, VA. Contact them at 540-942-9453 for more information.

RABIES

In the next few weeks, Peter Cowen, DVM, Ph.D. of NC State College of Veterinary Medicine, Dept of Farm Animal Health and Resource Management will send out a Rabies Vector Survey to all licensed wildlife rehabilitators in North Carolina. Please take the time to answer and return the survey.

Wanted
Information on Sightings of Color-marked Red-tailed Hawks

The four outermost secondary feathers on both wings have been dyed green, pink, or yellow. Please record the following information:

Your name, address, phone # and mailing address, Date and time of day, Location (state, county, locality), Age of bird Right and left wing dye colors, Behavior of bird – hunting, perching, nesting, etc.

Report all sightings to Wildlife Information Center
P.O Box 198
Slatington, PA 18080
Phone or fax at 610-760-8889, email at wildlife@fast.net

Dear WRNC Member

Enclosed with this newsletter you will find the first edition of the WRNC membership directory. We tried to make every effort to check the information contained for accuracy. Please note that this directory contains all members from 2000 and 2001.

If you would like additional information published in future directories, please contact Carla Johnson at the WRNC address on page 1 of this newsletter.

We apologize for the long delay in completing this first directory.

Disclaimer The opinions, techniques, and recommendations expressed in the articles of this newsletter are those of the author(s) and do not imply endorsement by WRNC.

Selected Notes, Part two, from the NWRA symposium, March 2001 by Mathias Engelmann
(These notes are by no means meant to be a complete summary of each presentation. Look for the proceedings to be published by the NWRA in 2002 with selected, complete papers)

- **Eagles – Yellow-heads and White-heads** – Grounded Eagle Foundation, MT – Ken Wolff

He has treated 300 eagles since early 1980's, 88 in 1999 & 2000 alone! Bald Eagle (BAEA): Golden Eagle (GOEA) ratio is about 5:3. 70% of the birds are released. Most are struck by vehicles, occasionally electrocuted. Ken often houses the two species together and has had only one casualty so far - a large female GOEA accidentally put a talon into the skull of an adult BAEA.
Food is not a problem for his center. A local stretch of highway supplies him with 1000 deer a year. Ken has been getting quite a few young BAEA's from Alaska for exercising. They are usually shipped back for release. He states that the paperwork associated with the transfers is a nightmare. The center has one eagle flight cage, L-shaped, 160' long from perch to perch., two large cages (12 x 48' and 12' x 80') and 7 small flights (8' x 8' to 16' x 24'). Surgical facility is on site. Ken exercises birds several times a day and does not have problems with eagles injuring themselves in the cages.

- **Popodermatitis and Wound Management in Raptors** – Louisiana State University, Mark Mitchell, DVM   (Popodermatitis is the medical term for bumblefoot)

Wound assessment – extent and tissues involved; remove (cut) surrounding feathers; remove devitalized tissues that may slow healing process; clean with saline, dilute chlorhexidine or Nolvasan (Trade name), or dilute iodine.

Pain management – Lidocaine for local, general anesthesia, or butorphanol

Popodermatitis
- Type 1 - mild, localized, thin epithelium (worn pad), scab
- Type 2 - bacterial infection, heat swelling
- Type 3 - chronic infection involving tendons, ligaments, joints; poor prognosis

Treatments – antibiotics, topicals, surgery, treat as open wound once clean. Uses wet-to-dry bandages in infected wounds, hydrocolloid dressings such as Replicare or Granulex, and live yeast derivatives (preparation H). Uses a new product, VetBioSISt, a single-layered derivative of porcine submucosal small intestine, a graft that is sutured into place. Also uses antibiotic-impregnated polymethylmethacrylate agents, rolled into beads and sutured into wound. Beads must eventually be removed. Beads are made with mixture of Gentamicin and polymer powder or Oxytetracycline and polymer powder. Gas sterilize beads before using them – caution – not all antibiotics can withstand gas sterilization.

- **Skin Allografts in Red-tailed Hawks (RTHA's)** – Auburn University, Paige Ruoff

This ongoing project will involve 10 non-releasable donor RTHA's and 10 RTHA's with wounds that are too large to close. All fractures or other wounds are healed before the procedure. Harvesting is done under anesthesia and the skin is placed onto a sterile piece of cardboard. The graft receives slits cut in parallel, staggered rows. During suturing, the graft is stretched to open the mesh holes. This creates more surface area for interaction and healing. Pay attention to feather direction when

Two vultures board an airplane, each carrying two dead raccoons. The stewardess looks at them and says, "I'm sorry, gentlemen, only one carrion allowed per passenger."

placing grafts. Tacking sutures are placed in several of the mesh openings to keep the graft in contact with the wound. Bandages are changed daily for 20 days!

Of the first four cases they have treated, three healed well within 28 days and the fourth bird died shortly after surgery.

There are three types of grafts:

- autogenic – the graft is removed from another part of recipient's body
- allogenic – the graft is removed from the body of another individual of the same species
- velogenic – the graft is removed from the body of another individual from another species

Medical Math *Continued from page 2*

2. You want to use amoxicillin to treat an infection in a herring gull. The drug comes in 50 mg, 100 mg, and 200 mg tablets. The bird weighs 1 lb. The dose of drug you have been told to use for this animal is 25 mg/kg as a daily dose, given BID.

   How are you going to figure this out? First of all, let's convert everything to the metric system; a one-pound bird weighs 0.45 kilogram or 450 grams (just under ½ kilo). Now if your daily dose is going to be 25mg/kg and your bird weighs about ½ kg, the dose per day will be ½ of 25 = 12.5 mg per day. 12.5 mg is 1/16 of a 200 mg tablet, 1/8 of a 100 mg tablet or ¼ of a 50 mg tablet. Obviously it will be much easier for you to use the 50 mg size and just cut the tablet in quarters.

   Now remember that a quarter of a tablet is a *daily* dose. To give this as a BID medication, you'll have to give ½ of that quarter tablet at 12-hour intervals. That's not so hard, is it?

3. You'd like to calculate the caloric needs of a 7 lb opossum that you're caring for, so you know how much food it should be eating. There are a series of formulae you can use to calculate Minimum Energy Cost (MEC) for different animals. (This is the daily energy that a healthy adult animal would need simply to keep its basic body processes going.)

   To do this we're going to have to use a tiny bit more complicated math … but by now I know that you can handle it!

   With any luck, you can remember the concept of powers and roots from high school. If not, let's see if I can explain it. Let's start with a power called the square. That simply means that you take any number and multiply it by itself; no big deal, right?

   So the square of 2 = 2 times 2 = 4. Another way to write this is $2^2 = 4$. Let's try another; 5 squared = $5^2 = 25$. Everyone all together? Good! Now remember that you can do this with any number; so ½ squared = $½^2 = ½ \times ½ = ¼$; and 0.5 squared = $0.5^2 = 0.5 \times 0.5 = 0.25$.

   Now that we all understand the concept of square as a power, let's try the *square root*. This simply means finding two identical numbers which, when multiplied together, will give you whatever number you started with. A bit vague? Well, if the square of 2 is 4, then the square root of 4 is 2!

   The square root of 9 is 3 (3 x 3 = 9); the square root of 100 is 10 (10 x 10 = 100).

   Unfortunately, square roots aren't something you can generally work out in your head; they are rarely even numbers (for example, the square root of 22 = 4.69). But with the advent of modern technology you're in luck! Virtually every pocket calculator over $5 has a square root button.

It looks like this $\sqrt{}$. So all you have to do, would be to hit the number you want (127), hit the square root button ($\sqrt{}$), and come up with the answer: (11.27).

Needless to say there are lots more of other powers and roots. A number *cubed* is that number multiplied by itself 3 times... 4 cubed = 4^3 = 4 x 4 x 4 = 64. The *cube root* of 125 is 5 ... $\sqrt[3]{}$ 125 = 5 (you can confirm that by multiplying 5 by itself 3 times and see it is = 125). You can also do fractional powers and roots (for example $2^{4.5}$ = 22.63). But for these esoteric things you need to make sure your calculator has buttons like x^y or $x^{1/y}$.

Meanwhile, back to our opossum. There is a series of formulae that we use to calculate MEC energy requirements. At first these may appear a bit intimidating, but it's really just a bit of multiplying and doing powers on your calculator. The formula that we use for marsupials is:

49 x (weight) $^{0.75}$ = energy per day required, in kilocalories (kcals = calories)

Other animal groups involve use of a different "constant" but always times (wt. in kg) $^{0.75}$.

Passerine birds:	129x...
Non-passerine birds:	78x...
Placental mammals:	70x...
Reptiles:	10x... (at a constant high environmental temperature - +/- 30 °C)

Don't get scared off by the symbol for the 0.75 power. That's the same as saying the ¾ power... or multiplying the weight (W) by itself 3 times then taking the square root twice. You can do this in 10 seconds on any good pocket calculator. But it does help if you have a button labeled "x^y" or "y^x" for doing powers directly.

For our 7 lb. opossum; 7 lbs = 7 divided by 2.2 (remember 1 kg = 2.2 lbs) = about 3 kg. So let's work the formula. First take 3 (weight in kg) to the 0.75 (or ¾) power. My calculator works like this: hit 3, hit x^y, hit .75, hit = .. and get 2.279 (call it 2.3). Now multiply 2.3 times the constant for marsupials (49) and get 2.3 x 49 = 112.7 kcals per day as its *minimum* energy requirement.

What's the MEC for a 1 kg hawk? (It helps if you remember that 1 to *any* power is still 1) 78 x (1) $^{0.75}$ = 78 x 1 = 78 kilocalories per day.

For a 5 kg red fox? 70 x (5) $^{0.75}$ = 70 x 3.4 = 234 kcals per day.

For an 80 gm Blue Jay? 80 gm is less than a kilogram ... it's 80/1000, or 0.08 kg (go ahead, check it on your calculator!) 129 x (0.08) $^{0.75}$ = 129 x 0.15 = 19.4 kcals per day.

For those of us on diets:

For a 110 lb person? First, 110 lbs = 50 kg; and of course we are placental mammals. 70 x (50) $^{0.75}$ = 70 x 18.8 = 1316 kcals.

For a 200 lb person? 200 lbs = 91 kg 70 x (91) $^{0.75}$ = 70 x 29.4 = 2060 kcals.

A FEW MORE PROBLEMS
1. Pounds to kilos
    a. 1 lb = 0.45 kilos
    b. 4lb = 4 x 0.45 = 1.8 kg

c. 7.5 lb = 7.5 x 0.45 = 3.375 kg

2. Kilos to Pounds
   a. 1 kilo = 2.2 lbs
   b. 4 kilos = 4 x 2.2 = 8.8 lbs
   c. 7.5 kg = 7.5 x 2.2 = 16.50 lbs

3. Grams to Kilos and Back
   a. 1000 gm = 1 kg
   b. 1 gm = 0.001 kg
   c. 10 gm = 0.01 kg
   d. 25 gm = 0.025 kg
      1.000 kg = 1000 gm
   e. 0.125 kg = 125 gm
   f. 1.425 kg = 1425 gm
   g. 0.03 kg = 30 gm

4. Percent to Grams and Back
   a. 10 % = 100 gm per ml
   b. 57 % = 570 gm/ml
   c. 132 gm/ml = 13.2%

5. Scaling With The ¾ Power (3/4 if 0.75 not available)
   a. 2 to the ¾ power = 2 x 2 x 2 (= 8)…take square root twice: 2.8 … **1.68**
   b. 3.5 to the ¾ power = 3.5 x 3.5 x 3.5 (= 42.87) … take sq root twice: 6.55 … **2.56**
   c. 0.250 to the ¾ power = .25 x .25 x .25 (= 0.0156) …sq root twice: 0.125 … **0.354**

AN IMPORTANT FINAL NOTE

The MEC you've just calculated is *not* necessarily the number of calories you'll have to supply to a patient. In most cases you must supply more energy. This is because few animals really operate at their *minimum* level. So we usually use the following correction factors:

Animal At Rest	1.3 – 1.5 x MEC
Animal With Injury	1.5 – 2.5 x MEC
Animal After Surgery	1.5 – 2.5 x MEC
Actively Exercising Animal	2-6 x MEC (depends on how much exercise)
Growing Young	1.3 – 3 x MEC (depends on how fast they grow)

Well, good luck. You now have the basics well in hand -- all you have to do is use these concepts until they are second-nature to you.

ACKNOWLEDGMENT

Juvenile bald eagle recaptured by Mathias Engelmann

Chances are you have seen or heard reports about the juvenile bald eagle "harassing" people at the New England coast in August. The bird was apparently very interested in chasing after footballs and similar flying objects. Unfortunately, two people were slightly injured before the bird was captured by authorities. Local wildlife biologists speculate that people had been feeding the bird and that it began to associate people, and especially anything that people toss in the air, with food.

This bird was originally captured in Kernersville, NC, on May 17th, 2001, after apparently suffering a mild concussion. It was rehabilitated at Carolina Raptor Center and released on July 25th, 2001.

When CRC staff first heard about the eagles' behavior, we were as surprised as most people. During the rehabilitation process it had never shown any unusual behavior and certainly never tried to approach humans. Preventing habituation and imprinting (in young birds) is an essential part of wildlife rehabilitation, and staff and volunteers at CRC make every effort to keep birds as wild as possible

The bird was taken to Tufts Wildlife Clinic in Massachusetts for evaluation. After consultation with the US Fish and Wildlife Service, the eagle was transferred to Earth Quest in Georgia to be used in educational programs. Release back into the wild is not out of the question, however – staff at Earth Quest will try to live-prey train the bird at some point, which would be one step towards release.

Regional Meetings

A report from the meeting of western NC rehabilitators during the spring of 2001 is in the works and will appear in the next issue.

The central regional meeting was held on March 10, 2001 in Winston-Salem, NC and was attended by 15 people. Topics of discussion included: the wildlife rehab center at the Asheboro zoo, rehab classes offered by Wildlife Rehab Inc. in Winston-Salem and Wildlife Welfare, Inc. in Raleigh, falconry workshop held in May 2001, court verdict in the case of a falconry bird being shot in Wilkes county, and the research being done in the southern Appalachian mountains on the saw whet owls.

At the September WRNC board meeting the need for regional meetings and educational opportunities was discussed briefly by a few attendees. All of us realize that the general meetings held in the center of the state are not accessible to everyone.

If you would like to see more happen in your part of North Carolina as far as meetings or workshops are concerned, GET INVOLVED! Talk to other rehabilitators and talk to the closest local WRNC board member about organizing a meeting.

Book Review by Lisa Borgia, President of the National Wildlife Rehabilitators Association (NWRA)

National Audubon Society's "The Sibley Guide to Birds" by David Sibley, 2000, Alfred A. Knopf, Inc.

This book boasts on the back cover that it is "North America's definitive guide to birding," which is quite a statement given that there are several field guides on the market today. Many well-respected naturalists have written birding guides that are fixtures on bookshelves across the nation. So what makes this book the definitive guide?

The answer is found in David Sibley's approach to identification of birds and his skill at illustrating his avian subjects. Sibley provides more than 6,600 carefully rendered and detailed illustrations of the 810 species described in this comprehensive book. The illustrations show many previously unpublished field marks and revisions of known marks and gives details of different plumage variations. For example, the Eastern Screech-Owl description includes eleven illustrations describing three color variations, the difference between fledgling and adult coloration, and two variations in flight from both top and bottom. Other species descriptions include adult breeding and non-breeding plumage for both sexes, with different stage juvenile variations, as well.

But the rich illustrations are only one facet of this multi-stage approach to complete bird identification. The book prefaces each group with a comparison page, which shows each member side-by-side in relative scale with a detailed textual description. This allows for comparison of similar species for easier differentiation. The individual species identification includes range maps, foraging habitat description, voice detail, and illustration of different behaviors.

Rehabilitators will find this volume useful not only for the detailed species descriptions, but for the extensive natural history background included in the first twenty pages. Anatomy of passerines, shorebirds, ducks, and gulls are illustrated. The molt cycles of passerines are summarized in an understandable fashion.

Sibley provides a very comprehensive and user-friendly identification tool for anyone who wants to know what species of bird he or she are observing. This guide, accompanied by "The Birder's Handbook : A Field Guide To The Natural History of North American Birds" (Paul R. Ehrlich, David S. Dobkin, and Darryl Wheye, Simon & Schuster Inc.) supply a fairly complete species account for the rehabilitator's library.

A summary of Dr Laurel Degernes' talk on West Nile Virus and emergency care of injured birds, given at the last WRNC general meeting, will appear in the next issue of the newsletter.

WRNC LOGO

Dear Members

You have probably noticed the logo at the top of page 1 of this newsletter. It's the official WRNC logo! Thanks to graphic designer Cheryl Williams of Mint Hill, NC, for donating her expertise.