Interactions between Immune and Neuroendocrine Systems
by Arthur J. Vander, M.D.

Editor's note: This summary, written by Dr. Elaine Marieb, recaps a lively talk by Dr. Vander, who was the Keynote Speaker at the banquet during the 1991 HAPS Conference in Greenville, SC.

After beginning his talk with a few humorous observations about HAPS and the field of physiology, Dr. Vander indicated that his goal for the evening would be more to create questions in the minds of the membership than to answer them, relative to his timely topic.

Dr. Vander first defined a few terms related to the topic of immunity and then briefly reviewed some notes concerning the effect of stress on the immune response. Pertinent points made were that stressors typically promote a reduction in the numbers of killer (cytotoxic) T cells and that taste aversion studies had indicated a suppression of the immune response could be conditioned. This strongly implies communication between the nervous system and the immune system.

Several interactions between cytokines, chemicals produced by immune cells or APCs (antigen presenting cells) such as the interleukins, interferons, etc., and the neuroendocrine system have come to light:

1. Lymphoid tissues have autonomic innervation.
2. Leukocytes and macrophages have abundant receptors for neurotransmitters and hormones.
3. Blood-borne cytokines influence both the CNS (brain) and endocrine organs.
4. Cytokines are also synthesized in the brain and probably serve as neurotransmitters and/or neuromodulators.

Since they were discovered, large numbers of cytokines have been characterized. They function as hormones to mediate adaptable responses to stressors that enhance survival. Although the cytokines mentioned by Dr. Vander included twelve interleukins, several interferons, tumor necrosis factor, and GM-CSF, he chose to expand on the effects of just one of these, interleukin I (II-1), which at various times has also been called lymphocyte activating factor (LAF), leukocyte endogenous mediator (LEM), and endogenous pyrogen (EP). Among the direct or indirect systemic responses to II-1 during the acute stress phase listed were: fever, fatigue, loss of appetite, increased ACTH and neuropeptide secretion, release of acute phase proteins by the liver, sequestering of zinc and iron (making these minerals unavailable to bacteria), enhanced capillary permeability, lymphpopenia, and increased synthesis of bone marrow growth factors.

Interestingly, it was then discovered that (1) if blood from a feverish animal was injected into another animal, the blood recipient also became feverish, and (2) if macrophages from the first animal were injected into another (non-feverish) animal, they induced synthesis and release of II-1 in the recipient. II-1 is considered to be the physiological cause of fever because if its effects are blocked, fever does not ensue. However, a whole host of other pyrogenic cytokines are secreted during the acute phase including TNF, II-6, II-2, alpha and gamma interferon, and lymphotoxin. The interactions between II-1 and the other cytokines are complex and tightly intertwined.

[continued on page 3]
1992 Conference - June 6-11

Registration

For members of HAPS, the registration fees for the week will be $150; for non-members, registration is $200. Registration for the seminar sessions only on Sunday and Monday or for the Workshops on Tuesday through Thursday will be $90 for members and $110 for non-members.

Tentative Schedule

Saturday, June 6  Registration and reception
Sunday, June 7  Seminars at Hanalei Hotel
Monday, June 8  Seminars at Hanalei Hotel, HAPS Banquet
Tuesday, June 9  Workshops at Mesa College
Wednesday, June 10  Workshops at Mesa College (am);
                    Optional Tours of Zoo, Wild Animal Park or SeaWorld (pm)
Thursday, June 11  Workshops at Mesa (am); Conference ends at noon
Friday, June 12  Optional Tours

Hotel

Rooms at the Hanalei Hotel will be $72 single or double occupancy per day, and these rates will be extended 3 days before and after the conference dates. Reservations can be made by calling 1-800-854-2608 (in California 1-800-524-6082).

Airline

The official airline for the HAPS Conference is American Airlines. Call 1-800-433-1790 for full details and ask for STAR file #0162V3.

Rental Cars

Reservations for special-rate Hertz rental cars may be made by calling 1-800-654-2240 and asking for CV#3375.

-- Shirley A. Mulcahy
1992 Conference Coordinator
San Diego Mesa College, Biology Department
7250 Mesa College Drive, San Diego, CA 92111
Phone (619) 627-2787 (This is a new number!); FAX (619) 279-5668

Behind the Scenes Tours

Special tours for educators have been arranged for the San Diego Zoo ($24), Wild Animal Park ($24) and SeaWorld ($16). Costs are approximate and include bus fare.

[continued on page 4]
Vander

Continued from page 1

As his next topic, Dr. Vander reviewed the classical pathway by which a stressor stimulates the release of glucocorticoids, notably cortisol: stress → hypothalamus → CRH → anterior pituitary → ACTH → adrenal cortex → cortisol. He then revealed that IL-1 (and possibly TNF) stimulate ACTH secretion by the anterior pituitary, and that lymphocytes, activated by bacterial endotoxin, viruses, and/or tumor cells, also secrete ACTH. Hence, the immune system interacts with the neuroendocrine axis to promote ACTH release, and at least part of the ACTH released during infections arises from lymphocytes rather than as a product of the classical hypothalamic-pituitary-adrenal cortex pathway.

Although initially this appears paradoxical because cortisol inhibits cytokine release, antagonizes their effects, and suppresses inflammatory and immune responses in general, it appears that the cortisol-cytokine interaction ensures that the immune system does not get out of control. Clinically, these findings have resulted in (according to Dr. Vander) "a wonderfully bizarre situation" in which about half of the involved clinicians are trying to figure out how to give IL-1 and TNF to help people fight off disease and the other half are trying to figure out how to block their effects because vigorous responses can debilitate or even kill people.

Dr. Vander’s final comments related to some effects of other hormones: (1) leukocytes secrete growth hormone (GH) which, in turn, enhances responsiveness to glucocorticoids; (2) prolactin enhances immunity in males (the role of PRL in males has been obscure); and (3) vasopressin affects memory.

--- reported by
Elaine Marieb, Ph.D.
Holyoke Community College
Holyoke, MA 01040

NOTE-SWAPPING

Editor’s note: "Note-Swapping" originally appeared in The Teaching Professor, February 1990 (Magna Publications, 2718 Dryden Drive, Madison, WI 53704-3086; 608-246-3580). It is reprinted here with the permission of the publisher.

The practice sounds sinister, of dubious ethical merit. In fact, it’s one of 53 Interesting Things to Do in Your Lectures proposed by Graham Gibbs, Sue Habeshaw and Trevor Habeshaw in a small book published in Great Britain (difficult -- and costly -- to obtain in the United States).

The swap in this case occurs at the end of class or after each major content chunk. Give students a few minutes to trade notes with someone nearby. The exchange lets students see what somebody else saw as the main points, how they differentiated between major and minor points, what drawings and details they chose to include and what facts (if any) they missed or misunderstood.

The benefits are even greater if you give students the opportunity to chat about what appears in each other’s notes -- and why. Encourage them to discuss material noted by one student but not by the other. They should talk about proportion and detail. What are the main ideas? They should identify written material that seems incomplete or unclear. After the discussion, allow them an opportunity to correct, revise and otherwise clarify notes, as well as a chance to raise questions about disputed issues with the entire class.

The swap takes time, probably the last 10 to 15 minutes of the period, if all the benefits are to be realized. It probably can’t be used every day -- but what a good idea for every now and then! Faculty regularly complain about the way students take and use notes. Students regularly report they haven’t been taught how to take notes. The swap idea teaches students something about note-taking and forces them to review course material before they’ve had a chance to forget what it means.

HAPS News is published four times a year by the Human Anatomy and Physiology Society (HAPS). Papers for publication, requests for information, positions available and wanted, and letters to the editor are welcomed. Send a double-spaced typed or printed copy together with your name, position, address, phone number, and school affiliation to the Editor. HAPS News is created in Microsoft Word on a Macintosh computer. Your editor appreciates receiving files on 3.5” microdisks or 5.25” double density PC disks. Please identify your software and hardware.

Because your Editor is suffering from Severe Overload Syndrome (SOS), this issue of HAPS News comes to you in late January rather than early December (as planned) and without the benefit of review by the Editorial Board. Numbers 3 and 4 will appear in March and May, respectively.

HAPS News January 1992 page 3
TOURS (continued from page 2)

San Diego Zoo
Among its 100 acres and 5000 species of exotic plants covering the expanse of the park will be found the world's rarest collection of animals. Tiger River is a three-acre tropical rain forest zone featuring tigers, tapirs and crocodiles. The new Sun Bear Forest features these long-clawed, pigeon-toed bears, the smallest in the world, residing in a one and a half acre enclosure. There also are lions, elephants, giraffes and other animals from around the world, all exhibited in moated enclosures without bars that resemble the animals' natural habitats. The two-hour tour includes one guide for 40 people, an hour-long bus tour on a reserved bus, and a visit to two back areas where you will see how the Zoo feeds, houses and medically cares for many of its inhabitants.

Sea World
This world-famous marine park, the second most popular attraction in California, is decorated by acres of beautiful flowers and palms. You can discover its many tropical lagoons and exotic birds as you stroll along winding walkways or experience the excitement of a journey to Antarctica at the Penguin Encounter. Dolphins and whales are in a special petting pool and the new Shark Exhibit enables you to see sharks up close. You can sit down to enjoy the famed Sea World Shows, starring Shamu, the Killer Whale. Educators will be taken behind-the-scenes to observe the veterinary care and training of some of the animals. The price includes a 1.5 hour in-depth tour for educators only, and allows you to stay in the park the rest of the day. Family members may pay the same admission ($16 versus a regular admission of $24) and remain in the park for the entire day also.

Wild Animal Park
It's only 30 miles north of San Diego, but you'll believe you're on another continent when you enter this park. Recognized the world over for its wildlife conservation efforts, this 1800-acre sanctuary simulates the wild sweeping plains and savannas of Africa and Asia--habitats for the 3600 untamed animals that roam freely throughout the preserve. The two-hour tour includes a 50-minute safari aboard a quiet monorail with an informative guide to help you identify the animals, admission to the bird and elephant shows, a visit to the petting kraal, with an opportunity to hike the Kilamanjaro Trail, in addition to special visits to the feeding and medical areas.

HAPS LOGO
During the Greenville conference, the Executive Committee decided to have a logo developed for the Society by asking members to submit their suggestions for a design. The designs submitted will be judged by a committee of six and a small number of finalists published in HAPS News along with a ballot for voting. The person whose design is selected by the membership will have his or her registration fees paid for a future HAPS conference. The Executive Committee would like a logo that represents both anatomy and physiology. The contest is open to all members of the Society except persons presently on the Executive Committee, Logo Committee or the newsletter editorial board.

Persons interested in participating in the design contest should place their design on a 3 x 5 card and send six of the cards (copies of the original) to Dr. Richard E. Welton, Department of Biology, Southern Oregon State College, Ashland, OR 97520. An individual can submit only one design. The six cards will be distributed to committee members for judging. Deadline for receipt of designs is March 1, 1992.

From Whence We Came?
The 159 people who attended the '91 conference in Greenville represented 41 states and the province of Ontario, Canada. Georgia, Illinois, Michigan, and South Carolina each sent 10 or more participants. Four to eight conference travelers from Kentucky, Maryland, Missouri, New York, Pennsylvania, Tennessee, Minnesota, Virginia, California, Florida, Texas, North Carolina, Wisconsin, and Ohio.

-- Karen LaFleur

Bill Belzer has a few fetal pig videotapes still available. The tape was described in HAPS News, Vol. 3, No. 1 (September, 1991). Send requests to:
Bill Belzer
Biology
Clarion University of Pennsylvania, Venango Campus
1801 West First Street
Oil City, PA 16301-3297

HAPS News January 1992 page 4
HAPS - APS Meeting

The 1991 HAPS Conference last May in Greenville, South Carolina, provided us, as teachers, with the opportunity to improve by sharing ideas and information with one another. It also provided HAPS, as an organization, with an opportunity to improve by sharing ideas and information with another organization, the American Physiological Society (APS).

Members of the HAPS Executive Committee met with Alan Rovick and Rob Carroll representing APS so that we might learn more about each other and explore the possibility of interaction between the two organizations. APS, with a membership of over 6000, is traditionally oriented toward research in physiology, but has a growing number of members for whom teaching is a major focus.

In addition to its research journal, APS publishes *Advances in Physiology Education*. While it was agreed that the two organizations have unique focuses and memberships and should remain separate, it was also agreed that there is some common ground. As a result of this meeting we hope to improve communication with APS so that our members can take advantage of any events or services that may be of interest. We will also be looking into the possibility of future joint efforts in organizing or planning workshops related to physiology education. The HAPS Executive Committee appreciated the opportunity to have this discussion and we hope that improved communication with APS will be to the mutual benefit of members of both groups who are interested in the teaching of physiology.

Regional Workshops: Indiana and Illinois

In the wake of a successful first HAPS Regional Workshop at University of Southern Indiana last October, a second is planned for February 15, 1992, at Joliet Junior College in Illinois.

Prof. Jackson L. Marr, Chair of the Biology Department at USI, organized the Indiana workshop, which included talks by local experts on Clinical Research Applications of MRI, Sports and Drugs, Embryonic Facial Development, Nutritional Aspects of Anatomy and Physiology. The workshop concluded with a group discussion on Balancing the Curriculum and Transferability of Course Credit. HAPS thanks Wm. C. Brown Publishing Co. and Bristol-Myers Squibb Co. for contributing to the success of the seminars.

Coming up soon in Illinois is a second regional seminar-workshop. Plans are to include Update Seminars, Hands-On Computer Laboratories, Biotech Labs, A&P Software Demos, and more. For additional information, contact:

Ann Smith / Lee Neary - Coordinators
A&P Seminar/Workshop
Joliet Junior College
1216 Houbolt Ave.
Joliet, IL 60436

phone: 815-729-9020
ext. 373 or 369

Location Sought For 1994 HAPS Conference

As noted elsewhere in this newsletter, the 1992 annual HAPS Conference will be held next June in San Diego, California. Arrangements are underway to hold the 1993 HAPS conference in Beaumont, Texas. Previous conferences sites have been Greenville (South Carolina), Madison (Wisconsin), Reno (Nevada), and Chicago (Illinois). The Executive Committee is looking ahead to 1994 and possibly 1995. If you feel that you and your institution would be willing to host a HAPS conference, the Executive Committee would like to hear from you. We would be particularly interested to locate a site in the Northeast, but we are open to all offers. If you would like to know a little more about what is involved, please contact Gary L. Johnson at Madison Area Technical College, 3550 Anderson St., Madison, WI, 53704-2599 or call him at (608) 246-6538.

Desperately Seeking Susan (or James, or ....YOU?)

While we haven't reached the state of desperation, each spring HAPS does seek candidates for its elected offices and individuals to serve on the various standing committees. The next newsletter will have a formal appeal for candidates and an application form, but we wanted to ask you now to consider volunteering your time and talents to further the goals of the organization.
At Lamar, Carley teaches anatomy and physiology, advanced human physiology, comparative physiology, endocrinology, and cell physiology. His research interests are in "sex and drugs and rock and roll." That is, as a comparative biologist he is particularly interested in how animals adapt to harsh "rock and roll" environments, the endocrine "drugs" that control physiological adaptation processes, and reproductive endocrinology controlling "sex," because successful reproduction is the ultimate adaptation to an environment. His specific research focuses on the hormonal control of water balance in earthworms and the role of ovarian estrogen receptors in controlling reproduction in pond turtles.

In addition to several research articles and book chapters, Carley is proud of his letters in the Land's End Catalog that describe his tie collection of fish, frogs, butterflies, worms, and a few things probably better not mentioned in print. He is noted around campus for actually having the guts to wear such things. But they do make good teaching tools and can be used to capture a class's attention. Besides ties, Carley has strong interests in teacher education at all levels, from elementary through graduate school. His efforts in this regard recently culminated in a $940,000 NSF grant for the Texas Minority Mathematics and Science Education Cooperative to provide science and mathematics education for elementary teachers.

A beautiful wife and two young children (all of whom are involved with Lamar), touring with his large boa constrictor Julius Squeezer, volunteer work in church, and HAPS keep him busy. Besides having just been elected to the HAPS Executive Committee, Carley will host and coordinate the 1993 HAPS Conference in Beaumont. He eagerly welcomes any suggestions or offers of help with that effort. He is the liaison between the Executive Committee and the Editorial Board, so he encourages everyone to contribute to the newsletter. Please let him know if you have any suggestions for the content or format of HAPS News.

Jane Salisbury, member at large on the HAPS Executive Board, has been a member of HAPS since 1988. She has also been active in the NABT, serving in each of the offices of the two-year college division. She was chairman of that division in 1989. Jane earned her undergraduate degree at the University of Evansville and both Master's and Doctorate at Indiana University. Additional studies were taken at Butler University, College of Pharmacy, West Virginia University, and Wright State University. She has taught at the college and university level for seventeen years. Currently, Jane is a professor of biological science at Edison State Community College in Piqua, OH, where she teaches anatomy and physiology and microbiology. She is active in faculty governance at Edison as well as serving on various state level advisory committees. She and her husband, Alvin, reside in Piqua, with their three junior high age children.
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Lab Ideas

RESOURCES FOR A&P LABS: CHECK YOUR OWN BACK YARD

Many of us face teaching A&P labs on a limited budget. Often, the specimens and materials required to give students hands-on experiences in the laboratory are expensive. A variety of resources can be obtained locally at minimal cost. In addition to the resulting savings, the specimens often are preferable to preserved ones.

A custom butcher shop or meat-packing plant is a valuable source of specimens. Look in the Yellow Pages of your phone book under "Meat." If none is available, contact the meat department at your local grocery store. They often can cut the item to your specifications.

The following specimens can be obtained:

Cow Hearts
The dissection of a preserved pig or sheep heart is a standard exercise in most A&P laboratory manuals. Fresh beef hearts from a local butcher shop are superior specimens. Instruct the butcher to leave the heart intact with the great vessels attached. Since the beef hearts are very large (some are nearly 10 inches long!), it is easy for the students to locate the chambers, valves, and great vessels. The chordae tendineae and papillary muscles are very prominent. Valve action can easily be demonstrated. In addition, the difference in thickness between the ventricles is quite evident; the left ventricle will resemble filet mignon while the right ventricle appears like a hamburger from a fast-food restaurant. Coronary vessels are also prominent. In addition, the students will gain an appreciation of the texture and appearance of fresh tissue.

Beef Pluck
A beef pluck consists of a cow's trachea, bronchi, lungs, heart, and great vessels. Preserved sheep plucks are typically used in many A&P labs. The fresh beef pluck has several advantages. First, it is large and one can easily observe the anatomical relationship between the structures of the respiratory and cardiovascular systems.

Second, since the tissue is fresh, a tube can be inserted down the trachea and the lungs can be inflated. This is a dramatic demonstration that your students will not forget!

Third, a pluck can be prepared with the larynx intact. This is certainly better than models for identification of vocal cords and examination of cartilage. The pluck can be dissected to demonstrate the branching of the bronchial tree. The c-shaped cartilages of the larynx are very prominent. Typically, portions of the diaphragm and pericardium will also be attached.

Cow Eyes
Although preserved cow eyes are commercially available, fresh ones are excellent dissection specimens. In addition to examining the anatomical features of the eye, the students will get a first-hand exposure to the consistency and appearance of the vitreous and the aqueous humor. The tapetum lucidum is quite remarkable. It is frequently difficult for one butcher shop to supply enough fresh cow eyes for each of the students in my class. This problem can be corrected by having the butcher shop collect them over a period of weeks and then freeze them. They thaw out nicely.

Beef Kidneys
Fresh cow kidneys are also excellent dissection specimens. When sectioned longitudinally, the anatomical landmarks of the cortex and medulla are readily apparent. The students also will gain first-hand experience with fresh tissue.

These specimens have been very popular with my students. Instead of dissecting smelly, hard preserved specimens, they gain experience with the appearance of features of fresh tissue. (And the teacher's A&P budget is smiling!)

from Gary Johnson
Madison Area Technical College, Madison, WI 53705

NAME THAT PIGGY

Perusing a back issue of Science News (4-6-91), I ran across an interesting anatomical tidbit you might appreciate. It seems that John Phillips, a fourth-year medical student at Yale University, has devised a system for giving individual names to the bones of the toes. Beginning with the big toe, the suggested names are: porcellus fori, porcellus domi,
porcellus carnivorus, porcellus nonvoratus, and porcellus plorans domum. These names translate, of course, into: little pig at market, little pig at home, little mean-eating pig, little pig that has not eaten, and little pig that cried all the way home! Try that out on your students!

from Mildred J. Galliher
Cochise College
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DOUGLAS, AZ 85607

AN ARTIFICIAL RETINA

When studying the eye and vision, the students are told, by books, videos and the instructor, that the lens focuses an inverted image on the retina of the eye. Even though the students read and hear this I find that many of them do not really comprehend this fact. I have developed an easily made "artificial retina" which I use prior to the video presentation. Since using this tool, I find the students have no problem comprehending the concept. In addition, they more easily understand the accompanying lecture on vision.

To make the artificial retina you will need a piece of cardboard (the cardboard support for a tablet of paper works well), a sheet of tracing paper, some tape and a lens. I use a lens about two inches in diameter (dime-store variety). Cut a six by five inch rectangular opening in the center of the cardboard. Lay the sheet of tracing paper across the opening and trim it so that it extends beyond the opening about 1/2 inch in all directions. Tape the edges of the paper to the cardboard. This is your artificial retina.

To use the retina, darken the room, then stand near a window or door. Hold the retina up perpendicular to the floor. Have the students gather around. (They will be looking at the back of the retina.) Hold the lens between the retina and the window so that the light will pass through the lens and fall on the retina. Move the lens closer or farther away from the retina until a picture is formed on the retina. Usually, there are exclamations of surprise when the image forms. Students immediately note that the image is upside down, but usually need a little prompting to note that the image is also reversed left-to-right. It is also possible to show the students that by moving the lens slightly closer or farther from the retina different objects will be brought into sharp focus. Near objects are in focus while distant objects are out of focus or near objects are out of focus while distant objects are sharply focused. This brings up the idea of needing to adjust our lens for near or far vision. It is pointed out that we do not move our lens; rather we change the shape of our lens to accomplish this.

Astigmatism may also be demonstrated very simply. The easiest way is to place a small drop of water on the lens. When focusing the image, the light that passes through the water drop will not be in focus and will be seen on the retina as a blurred area. Another way to demonstrate this is with a lens that has an additional high magnification area ground into it. The part of the image which passes through this area will be out of focus when the rest of the image is in focus and visa versa.

When teaching a class at night, you may get much the same effect by darkening the room but having a bright light shining on objects near a wall. The brighter the light the better the results.

Lecture Idea

from John Pasto
Department of Biology
Middle Georgia College
1100 Second Street SE
Cochran, GA 31014-1599

BLOOD FLOW

The relationship between vasodilation or vasoconstriction and blood flow is not always clear. Students often think of a garden hose from which water squirts faster when squeezed. Here's a good demonstration for discussing the regulation of blood flow to specific organs. Attach one end of a plastic tube to a faucet and insert a "Y" connector from which two identical tubes extend into the other end. Turning on the water produces an equal flow out of the two tubes. Squeezing one tube(vasoconstriction) clearly decreases the flow through that tube and increases the flow through the other. Thus the role of vasoconstriction and vasodilation in the regulation of blood flow to specific organs is easily demonstrated.

Please send your SWAP ideas to:
William Nicholson
SWAP SHEET Editor
Department of Natural Sciences
University of Arkansas
Monticello, AR 71655

HAPS News January 1992 page 9
Variety Is the Spice of Teaching

The U.S. Constitution not with-standing, students are not created equal in terms of learning styles. Some are visual, some verbal. Some are "left-brain" and some "right-brain." Effective teachers vary teaching methods to provide many different learning opportunities to reach the largest number of students. To this end, Michael Davis offers the "Various Approaches to Teaching Human Anatomy" (Journal of College Science Teaching, February 1991) used at the University of Wisconsin-River Falls. Davis begins by listing the seven principles inherent in any successful teaching technique:

1. student-faculty contacts
2. cooperative learning
3. active learning
4. prompt feedback
5. time management
6. high expectations
7. respect for the diverse talents of students and the different ways they learn.

The faculty at Wisconsin-River Falls have introduced several innovations into their human anatomy class that reflect current research in teaching. Here are the highlights of their newly revised course.

Clinical Correlations

Medical professionals are invited to the class to present case histories during evening lab sessions. In discussing the cases, these experts are asked to emphasize how knowledge of human anatomy is applied in diagnosing and treating the patient. Guest presenters are specifically asked not to teach the underlying anatomy, but to show how the anatomy can be used in real-world settings.

Cadavers

Wisconsin-River Falls recently introduced cadavers into their anatomy classes and the response has been overwhelmingly positive. Students spend three sessions viewing and studying a prospected cadaver and do not do any dissection. Davis reports that the using a cadaver is highly cost effective compared to expensive commercial models.

Computer Quizzes

Each student takes eight five-question quizzes generated randomly by a computer. Their testbank contains 1,800 questions on a mainframe computer to insure no redundancy between quizzes and exams. The quizzes provide immediate feedback and, because they are given in the computer laboratory, do not require additional class time. The instructor can call up and record the grades stored in the computer. Students uncomfortable with the computer or its time limits can take written quizzes.

Videotapes

Students are also assigned commercial videotapes on region dissection, the skeleton, and other topics. Students complete and turn in a study guide after viewing the tape.

All of these activities keep both the student and the teacher alive and thinking. To emphasize the importance of active teaching, Davis concludes his article by quoting from Lock:

"It is not inadequate teaching that bedevils us, it is mindless teaching; the non-teaching teacher. How to keep the teacher alive and struggling with the problem of doing good work, is now and will continue to be the question from which any great leap forward must begin."
Drugs: The Altered Brain

presented by
Dr. Nydia R. Hanna, R.Ph., M.S., Emory University
Department of Chemistry
Program Consultant - Adult and Adolescent Addictive Disease, Charter Hospital
of Greenville, SC

Drug abuse and dependency is a serious problem in our society today. An estimated 15% of our population could be considered 'chemically dependent' with alcohol and nicotine heading the list as the drugs of 'choice'. One third of high school seniors admit to getting drunk once a week and one third report experimenting with drugs other than alcohol. Against this backdrop an understanding of drug dependency is valuable.

Neurons in the brain communicate by using a number of distinct chemical messengers. To date over a dozen neurotransmitters and over a dozen neuropeptides have been identified as having activity within the brain. One neurotransmitter important in drug dependency is dopamine. Elevated dopamine levels are associated with depression. A second neurotransmitter, serotonin, is associated with sleep/wake cycles and eating behaviors. Norepinephrine causes an elevation of vital signs. To serve as a messenger, each of these chemicals must be synthesized by a neuron, be released at the appropriate moment in correct amounts, make contact with specialized receptors on the postsynaptic cell, be broken down, and have its components taken back up for resynthesis. A drug may interfere with different parts of this process and have activity at different locales. A drug may also have effects on a number of these messengers. Alcohol is known to affect 8 different neurotransmitters, marijuana 9, and cocaine at least 11. This makes the study of drug activity and dependency a difficult and challenging task.

Cocaine

The drug cocaine in its various forms has received increasing attention and study over the last decade as its level of use and abuse has risen. This drug appears to have its primary effects on the neurotransmitter dopamine. The euphoric cocaine 'high' is caused by a diminished breakdown and re-uptake of dopamine at synapses which prolongs the transmitter's exhilarating effects. This is followed very consistently by a 'low' when the dopamine effect finally wanes. The prolonged high level of dopamine in the synaptic cleft is also sensed by receptors on the dopamine-producing neuron and tends to depress further dopamine production. Cocaine also appears to block the uptake of tyrosine, needed for dopamine synthesis, possibly by competitive inhibition of the carrier molecule for this amino acid. Thus the after-effect is a decreased availability of dopamine.

Repeated use of the drug tends to result in lower 'highs' and more severe 'lows', thus leading to a cycle of more frequent consumption of higher amounts of the drug. Chronic abuse of cocaine in amounts of 5-6 grams per week have been known to depress dopamine activity to the extent that Parkinson-like symptoms appear.

Other brain messengers are affected by cocaine as well. Depressed dopamine levels can lead to depressed levels of the neurotransmitter GABA (gamma-aminobutyric acid) which can lead to seizures. Evidence also indicates that cocaine blocks the reuptake of serotonin, endorphins, and norepinephrine. The latter could account for the increased feeling of apprehension in the cocaine user. Cocaine use has implications for reproductive organs, also. Menstrual cycles in women may be shortened by up to a week and male testosterone levels rise for 2-3 weeks and then drop below basal levels. The effects on newborns of mothers who used cocaine during pregnancy, so-called 'crack babies', have been
well documented. At birth these infants have poor response to touch and difficulty in fixing their gaze and exhibit poor memory skills and attention spans as children.

Marijuana

Marijuana is not a drug, but actually a number of drugs. The plant itself contains over 400 chemical agents; and this increases to over 2000 after combustion, some 200 of which are carcinogenic. A marijuana joint has 12 times the tar of a cigarette and over 20 times the nicotine. The most active drug in marijuana is tetrahydrocannabinol (THC). While the typical 1960s joint had a THC concentration of about 2%, a typical 1990s joint may have a THC concentration of 30%. THC is a lipophilic drug that readily passes through membranes and has an affinity for the liver, brain, lungs, and reproductive organs. It has a half-life in the body of about a week. Its main activity in the brain appears to be on acetylcholine (ACh) pathways in the cerebral cortex. In the reproductive tract THC has been found to lower testosterone levels and can cause infertility. Poor testes development, infertility, and aberrant folding of DNA have been found in offspring of chronic marijuana users. Lowered levels of growth hormone have also been associated with marijuana use. Marijuana is used clinically to control intraocular pressure (in glaucoma) and has some anti-emesis and analgesic properties.

Serotonin Agonists

Hallucinogenic drugs include LSD, mescaline, PCP (angel dust), psicbybin (from mushrooms), and MDMA (ecstasy). These agents act as serotonin agonists. Serotonin is a brain neurotransmitter associated with senses and sleep/wake cycles. Some of these drugs may have irreversible or quite unpredictable effects. The 'flashback' phenomenon of LSD appears to be due to the reuptake of LSD from synapses and repackaging of the drug into synaptic vesicles that are released at a later time. The drug MDMA has been shown to improve short-term memory for a period of several hours and may be used to this end by students.

Inhalants

Drugs taken as inhalants include markers, white-out, glue, toluene, jet propellant, brake fluid, and nitrous oxide. The agents involved are readily absorbed through mucous membranes and offer a reliable, predictable high with no adaptation or tolerance. They also will not be evidenced on a typical drug screen. Long-term use causes membrane damage that lowers transmitter release. Memory loss often occurs with use of these drugs.

Addiction and Withdrawal

The cause of addiction or drug dependency is difficult to pinpoint. The use of many drugs causes a sense of euphoria or an escape from unpleasant realities in life. Use of the drug creates a new chemical balance in the body. Absence of the drug results in a new imbalance, which in turn causes a craving for the drug. It is hard to tell where the cycle starts and impossible to totally separate physical from psychological factors. Each drug dependency is contextual to the particular person.

Withdrawal from drug dependency is also very difficult. Drug use leads the brain and other organs to reach a new balance with the drug being present. Withdrawal of the drug then forces the brain to revert back to the balance present prior to drug use. This can be a long process. It is estimated that it takes 20-30 hours for the body to return to a normal balance following the consumption of two alcoholic drinks and 3 weeks to return to normal following 10 days of cocaine use. Once an individual has been dependent on a drug, there appears to be a 'memory' of the drug-induced balance, and the body reverts back to that balance very quickly upon re-exposure to the drug.

Drug screening has been a hot topic in the news the past few years. Despite all the publicity, most inexpensive drug screening procedures (like urinalysis) are not very effective, missing as many as 50% of drug users. Many drugs (such as inhalants) do not appear on a conventional drug screen, and there are ways (manipulation of pH, alcohol blocking, sample tampering) to hide drug use. False positives from prescription or OTC medications are another concern.

As we learn more about the brain and how it works, we are able to learn more about how these drugs affect the brain. This knowledge will help us deal with the problem of drug dependency.

-- reported by Gary L. Johnson
Madison Area Technical College
Hazardous Biological Materials and OSHA

presented by
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Do you know where your MSDSs (Material Safety Data Sheets) are? Well you had better find them and get them in order and in their proper places! And that does not mean on your desk two floors away from the laboratory. The MSDSs are only one small part of a total plan that must cover employee training and safety, hazardous material accumulation, storage, and disposal. And the time to have all of this information at hand is yesterday, for, as Ms. Lamb informs us, OSHA has declared this to be the "Year of the Institution."

To make matters more complicated, two different agencies, OSHA and EPA, require that you conform to different laws. Each agency uses its own definition of hazardous substance which further complicates the issue. OSHA's main thrust is the "Employee Right to Know". EPA is concerned with the environment and how the accumulation, storage and disposal of hazardous materials will impact the environment.

OSHA requires that you comply with its Hazard Communication Standard. On January 31, 1991, special regulations for laboratories went into effect. These special regulations are compiled into Occupational Exposure to Hazardous Chemicals in the Laboratory (Laboratory Standard). Basically, this standard requires that employers inform all workers (anyone who is paid by the institution) on how to protect themselves from any hazardous material they may be exposed to in the work place. Hazardous materials are classified into two major categories: Physical Hazards and Chemical Hazards. These may include anything from something as innocent as common household bleach to more generally acknowledged hazards such as preservatives for dissection specimens.

An institution must maintain chemical inventories, MSDSs, and proper container labeling, as well as provide training sessions for the employees. There must be a written Chemical Hygiene Plan. This written plan is no small matter. The lack of a written plan is the number one OSHA violation. When preparing a Chemical Hygiene Plan, an institution should involve any area that deals with hazardous materials. This includes the chemistry and biology laboratories, art department, and maintenance and physical plants.

The Chemical Hygiene Plan must cover ten specific areas of information. These points include: who is the Chemical Hygiene Officer; what are Standard Operating Procedures; where personal protection equipment is located; and who is responsible for MSDS acquisition, chemical labeling, and training.

It is important to maintain MSDSs for all chemicals. The MSDS may be obtained by contacting the chemical company that produced the chemical. If a similar chemical is purchased from different sources, an MSDS must be on file from each company. Old MSDSs should never be discarded but should be maintained in a separate file. This will protect the institution (and you) should any legal matters arise at a latter date.

The Chemical Hygiene Plan should also cover the location of "The Plan" and MSDSs, ventilation systems, and provisions for medical exams. Medical exams are the
Examples of medical wastes include sharps, microbiologicals, blood and blood products, pathological wastes, contaminated animal wastes, and infectious waste residues. Recommended EPA policies begin with the institution having an EPA Infectious Waste ID number. Transport and treatment of infectious waste must be taken care of by legally approved facilities. Infectious waste should be separated from other waste and appropriately labeled. It must be stored inside orange or red plastic bags and placed into rigid, leak-proof containers. Sharps must also be contained in rigid, puncture-proof containers.

Do you know where your MSDSs (Material Safety Data Sheets) are? Well you had better find them and get them in order and in their proper places! And that does not mean on your desk two floors away from the laboratory.

Someone must be hired to treat the infectious waste materials with an acceptable EPA method prior to sanitary land filling. It is required that microbiological cultures and etiological agents be treated on site. Individual state requirements need to be taken into consideration at this point as well. Be sure to maintain all records of tests that you perform that show sterilization techniques were effective. Standards must be established for ventilation and disinfection policies as well as reporting requirements.

An important take-home message from Lamb's presentation was that action needs to be taken now. Complying with regulations will help protect your institution as well as you and your students and staff by helping to provide a safe workplace. It may be helpful to call EPA or OSHA in your state to get specific policies or guidelines, and you may want to request a Courtesy Visit. This may result in specific recommendations, however, that your institution will be required to follow up on in a reasonable period of time.

**RESOURCES**


*Less is Better, American Chemical Society, 1985.*

*RCRA & Laboratories, American Chemical Society, 1986.*

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*reported by Felecia L. Harvey Biology Instructor Eastern New Mexico University Roswell, New Mexico*
Slice of Life

presented by
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Marketing Manager, Slice of Life, Eccles Health Sciences Library, University of Utah, Building #589, Salt Lake City, UT 84112-1185

The Slice of Life is a medical videodisc with 34,000 images that was developed by Suzanne S. Stensaas, Ph.D., a pathology professor at the University of Utah Medical School. The latest version (Slice of Life V Videodisc 1990) is the result of a cooperative effort with other medical schools to provide a source of medical images at a reasonable price. Contributors share production costs of the videodisc but purchase the disc at a discount. These images may be used alone with any NTSC videodisc player and color monitor as an adjunct to classroom presentations. The videodisc may also be interfaced with a Macintosh SE, LC or II series computer with at least 1 meg of RAM and a 5 to 20 MB hard disk. This permits the application program HyperBrain 4.0 (HyperCard version 1.2.5) to be used as an independent-study neuroanatomy course.

Several other programs are also available which utilize the Slice of Life videodisc. These include: HyperHeart - a HyperCard program for studying cardiac anatomy, physiology and clinical diagnosis; STAKAuthor - a HyperCard based database to the Slice of Life videodisc which gives non-programmers the ability to create interactive videodisc lessons quickly and easily; and the Slice of Life V Videodisc Database (software available in ASCII Mac or IBM format) which will provide the data needed for a database management program to do a search by title, author, organ, or frame number. There are several other HyperCard stack programs that will be available soon for use with the videodisc: HyperBugs for microbiology, HyperDrugs, HyperHead for gross anatomy, and several others.

Slice of Life VI is in production and will be available by late Fall 1991 or Spring 1992. HyperBrain 5.0, which will run with HyperCard 2.0, will also be available in 1992.

The use of HyperBrain 4.0 with Slice of Life V set up as a videodisc hyperstation with a Macintosh computer permits the instructor to follow student performance. By entering their initials and the last four digits of their social security number, performance may be tracked as students work their way through the program. HyperBrain contains 14 chapters which relate to the provided syllabus. The student selects the chapter to study and then as the text is presented, the student may use the mouse to "click" on the videodisc numbers and bring up the image associated with that text. "Clicking" on certain terms brings up the glossary with the associated videodisc images. Each chapter has a 20 question quiz with 5 answers per question. If the wrong answer is picked, the image associated with that wrong answer is shown and the reason that the answer is incorrect is given. If the answer is correct, the correct image is shown along with the justification for the answer. No tracking is available for the final practical which is also a part of the HyperCard program. The professor may unlock the HyperCard program and alter the text as well as the questions and answers. Certain other programs may be linked to HyperBrain.

These programs are available from the Eccles Health Sciences Library. Slice of Life V Videodisc is $300 for the first copy and $150 for each additional copy, including future revisions. STAKAuthor 5.0 (approx. 8.0 MB) using HyperCard 1.2.2 or 1.2.5 is $150; if HyperCard 2.0 is required the price is $200. A Site License for STAKAuthor is $500. HyperBrain 4.0 (approx. 8.0 MB) is $300. A Site License is $600. HyperHead 1.5 is $100; the Site License is $200.

-- reported by
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NSTA Meeting

The Society for College Science Teachers (SCST) is offering an Anatomy and Physiology Minisymposium at its annual meeting in Boston on March 27, 1992. There will be presentations from three speakers and opportunities for questions, answers, and introductions. The session will be from 3:30 to 4:30 at the Marriott Copley Place. SCST meets in conjunction with the National Science Teachers Association.

For more information, please contact:
Dr. Rebecca Halyard, School of Arts and Sciences, Clayton State College, Morrow, GA 30260.
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