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MEDICAL NEWS LETTER

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Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

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The issuance of this publication approved by the Secretary of the Navy on 28 June 1961.

Radiation and Pregnancy

CDR Thomas B. Lebherz MC USN *, and Friedrich Ellinger MD **,
Med Ann DC, Vol 31, February 1962.

The effects of ionizing radiation on organs of reproduction are of paramount importance in medicine and public health (1). Regardless of the source, whether a nuclear explosion, background, X-ray exposure during diagnostic studies, or scatter from poorly insulated machines, a measurable amount of maternal gonadal or total fetal radiation always occurs. The effect of radiant energy on cell life is always discernible (2); that is, no matter how minute, what the source, or which cell is affected, the ultimate result can never be tissue creation, only tissue modification or destruction.

Natural radiation issues fundamentally from two main sources, cosmic from the atmosphere, and background from radioactive sources in the earth. The total cumulative dose from these sources is estimated to be 150 milliroentgens per year to the human gonads, or 4 r by the end of the third decade of life. These sources probably have been present since the beginning of man.

Artificial irradiation, on the other hand, is in its early infancy when one considers it in relation to creation. Common sources of this type of ionizing radiation are found in daily environmental contamination. This type occurs in industry and in fallout from nuclear and thermonuclear explosions. It is an occupational hazard among physicians, nurses, and technicians involved in diagnostic and therapeutic procedures with cathode-ray tubes and radioisotope sources. Finally, it results from devices available to the general public, such as luminous watch dials and fluoroscopic shoe-fitting machines. By far the most significant source is from diagnostic use of roentgen apparatus and radioisotopes. It is estimated that as of today our population receives an average yearly exposure 10 to 100 times that of background, the variable being dependent upon geographic location and availability of medical care (3).

Since we think we must accept the original premise that radiation, regardless of kind or source, never creates but only modifies, suppresses, or destroys, and since from volumes of material it appears that diagnostic X-ray examinations are the most significant source of artificial irradiation, one must next consider what are the potential hazards of exposure to the pregnant patient. We consider this facet in three parts—somatic to the individual, somatic to the individual to be, and genetic to the human race.

The first category is not truly germane to this discussion except that all radiation is cumulative and that ultimately a significant dose can finally

* Chief, Division of Obstetrics and Gynecology, U.S. Naval Hospital, National Naval Medical Center, Bethesda, Md.

** Chief Radiation Biologist, and Head of the Pharmacology Division, Naval Medical Research Institute; Member, Radioisotope Board and Consultant to the Tumor Board, U.S. Naval Hospital, NNMC, Bethesda, Md.

result with promiscuous exposure. The suggested relationship of thyroid neoplasm to head and neck therapy in childhood is an example of this.

Of special interest is the second category, that is, somatic to the individual to be. Ionizing radiation affects the pregnancy from this standpoint by direct action on the products of conception. These immediate effects in humans were reported by Bar and Boule (4) in 1901. This fetal somatic effect has since that time been thoroughly investigated in both animals and man. Experimental studies by Job and his associates (5) in 1935 first demonstrated the existence of critical periods for the development of radiation injuries in rat embryos. These studies have been extended and enlarged by subsequent investigators (6) (7) so that exact time tables for the development of various malformations have become available. Although these data are not directly applicable as regards total dosage to man, they bring to the fore the question of the possible hazard to the human embryo during roentgen diagnostic procedures. Human studies are difficult to get, but case reports of accidental, inadvertent, or therapeutically indicated exposures suggest the fetal somatic effect to be a potential reality, and that the degree and type of malformation bear a direct relationship to total dose and week of gestation.

Before nidation (7 to 10 days of gestation) the effect is all or none; that is, if successful implantation follows irradiation, abnormalities secondary to irradiation do not seem to occur. However, if irradiation exposure occurs from the second to the seventh week of gestation, the chances are great that malformation will result, more commonly those of central nervous system involvement. Evidence from Hiroshima suggests that this somatic effect may be produced as far as the eighteenth week of intrauterine life; but in the light of present day experience the likelihood of causing a malformation by radiation of the developing fetus at any time is probably minimal if the dose is 20 r or less and a given time span is not exceeded. Also, there is no experimental or clinical evidence that dosages of the order involved in routine diagnostic examinations will produce neonatal malformations. This does not hold true for some of the more specialized fluoroscopic procedures. The other fetal somatic effect, that is, postnatal tendency to develop a malignant tumor, alluded to by Stewart et al (8), needs much more evidence for us to accept. As a matter of fact, Court Brown et al (9) recently completed a more controlled study and concluded that such a possibility does not appear statistically sound.

The final category, and the one which appears to have the soundest basis, is the genetic effect. The mutogenic action of radiant energy was first reported by Muller (10) in 1927. His work has since been confirmed by other investigators (11) (12) (13). Mutations arising after irradiation are of the same type as the spontaneously occurring mutations but are more numerous; hence we can say irradiation does increase mutation rate. It is fortuitous that recessive mutations are more common than dominant ones and lethal more common than nonlethal. The recessive mutations will cause no problem unless the same recessive factor is present in both parents. Lethal mutations are self-destroying and therefore cannot be propagated. These factors tend to make (less significant) the mutation rate increase, but they do not alter the fact that the increased rate

is a reality. Furthermore, Muller has noted that it probably takes 25 r to double the mutation rate. From a clinical point of view, the important material reported by some authors (14) (15) is the fact that the radiation-induced mutation rate is independent of intensity and time, and the mutagenic effect of radiation shows complete cumulation over a life span.

Although much data have accumulated regarding the genetic changes in experimental work, it must be realized that it is most difficult to project these results to man. For instance, the inbreeding necessary for such investigations precludes simple application to man.

Data are available in regard to genetic changes in man, but such data are modified by the length of time necessary to accomplish a generation, and therefore such studies so far evaluate only to the second generation and with a very small number of patients. Such studies (16) (17), although they do not suggest any genetic changes, at the same time in no way dispose of the presence of genetic injury. On the other hand, a survey comparing 5461 offspring of radiologists to 4484 unexposed parents suggests a higher incidence of congenital defects in the progeny of the exposed group (18). The differences in this study are not large and should not be viewed with alarm, but they do suggest that further investigations along these lines are urgently needed. The Hiroshima-Nagasaki report on 76,626 offspring of parents who had gonadal irradiation stated that "on the basis of what is known concerning radiation genetics in mammals, genetic effects of the atomic bombs have, in fact, not been demonstrated" (19). In essence, it appears that deleterious genetic changes to the future human race appear on the surface to be real, and until sound human studies are available our approach should be one of caution rather than fear or agnosticism.

To what degree are the maternal and fetal gonads affected by irradiation in routine diagnostic procedures? The figures reported (20) (23) vary considerably when different technics are used to determine dose as follows:

	Maternal Gonad	Fetal Gonad	Total Fetal
Pelvimetry without Thoms	1-2 r	3 r	1-3 r
Pelvimetry with Thoms	4-5 r	5 r	4-5 r
Intravenous pyelogram	1-2 r	1 r	1-2 r
Lumbar spine	1-3 r	2 r	3 r
Barium enema with fluoroscopy	3 r	3 r	3 r
Gastrointestinal with fluoroscopy	1-3 r	3 r	3 r
Chest with cone shield	0.07 mr	0.07 mr	0.07 mr
Chest without cone shield	0.4 mr	0.4 mr	0.4 mr
Hysterogram with fluoroscopy	4-10 r	—	—

Although these doses alone appear to involve but little or no risk to the embryo, they do appear significant from the point of view of the induction of genetic effects, especially since the hazard lies in the repetition of exposures. As an example of a possible case report, it is not inconceivable that the following procedures could be carried out in a 20-year life span.

1. G. I. series for nausea and vomiting, 6 to 8 weeks' gestation		1.5 r
2. Routine X-ray photofluorogram at 12 weeks		0.4 r
3. I. V. P. at 30 weeks (pyelonephritis)		2 r
4. Pelvimetry with Thoms' position repeated because of technical error at 38 weeks		8 r
5. Four chest roentgenograms on the third to seventh days of life for respiratory problem in the new baby girl	0.56 mr	
6. Routine chest roentgenogram at 20 years	2.8 mr	
7. Barium enema for suspected intussusception		3 r
8. Chest fluoroscopy for heart murmur at age 7		3 r
9. Lumbosacral series after fall in sports at age 14		4 r
10. Barium enema for episode of rectal bleeding at age 19		3 r
11. Hysterosalpingogram with fluoroscopy at age 21 as infertility study		5 r
Ovum now fertilized has received		29.9r

On the surface this appears absurd, but such a history is not unheard of and this is the type of situation we must prevent. That this dosage can be decreased by modifying technics has been well shown, and these modifications can be easily integrated into any system (24) (25):

a. Cone down to desired field.
b. Utilize higher KV and lower amperage.
c. Use faster film necessitating less exposure.
d. Check equipment frequently for scatter.
e. Improve apparatus installation with regard to scatter.
f. Use fluoroscopy only with an intensifier.

Positive steps to be taken by physicians managing female patients are:

a. Stop all routine roentgen diagnostic studies in pregnant women.
b. Add a fill-in space for last menstrual period on X-ray request chits.
c. Do only emergent diagnostic procedures after the fourteenth day of menstrual cycle.
d. Consider X-ray pelvimetry as an intrapartum procedure.

e. Utilize the last menstrual period of nurses and personnel in radium and radioisotope studies.
f. Do more investigation of radioisotope procedures as substitutes for cathode-tube studies.
g. Consider sponsoring a follow-up registry for patients who receive irradiation early in pregnancy.

Summary

Three factors must be ever present in the physician's mind when he is considering diagnostic roentgen procedures or radioisotope studies: maternal somatic, fetal somatic, and fetal genetic effects. Positive steps can be taken such that the total radiation exposure of the human race can be lessened.

Muller (26) who first noted mutant effects so aptly sums up the problem: "We must remember that the thread of germ-plasm which now exists must suffice to furnish seeds of the human race even for the remote future. We are the present custodians of this all important material, and it is up to us to guard it carefully and not contaminate it for the sake of an ephemeral benefit to our own generation."

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NOTE: This timely and important paper was presented, on invitation, at the Annual Convention of the American Academy of General Practice in May 1961. Further significance of the article is reflected in action being taken by the World Health Organization to translate it into several foreign languages for wide distribution.

It is the duty of physicians everywhere to take positive steps to reduce the amount of radiation received by patients and staff alike, limiting exposure to those situations for which a definite indication and justification exist. This concept should be applied across the board to all specialties and all medical activities. —Editor

Prenatal X-Ray Exposure and Childhood Cancer

Brian MacMahon MD*. J Nat Cancer Inst 28: 1173-1191, 1962.

This study was designed to test the hypothesis that in utero exposure to X ray in diagnostic doses increases subsequent mortality from neoplastic disease during childhood. The study population consisted of 734,342 children born in, and discharged alive from, any of 37 large maternity hospitals in the Northeast United States in the years 1947 - 1954. The frequency of intrauterine X-ray exposure in the population was estimated by review of the records of a 1% systematic sample. Abdominal or pelvic X rays were recorded in 770 (10.6%) of 7242 single pregnancies in the sample.

Five hundred and eighty-four children born in the study population who subsequently died of cancer were identified by review of death and birth certificates in the Northeast Region. Records of pregnancy and delivery of 569 of these children were also reviewed. Eighty-five (15.3%) of the 556 cancer deaths born of single pregnancies had intrauterine X-ray exposure. The higher frequency of prenatal X ray in the cancer cases than in the sample was statistically significant.

After correction for indirect associations with birth order and other complicating variables, it was estimated that cancer mortality was about 40% higher in the X-rayed than in unX-rayed members of the study population. This relationship held for each of the three major diagnostic categories—leukemia, neoplasms of the central nervous system, and other neoplasms. The excess cancer mortality in the X-rayed group was most marked at ages 5 through 7 years at which time the relative risk was 2.0. Excess risk apparently was exhausted by age 8. A trend toward higher mortality in the more heavily exposed children was small and not statistically noteworthy. No significant variation with stage of pregnancy at exposure was evident. The association of intrauterine X-ray exposure with cancer mortality does not explain the high incidence of leukemia in first births noted previously.

* Dept of Epidemiology, Harvard School of Public Health, and Dept of Environmental Medicine and Community Health, Downstate Medical Center, State University of New York, Brooklyn, N. Y.

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Postoperative Temperature Changes

C. R. Stephen MD, Professor of Anesthesia, Duke University Medical Center, Durham, N. C. Anesthesiology 22: 795-799, Sep - Oct 1961.

In the recovery room it is habitual to record the pulse rate, blood pressure, and respiratory rate at regular intervals, to estimate the state of oxygenation by the color of the patient and to determine the rate of returning consciousness,

to administer parenteral fluids and oxygen as required, and to measure fluid output from drainage catheters and chest catheters. Vigorous measures are taken to promote a stir-up regime, aspirate secretions from the respiratory tract, and preserve adequate respiratory exchange while at the same time making the patient as comfortable as the above prerequisites permit.

Often, in the postoperative period, the patient may remain lethargic even though the effects of the anesthetic drugs appear to have worn off. It may be difficult to obtain blood pressure recordings by means of the sphygmomanometer and the peripheral pulses may be difficult to palpate, though the pulsations of the carotid artery are full and bounding. The nail beds of the fingers and toes may be distinctly cyanotic, with perhaps the lips sharing in the dusky hue, though the functions of the respiratory and cardiovascular systems belie the presence of profound hypoxia. Or, more obviously, the patient will complain of being cold and will manifest gross shivering.

On the other hand, an increased respiratory rate associated with tachycardia and a flushing of the skin may be present. If persistent, these signs may be followed by profuse sweating or twitching may supervene.

An explanation for these diverse signs and symptoms may be found by determining the body temperature of the patient. In the postoperative patient a recording from the rectum is more representative of body temperature than one recorded from the mouth; it is considerably easier to obtain under normal circumstances than one recorded from the esophagus. If a body temperature alteration has resulted primarily from surface temperature changes, the rectal temperature will differ little from the esophageal.

Heat Regulation

There is reason to believe that in the modern hospital the body temperature of patients having recently undergone operation may be altered frequently. To understand the factors involved, it should be recalled first that man has a most efficient homeostatic mechanism of body temperature regulation under normal circumstances. Heat produced within the body is dissipated chiefly through the respiratory tract by warming inspired air, by evaporation, through the skin by radiation, conduction, and convection, and by insensible water loss. There are fine and coarse mechanisms which can be called upon to maintain body temperature. Variations in skin blood-flow provide the finer adjustments—the cutaneous vessels dilate in warm environments and constrict in cool environments. In extremes of heat, man reacts by sweating; in cool atmospheres gross shivering occurs. Both the fine and coarse mechanisms in man are regulated reflexly through the nervous system and require the integrity of the central nervous system up to and including much of the hypothalamus.

The reflex arc may be as follows: thermal receptors in the skin provide afferent stimuli which flow to a central receptor area or areas, probably located in the hypothalamus: (1) this central receptor area probably is also responsive directly to changes in blood temperature in the order of 0.2 degree centigrade; (2) efferent arcs regulate shivering through the motor nerves and cutaneous vasoactivity and sweating through sympathetic fibers.

Effect of Anesthesia

Anesthesia depresses and renders inefficient the temperature regulating mechanisms of the body (2) (3). It is not known whether this action occurs as a result of suppression only of reflex mechanisms or whether the central receptor area is affected also. Not only are the fine and coarse reflex actions which preserve the milieu interieur impeded, but spinal analgesia and general anesthesia produce extensive peripheral vasodilatation, measurable by the increases in skin temperature (4). This peripheral vasodilatation is conducive to the loss of heat if the ambient temperature surrounding the patient is reduced. Certain technics employed in anesthesia—the nonrebreathing and semiclosed—will increase the loss of heat from the body, whereas the closed technic will act to retain heat (5).

With any technic of anesthesia the normal mechanisms for losing heat through the skin and respiratory tract, and which compensate for normal heat production, are altered one way or another. The net result of the anesthetic state is that the temperature regulating mechanisms are held in abeyance so that the patient tends to become poikilothermic and at the mercy of environmental temperatures and other heat-altering mechanisms to which he may be exposed. The smaller the patient, the less is the total body mass and the greater the relative surface area so that small subjects are prone to more frequent and extensive body temperature changes under anesthesia (3) (6). Because the temperature regulating mechanisms are obtunded and interfered with during anesthesia, body temperature alterations may persist into the postoperative period.

Factors Inducing Hyperthermia

Prior to the advent of air conditioning, operating rooms—particularly in the summer months—had a high ambient temperature and high humidity, with the result that body temperature increased during operation (7). Moreover, the application of heavy drapes limited the potential loss of heat through conduction and convection. The operating room lights radiated heat directly to the patient, increasing the tendency toward heat retention, and the closed systems of administering anesthesia favored an increase in body temperature. Under extreme circumstances, compensatory sweating occurred, but only when body temperature was elevated markedly. Frequently, patients—particularly children—were admitted to the recovery room or returned to the ward with all the stigmata of hyperthermia.

Factors Inducing Hypothermia

Within recent years the situation described above has changed notably. With the almost universal introduction of air conditioning into operating rooms, and the need for surgeons and other operating room personnel who are heavily gowned to work in comfort, operating rooms are maintained at a relatively low ambient temperature of 68° to 72° F. The situation has become reversed for the

patient: today he is exposed to ambient temperatures which favor the loss of body heat. Moreover, operating room lights are now constructed so they do not radiate heat, and more and more semiclosed or nonrebreathing technics of anesthesia are being employed. In addition, major operations with body cavities exposed to the low ambient temperatures are going on for longer periods of time. Whole blood, which often comes directly from a refrigerator at 4° C is being administered with greater frequency (500 ml of cold blood administered over a period of 5 to 10 minutes will reduce body temperature an average of 0.5 to 1.0 degrees centigrade). Frequently, body cavities, e.g., bladder, are repeatedly exposed to cold irrigating solutions.

Over and above these situations, an increasing number of patients are being subjected purposefully to varying reductions of body temperature in the operating room to facilitate surgical procedures. The net result is that patients are returning to the recovery room with body temperatures below normal. In one average operating day recently, 18 consecutive patients between the ages of 6 months and 67 years returned from the operating rooms at Duke Hospital with rectal temperatures ranging between 33.8°C and 36.5°C (93.0° F and 98.2° F) These reductions in body temperature depend on numerous factors, but are more prone to be seen in infants and the geriatric patient (3) (6) (8).

Postoperative Care

Perhaps the most significant point about postoperative temperature changes is to recognize their presence: this demands the institution of technics, intermittent or continuous use of a thermistor and recorder, whereby the body temperature of patients can be monitored. Knowledge that the body temperature is altered often will explain physiologic abnormalities that are present, such as a slow respiratory rate, cyanosis of the extremities, difficulty in obtaining the blood pressure, bradycardia, lethargy, and so on, and will permit corrective measures to be taken.

The question arises as to the significance which should be attached to hypothermia or hyperthermia in the postanesthetic period. Hyperthermia seldom is seen in the present-day recovery room. It may develop over a period of hours when massive areas of infection have been stirred up by operative intervention, it may follow certain intracranial procedures, and may develop following episodes of severe hypoxia. Rarely, it may be associated with a delayed allergic or pyrogenic reaction to a blood transfusion or drug administration. As the patient recovers from anesthesia, the shivering of a "chill" may be associated with a rise in temperature. It is important to differentiate this reaction from the shivering which accompanies the efforts of the patient to combat the presence of hypothermia. The recognition of a progressive rise in body temperature is important so that appropriate countermeasures may be taken if desired.

Much more common in the early postoperative period is the patient with hypothermia. What is seen in the recovery room are manifestations of the rewarming phenomenon. As the patient recovers from anesthesia, the homeostatic

mechanisms which have been held in subjection reassert themselves. There is no evidence to suggest that basic metabolic functions which have been altered by the initiation of hypothermia do not return to normal during the rewarming period. Animal experiments have shown that rewarming after 2 to 12 hours of hypothermia is not associated with significant changes in electrolytes, acid-base balance, blood sugar, amino acids, or the lactic/pyruvate ratio (9). Urinary function which may be impeded during hypothermia returns to 75% of control levels during the rewarming period, and completely to normal within 24 hours (10).

However, certain factors may be of importance in the rewarming period. The first of these is the ability of the patient himself to institute rewarming. There is evidence that the newborn, and indeed infants under 6 months of age, have poorly developed mechanisms for initiating rewarming (11). Not only are they prone to lose heat, but they usually require a warm environment to regain it. There is also danger in allowing the body temperature of an infant to remain below 34° C (93.2° F) for a prolonged period. The syndrome known as sclerema may develop and progress to an irreversible outcome (6) (11). Therefore, when moderate hypothermia is present in an infant postoperatively, active measures to combat it should be undertaken. A warm atmosphere approaching body temperature with a high humidity (9) should be made available. An Isolette will provide these features, although if the patient has received ethyl ether, care should be taken to make certain that breakdown products of this drug do not accumulate in the apparatus due to exposure to the hot metal heating element (12).

In older children and adults, hypothermia usually induces peripheral vasoconstriction and varying degrees of shivering during recovery from anesthesia. It has been suggested that patients who have received thiopental are more prone to develop active shivering movements, and that perhaps suppression of adrenal function may be the etiologic factor (13). Support for this thesis is gained from the fact that shivering movements are also common following halothane anesthesia during which adrenal function is not stimulated. However, the ability of the patient to shiver rests more likely with the alacrity with which reflex functions are restored and the necessity of the patient to utilize them.

The act of shivering is undesirable in some patients because oxygen utilization (and therefore demand) is increased greatly. In postoperative patients in whom respiratory or cardiac reserve is low, shivering can place a dangerous burden on the organs responsible for preserving physiologic function. It is wise to administer oxygen to all such patients. The shivering itself sometimes can be minimized by placing warm blankets in close contact with the patient.

The peripheral vasoconstriction which accompanies the patient's efforts to rewarm himself may produce a cyanosis of the nail beds and sometimes of the lips and ears. Due to the reduced peripheral circulation, a capillary stagnation occurs and unoxygenated blood collects in these areas. Brisk rubbing of the extremities will cause a reduction of the cyanosis and permit a differentiation between this condition and that due to generalized hypoxia. As the patient warms, the nail beds become more normal in color.

As the patient's temperature returns toward normal the reflex peripheral vasoconstriction becomes less marked. At this time, the systolic blood pressure may be reduced to relatively dangerous levels. This phenomenon has been called "rewarming shock" (14). Under these circumstances, the capacity of the circulating bed has increased, so that what was a satisfactory blood volume to maintain an adequate blood pressure has now become less than adequate. As patients are being rewarmed postoperatively, the possibility of this situation arising should be kept in mind, and whole blood administered to combat the deficit.

Occasionally, as a patient is rewarming himself, an overshoot may occur and the body temperature may become elevated beyond normal. The importance of this is in its recognition so that efforts to promote warming are not carried on indefinitely.

The purposeful initiation of hypothermia in the postoperative period may be difficult if the homeostatic mechanisms to preserve body temperature are active at the time the decision is made to reduce body temperature. The postoperative patient who has recovered from anesthesia will resist attempts to reduce his body temperature by violent shivering. The administration of chlorpromazine will reduce the shivering reflex to some extent, but it is difficult to prevent shivering until the body temperature has fallen below 34° to 33° C (93.2° to 91.5° F). It is suggested that, if it is believed desirable to maintain a state of hypothermia in the patient postoperatively, this decision be made and implemented while the patient is still anesthetized so that the body temperature reduction may be accomplished while the compensatory reflex mechanisms are still in abeyance. If the body temperature is maintained below 34° C (93.2° F) in the postoperative period, shivering will not be a serious complication.

Summary

Postoperative temperature changes are prone to occur in patients because the normal homeostatic mechanisms which preserve the constancy of body temperature are inactivated by anesthesia. Moreover, anesthesia produces peripheral vasodilatation, so that in today's air conditioned, cool operating rooms the patient is likely to lose body heat. As a result of these and other factors, a majority of patients have a reduced body temperature in the postanesthetic period. Recognition of this state is important so that compensatory measures may be taken when required, and certain signs and symptoms associated with hypothermia may be recognized for what they are.

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From the Note Book

URGENT TRAINING NOTICE

Applications for Residency Training 1963 - 1964

Interested applicants for residency training, both inservice and outservice, should carefully review BUMEDINST 1520. 10B for information concerning programs offered and procedure for submitting applications.

Training in Civilian Institutions

Deadline for submission of applications for training in civilian institutions to begin 1 July 1963 or early Fall for academic programs is 15 August 1962. Requests for the following types of training programs will be considered by the Professional Advisory Board at its meeting in early September.

1. Thoracic Surgery - Certification by American Board of Surgery required.

2. Plastic Surgery - Completion of 4 years of General Surgery required by Bureau of Medicine and Surgery.

3. Public Health - leads to Masters degree in Public Health and certification by American Board of Preventive Medicine in Public Health.

4. Occupational Medicine - leads to Masters degree in Public Health (in Industrial Health) and certification by the American Board of Preventive Medicine in Occupational Medicine.

5. Aviation Medicine - leads to Masters degree in Public Health and certification by the American Board of Preventive Medicine in Aviation Medicine.

6. Neurology - 3-year program in civilian institution.

7. Radiobiology - academic year at the University of Rochester preceded by 12-week academic refresher course (summer session), and followed by field trips to reactor sites.

8. Subspecialties of Internal Medicine (Allergy, Gastroenterology, Hematology, and Pulmonary Diseases) - completion of 3 years of formal training in Internal Medicine required by Bureau of Medicine and Surgery.

Applications for Neurosurgery will be considered by the Inservice Professional Advisory Board meeting in November 1962, as the required training in General Surgery (6 months to 1 year) is spent in a naval hospital prior to the civilian training. Those selected will begin the inservice phase during 1963-64 and the civilian phase during 1964-65.

Officers may indicate three choices of civilian institutions in order of preference where they desire the training or may request training in a civilian institution to be determined later. However, the Bureau of Medicine and Surgery will make final arrangements for enrollment after approval of the request has been obtained.

Applicants may contact institutions relative to training, but in any correspondence or interviews it should be made clear that acceptance will be contingent upon approval being obtained from the Bureau of Medicine and Surgery.

Only a limited number of individuals will be sponsored in these programs in view of the existent personnel shortage.

Inservice Residency Training

Deadline for submission for inservice training programs to begin in the summer of 1963 is 15 November 1962. Candidates will be notified of selection or nonselection by 15 December 1962. Applications, submitted via chain of command, should be for the full training program as outlined in BUMEDINST 1520.10B.

Combined programs, such as in Neurosurgery, should be requested for the inservice portion first to begin in the summer of 1963, with the civilian portion to follow in a civilian institution to be determined.

Applicants are encouraged to list at least three choices of naval hospitals for location of training if such choices exist in the chosen specialty, and may feel free to write the chiefs of the services for details of the training offered, if desired.

Early submission of applications is recommended to assure processing through chain of command and receipt in BuMed prior to the 15 November 1962 deadline.—Training Branch, Professional Div., BuMed

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Space and Astronautics Orientation Course

This course has been established to give senior officers of the Navy a better understanding of this new technology, its application to naval warfare, and its important role in national defense. The course is in consonance with the Navy's global mission, and emphasizes the significant impact of astronautics on sea power. It is primarily designed for those senior officers who have not had opportunity to gain knowledge of astronautics and our current Space programs. A highlight of the course is a visit to the space vehicle launch and control facilities at Point Arguello Naval Mission Facility and at Vandenberg Air Force Base.

Location:	U. S. Naval Missile Center, Point Mugu, California
Duration of Course:	Four days (Tuesday - Friday)
Convening Dates:	21 August - 25 September 1962
BuMed Quota:	ONE, each class
Deadline Date to Have Application in BuMed:	Immediately, for 21 August course; 14 August for 25 September course
Eligibility:	Rank of Commander and above. TOP SECRET Security clearance required.

Requests should be forwarded in accordance with BuMed Instruction 1520.8 and comply with the deadline dates as shown above. All requests must indicate that a Security Clearance of TOP SECRET has been granted to the officer requesting attendance, and if Bachelor Officers' Quarters are desired.

—Training Branch, Professional Div., BuMed

New Clinicopathologic Conferences Available. CAPT Roger H. Fuller MC USN, Deputy Director, Armed Forces Institute of Pathology, recently forwarded to the Medical News Letter the following information which was prepared by COL Joe M. Blumberg MC USA, Scientific Director of the American Registry of Pathology, for publication by that Registry:

"AFIP clinicopathologic conferences that are available on 2-week loan from the American Registry of Pathology:

#104-61 Acute hemorrhagic pancreatitis with chronic cholelithiasis
106-61 Subacute bacterial endocarditis

Massachusetts General Hospital Case Records available for loan at the American Registry of Pathology on a 2-week basis to military and Federal installations:

#57-61 Acute and chronic pancreatitis, with suppuration and monilial infection
58-61 Transitional-cell carcinoma of urinary bladder, with metastases
59-61 Thymic cyst, multilocular
62-61 Glomerulonephritis, chronic, with nephrocalcinosis secondary to hyperparathyroidism
63-61 Adenocarcinoma of stomach, predominantly signet-ring-cell type, with metastases
64-61 Chronic cicatrizing ureteritis, with stricture. Chronic interstitial cystitis (Hunner's ulcer)
65-61 Necrotizing renal papillitis, bilateral in diabetes mellitus, with pyelonephritis, acute
66-61 Infantile Gaucher disease
67-61 Amyloidosis involving heart, kidneys, and blood vessels, with pulmonary embolism and infarction
68-61 Endometriosis of sigmoid and right ovary
69-61 Cirrhosis, Laennec's and postnecrotic, with primary hepatoma and metastases
70-61 Salmonella peritonitis, with pseudocyst of peritoneum
71-61 Acute hemorrhagic pancreatitis with esophageal laceration
72-61 Benign osteoblastoma of sacrum
73-61 Chronic pneumonitis and marked pleuritis, left upper lobe, asbestosis
74-61 Adrenal hyperplasia, adrenogenital type
75-61 Disseminated lupus erythematosus, central nervous system cryptococcosis
76-61 Tuberculous ileocolitis, appendicitis, and peritonitis
77-61 Subacute hepatic necrosis (fatal viral hepatitis)
78-61 Acute appendicitis, with perforation and abscess formation
79-61 Dissecting aneurysm of pulmonary artery, with rupture into pericardium
80-61 Renal-cell-carcinoma, with hypercalcemia
81-61 Parathyroid adenoma, with hyperparathyroidism
22-62 Syphilitic aneurysm of thoracic aorta, with rupture and hemopericardium
23-62 Soft-tissue chondrosarcoma, with invasion of knee joint, femur, and tibia
24-62 Adenocarcinoma of breast, with metastases
25-62 Fat embolism, massive, pulmonary, cerebral, and renal, secondary to fractures of femurs
26-62 Cirrhosis of liver, postnecrotic, with hepatoma."

These CPC's may be obtained by writing to the American Registry of Pathology, Armed Forces Institute of Pathology, Washington, D. C.

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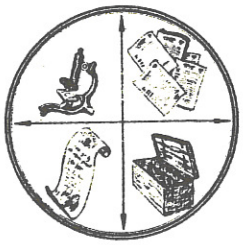

MISCELLANY

General Status of the Hospital Corps

CAPT L. K. Witcofski MSC USN, Director, Hospital Corps Division, Bureau of Medicine and Surgery.

General. The on board strength of the Hospital Corps has increased slightly keeping pace with additional allowance requirements authorized. Personnel available for assignment continue to remain stable with seasonal variations.

Beginning Strength - Fiscal Year 1962			Strength as of 31 March 1962		
Males	Waves	Total	Males	Waves	Total
22,276	1134	23,416	22,267	1178	23,445

Procurement. The total number of Hospital Corps trainees from among volunteer recruits and strikers continues to fill total personnel requirements. The Programmed School Input Plan (whereby eligible personnel completing recruit training are designated HA's and assigned to fleet and shore activities for from 6 to 8 months prior to attending Class "A" Hospital Corps School) is the major school input source. Personnel so designated receive TEMDU orders with ultimate assignment to Class "A" HM instruction by class convening date. Personnel designated PSI HA's are not qualified hospital corpsmen and are reported in accounting category #1500 in accordance with the Naval Manpower Information System. Utilization and preschool training of PSI personnel can be effectively accomplished by activities to augment on board HM strength where practicable. Training so accomplished should be by inservice instruction as set forth in existing directives.

Wave Hospital Corpsmen. Requirements for Wave HM personnel continue to increase in support of female patient care. Presently authorized quasi-allowances exceed personnel available for assignment. Request for establishment of and/or increases to approved quasi-allowances cannot be authorized until the on board strength is substantially increased. A Wave quasi-allowance is within the activity's total authorized HM allowance as published on NAVPERS 576, and substitutes on board a female HM for a male HM. Action has been taken which increased the Class "A" Hospital Corps School input of Wave personnel; however, past data have indicated that increased inputs were offset by increased losses. On a monthly basis, Wave losses continuously offset planned gains and

greatly reduce the total number available for assignment. Additionally, Seaman Wave "Hospital Trainee" Program under EPDOCONUS cognizance was concurred in to further augment naval hospital Wave strength. When available, Seaman Waves eligible for assignment to Class "A" Hospital Corps School upon completion of recruit training (for which no school quota exists) are assigned to naval hospitals for screening, indoctrination, and preschool instruction. Attention is invited to Commanding Officer, Enlisted Personnel Distribution Office, Continental United States ltr, 1306/15, Ser: N36/4394 of 6 April 1962, for administrative regulations relative to this program which must be complied with.

Rate Status. As a result of the February 1962 advancement examinations, requirements will be met by rates for a peak period only. Percentagewise, 100% of those passing the E-7 examination are to be rated; 72% of E-6; 83% of E-5; and 70% of E-4. By comparison, the following percentages of those taking the examination passed: E-7, 35%; E-6, 44%; E-5, 50%; and E-4, 63%. In excess of 626 Fleet Naval Reserve transfers were effected for fiscal year 1962. A comparable number is anticipated each forthcoming year through FY 1965. This has necessitated increased input into Class "A" Hospital Corps School to provide a sufficient number of career motivated non-rated personnel to fill the petty officer structure gap. Increased counseling and inservice training to provide the fundamental traits necessary of petty officers must be emphasized by all activities. Professional and morale training to meet projected petty officer requirements through competitive examination cannot be foresaken if the high caliber of hospital corpsmen is to be maintained. Operational requirements will continue to be met with available personnel; a large number of these will be Class "A" school graduates assigned to larger shore and fleet activities where sufficient additional training can be accomplished.

Distribution. The petty officer situation at shore activities has improved considerably since the commencement of Seavey Segment 3-61. However, due to fleet commitments and independent duty billet requirements, larger shore activities will be expected to absorb a large number of Class "A" school graduates for the remainder of this year. Hospital Corpsmen second class, who are graduates of Advanced Hospital Corps School are being assigned by the Fleet EPDO's to independent duty whenever a Chief Hospital Corpsman or Hospital Corpsman first class is not available.

Many individuals are listed on the inactive Seavey due to insufficient obligated service. Their attention is invited to the provisions of para. 3.37 of the Enlisted Transfer Manual which requires a minimum of 12 months of obligated service subsequent to the transfer month to be issued orders to shore duty. Shore tours of all Hospital Corps rates have recently been extended. In order to be eligible for a normal tour of shore duty the provisions of para 7.4 (when shore duty starts) of the Enlisted Transfer Manual must be complied with. It is requested of Commanding Officers that the provisions of Chapters III and VII of the Enlisted Transfer Manual (NAVPERS 15909A) be fully explained to individuals eligible for rotation.

Navy Enlisted Classification. Since implementation of the Navy Enlisted Classification Assignment Control ("Tape Control" System) two major problems relative to HM classification coding have been experienced: (1) Deletion of all codes other than those in the 8400 series; (2) A definite lag time of from 30 to 45 days in the authorization for assignment, deletion, or change in NEC. Under the assignment control system, classification codes such as those in the 3400 series (Instructor) and the 9700 series (Sound Motion Picture Operators) were deleted as primary or secondary NEC's for hospital corpsmen. The distribution of hospital corpsmen is by NEC's in the 8400 series only. This is considered necessary to obtain maximum utilization of Hospital Corps training in specialized areas.

Personnel having received specialized training in other fields will have appropriate school completion entries made on Page 4 of service record only. Upon interview to complete rotation data cards under Seavey/Shorvey procedures such other specialized training should be entered in block 15 "Remarks." Inasmuch as Instructor billets are Bureau of Naval Personnel controlled, special qualifications necessary are known and noted at the time of screening the individual's records. The problem of lag time in official designation of NEC's is realized. Monthly verification of BuPers Report 1080-14 (MOD) must be reemphasized to insure accurate coding. Errors noted during verification of 1080-14's should be reported to the Bureau of Medicine and Surgery (Code 34) for determination and correction. Action is being taken to assist activities in personnel accounting by a proposed additional earned NEC column in the BuPers Report 1080-14 (MOD).

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WAVES' Twentieth Anniversary Year Convention

The News Letter wishes the WAVES a happy Anniversary Year.

The focal event of the WAVES' Twentieth Year will be the National Convention to be held in Washington, D. C., 26 - 29 July 1962. Chaired by CDR Irene Wolensky USNR, the Convention is open to all WAVES, Regular or Reserve, active or inactive.

The Convention will get off to a good start when registration opens at noon on Thursday, 26 July 1962, and is formalized at 1600 with a combined registration and reception entitled "Registration on the Rocks." Friday morning will be marked with a special White House Tour for the "first wave of the WAVES" - those 200 who register first. Free time is reserved on Friday afternoon for sightseeing, visiting Congressmen, et cetera. A reception at the Convention Hotel, the Statler-Hilton, at 1700 will be followed by a visit to the Marine Barracks for the famous Evening Parade.

Saturday morning's activities include "Business and Buffoonery," a combined business meeting and humorous review of the WAVES' Twenty Years. Those attending the banquet Saturday evening at the Sheraton-Park Hotel will

include the Secretary of the Navy, the Chief of Naval Operations, past Directors of the WAVES, present Directors of all the women's services, and members of government who have played prominent roles in the development of the WAVES. Mrs Douglas Horton, formerly CAPT Mildred McAfee, first Director of the WAVES, will act as toastmistress.

A Sunday breakfast at the Statler-Hilton will be followed by a special memorial service in the amphitheatre at Arlington National Cemetery.

Two special post-convention tours have been arranged for those WAVES who wish to extend their vacations, one to San Juan, Puerto Rico, and the other to southern Virginia. Both are run by the Fugazy Travel Bureau Inc., 1725 K Street, N. W., Washington 6, D. C.

Advance registration for the Convention itself may be made now, and will insure preferred seating for the banquet as well as a place in the special White House tour. Those wishing to sit together at the Banquet may register as a group. $20 covers the entire Convention weekend; the only event which may be purchased separately is the Saturday banquet at $10. Registrations should be mailed to: WAVES Twentieth Convention, 1616 K Street, N. W., Washington 6, D. C.

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Honor for LCDR Elizabeth O'Malley MSC USN

LCDR O'Malley recently received a letter of appreciation from Rear Admiral A. S. Chrisman MC USN, Acting Surgeon General. The letter reads:

"It is a pleasure to acknowledge and to express my appreciation for your commendable performance since March 1959 in your additional duty assignment in this Bureau as Assistant to the Director, Medical Service Corps Division for Women Specialists Section officers. In this capacity, and while assigned primary duty as Senior Dietitian in the U. S. Naval Hospital, Bethesda, Maryland, you have rendered loyal and dedicated service to the Bureau of Medicine and Surgery in matters pertaining to the Women's Specialists Section of the Medical Service Corps.

In particular, you have contributed significantly in the recruiting of professionally qualified women specialists for appointment in the Medical Service Corps. Your visits to colleges and universities, interviews with interested students, and your attendance at various professional conventions and association meetings have provided excellent liaison between this Bureau and the civilian institutions and/or groups concerned. As the representative of the Surgeon General on several of these occasions, your conduct has reflected credit on the Medical Department of the Navy.

You have earned our sincere 'WELL DONE'."

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DENTAL SECTION

Danger! Antibiotics at Work

Harrison F. Flippin, University of Pennsylvania. Year Book of Dentistry, 1961-1962 Series, pp. 224-225.

The author states that for the most part, continued usefulness of an anti-infective agent depends on the number of microorganisms and the rapidity with which they develop resistance to the drug, and on incidence and severity of toxic reactions associated with its use. Both factors appear to be related to frequency and intensity with which the drug is used.

Bacterial resistance to antibiotics results largely from continued exposure to subinhibitory concentration of these drugs. Penicillin, in contrast with other commonly used antibiotics, has long been considered unique in that, except for a small percentage of staphylococci, there is little evidence of penicillin-resistant strains of microorganisms cultured from patients. Nevertheless, there has been a progressive increase in the number of penicillin-resistant staphylococci, which is probably related to the promiscuous use of penicillin recently as part of hospital treatment.

Streptomycin shows the greatest potential for development or emergence of resistant strains, and resistance to the tetracyclines has occurred in a large proportion of staphylococci, especially those isolated in hospitals where these agents have been used extensively over long periods. Use of Novobiocin and the members of the erythromycin group may result in rapid and significant increase in resistance, especially among staphylococci, Streptococcus viridans and enterococci. Resistance to chloramphenicol occurs infrequently. Resistance and cross-resistance have not been recorded for bacitracin, polymyxin, and neomycin.

Penicillin is the least toxic antibiotic, but it is also the most allergenic and the one most often involved in fatal reactions. Although incidence of allergy to penicillin is unknown, there is little doubt that it is increasing and represents the primary problem in drug allergy. The most serious reaction is the immediate anaphylactic type, which may vary from a few urticarial lesions or asthma, to shock, unconsciousness and death. These reactions usually begin shortly after administration of the drug. The more severe reactions develop the most rapidly, and most fatalities occur within seconds or minutes. Serious allergic reactions are most likely to occur after parenteral administration. The oral route is least likely to initiate severe hypersensitivity reactions.

Incidence of hypersensitivity reactions to penicillin may be reduced if an allergic history is obtained before the drug is administered. However, a careful history will not reveal all potential allergic reactions, e.g., prior exposure to unknown sensitization by ingestion of penicillin-containing foods. Attempts to predict reactions to penicillin by skin or conjunctival tests are variable, unpredictable and not without danger. In patients showing immediate anaphylactic reactions to penicillin, prompt administration of epinephrine, aminophylline or hydrocortisone is frequently effective, but death often occurs before they can be given.

Antihistamines or penicillinase is of no value in these patients. A person with a history of any type of reaction to penicillin, even though questionable, should not be given this drug.

The more serious toxic reactions to antibiotics may be avoided by knowledge of the hazards, use of recommended doses, avoidance of undue and prolonged exposure to the drug and use of the more toxic agent only when a less toxic one is ineffective. Antibiotics should not be used as therapeutic panaceas for minor, nondescript ailments or as protective umbrellas but should be reserved for control of infections in which their usefulness has been proved.

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Protective Mouthguard Program at the United States Naval Academy

Important Facet of Preventive Dentistry Program

Part of the overall mission of the United States Naval Academy is to develop midshipmen morally, mentally and physically. With physical fitness being stressed as a part of the education of a naval officer, all midshipmen are required to participate in some form of athletics or physical activity with the majority choosing contact sports.

As part of the Academy's Preventive Dentistry Program, under the direction of the Senior Dental Officer, Capt K. L. Longeway, DC, USN, and with the cooperation of the Director of Athletics, Capt Asbury Coward, USN, the entire brigade of over 3800 midshipmen has been provided with custom-made, latex mouthguards. Midshipmen reported to the dental department where dental officers took impressions of both arches, and dental technicians completed the laboratory phase. The technic of fabrication is essentially the same as that outlined in the 1960 report of the joint committees of the American Association for Health, Physical Education and Recreation, and the American Dental Association. A finished mouthguard with the individuals name implanted therein was delivered to each midshipman. The casts are kept on file in the dental department for use as necessary to replace lost or damaged mouthguards. In addition, they have proved of value in determining occlusal disharmonies, serving as preliminary study casts for prosthodontic purposes,

aids in proper reduction of jaw fracture and in one case as a guide in determining temporomandibular joint dysfunction.

It was determined that the degree of comfort of a mouthguard had much to do with player acceptance. The mouthguards must fit well, be comfortable and stable and not interfere with breathing or speech. After several modifications, it was determined that among the factors contributing to the wearer's discomfort were either over or under extension and a noticeable peripheral thickness particularly in the palatal area. It was also considered important to cover the gingival alveolar tissue as well as the teeth, but the periphery must be free of the muco-buccal fold and any frena.

When the mouthguards were delivered, directions for proper care and cleaning were included. Metal ointment cans were at first used as storage containers for the mouthguard but they proved unsatisfactory in that the latex and the metal of the can reacted chemically. A plastic, perforated container is now preferred.

Acceptance of the program at the Academy has been excellent. The dental department is keeping data on all types of dental injuries and, to date, none have been reported by personnel who have been wearing the mouthguard. While insufficient data has been obtained thus far, it is assumed that many injuries have been prevented by means of the mouthguard.

It is planned to continue this program at the Naval Academy. Each entering Plebe will receive his mouthguard during his indoctrination summer in conjunction with his initial oral diagnosis and treatment-planning visit to the dental department. The importance of preventing injuries to the teeth and jaws is stressed in their oral hygiene lectures.

The fabrication of the custom mouthguard is inexpensive and easily accomplished by a minimum of officer and auxiliary personnel. For the small cost of each mouthguard and the saving of treatment time necessitated by injuries, it is considered a most economical preventive dentistry program.

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Personnel and Professional Notes

Dental Technician Graduation. Certificates for successful completion of advanced and specialized training courses in the Enlisted Schools of the U. S. Naval Dental School were awarded to 42 dental technicians at graduation exercises on 15 June in the Main Auditorium, NNMC, Bethesda, Md.

The graduation address was given by Capt Robert S. Snyder, DC, USN, Assistant Chief of the Dental Division, Bureau of Medicine and Surgery.

Capt A. R. Frechette, DC, USN, Commanding Officer of the Dental School, presented letters of commendation to those students with the highest averages in their respective fields of dental technology: Richard A. O'Neil, DT1, Advanced General; John A. Mills, DT1, Advanced Prosthetic; and John L. Gorman, DT2, Basic Repair.

Ira W. Briggs, DT2, received the fifth Thomas Andrew Christensen award in recognition of his loyalty and devotion to duty in the U. S. Navy.

The award, which is made by the Naval Dental School to honor the only naval dentalman posthumously presented the Navy Cross for extraordinary heroism, is presented from time to time, to a graduate of an enlisted course of instruction who is chosen on the basis of his service record and service reputation.

Capt Frechette, assisted by Capt W. A. Newman, DC, USN, Head of Enlisted Education and Training Department, awarded certificates to the graduates.

Okinawan Dental Society Members Visit New Camp Hansen Dental Clinic. On 10 June 1962, as part of the "People to People" program, Capt L. R. Frantz, DC, USN, Executive Officer of the 3rd Dental Company, FMF Pacific, and Clinic Director, hosted members of the Okinawan Dental Society, their assistants, and families.

The group was escorted on a trip through the recently commissioned Camp Hansen, the high light being an inspection of the new 10-unit Dental Clinic. The tour was concluded with a visit to a mess hall where refreshments were served to the party.

Captain Lyons Elected Secretary. Capt Norwood E. Lyons, DC, USNR was recently elected secretary of the Loma Linda Gold Foil Seminar located at the College of Medical Evangelists School of Dentistry, Loma Linda, California. Capt Lyons is on duty at the U. S. Marine Corps Air Station, El Toro (Santa Ana), California.

Lieutenants Begin and Smith Appear at Meeting. Lts Raymond J. Begin and Preston L. Smith, DC, USN, attached to the U. S. Naval Air Station, Brunswick, Maine, presented a Table Clinic and Lecture entitled "A Technique for Apicoectomies" at the Maine Dental Convention, Samoset Hotel, Rockland, Maine, during the period 14 - 16 June 1962.

Commander Stephenson Elected President of Dental Society. Cdr Thomas D. Stephenson, DC, USN, was recently inaugurated as President of the Panama Canal Zone Dental Society, a constituent society of the American Dental Association. Dr. Paul K. Musselman, Trustee of the American Dental Association for the 4th District, attended the meeting and presented a lecture entitled "Legislative and Social Problems Facing Dentistry." Dr. Stephenson is presently attached to the U. S. Naval Station, Rodman, Canal Zone.

World Health Organization Advisor Lectures at Naval Dental School. Doctor George N. Davies, Head of the Department of Preventive Public Health, and Children's Dentistry, University of Otago, Dunedin, New Zealand, recently lectured on world health problems and the role of dental health as it pertains to the total health of the country, to staff, resident, and postgraduate dental officers, and civilian and military guests, at the U. S. Naval Dental School, Bethesda, Md.

Dr. Davies is on the World Health Organization Expert Advisory Panel on Dental Health; he is a member of the Special Commission on Oral Statistics

of the Federation Dentaire Internationale; a member of the Medical Research Council of New Zealand, and serves on the Fluoridation Committee of the New Zealand Board of Health.

At the present time Dr. Davies is on a world tour lecturing in many cities on various phases of public health and preventive dentistry.

New Format on Instructions and Notices. The 1 June issue of the weekly Transmittal Sheet is the first to appear in a new typeface and two-column unjustified format approved by the Administrative Assistant to the Secretary of the Navy. Adoption of this new format was recommended by the Navy Publications and Printing Policy Committee after unanimous endorsement by the bureau and office representatives who comprise the Navy Publications and Printing Control Subcommittee.

Adoption of the new format will reduce the number of pages by approximately 22% and will achieve estimated savings of more than $18,000 in annual printing costs.

Approval of the new format is not restricted to All Ships and Stations directives. The recommendation of the Committee, as approved by the Administrative Assistant, includes approval of the same format for any other directives when it will reduce printing costs.

Navy Sponsors San Diego County Dental Meeting. The June meeting of the San Diego County Dental Society was sponsored by the Navy Dental Officers in the 11th Naval District. Capt Paul Carbiener, DC, USN, District Dental Officer, 11th Naval District, arranged the scientific program headed by Dr. Henry M. Tanner of the University of Southern California. The following Naval Dental Officers, from the U. S. Naval Training Center, San Diego, presented table clinics: Cdr R. D'Vincent, DC, USN - "Emergency Treatment for the Obstructed Airway." Lts R. Lord and C. Taggart, DC, USNR: "Large Amalgam Restorations Using Posts."

Military Symposium Held with Southern California Meeting. A military symposium was held in conjunction with the Southern California State Dental Association Meeting on 16 April 1962. Eleventh Naval District Dental Officers presented the following table clinics:

Full Denture Techniques

Lt Saburo Kami, DC, USNR - Diagnosis and Preliminary Impressions
Lt Steven G. Morrow, DC, USNR - The Maxillary Denture: Anatomy, Reliefs and Post Dam
Lt Clair R. Adkins, DC, USNR - The Mandibular Denture: Anatomy, Reliefs, and Beading
Capt Glenn D. Richardson, DC, USN - The Final Impression
Cdr Victor P. Knapp, DC, USN - Vertical Dimension and Centric Relationships
Capt Gus W. Gray, DC, USN - The Delivery Phase of Complete Denture Construction

Capt James B. Lepley, DC, USN, and
Capt Frank N. Ellis, DC, USN - Fixed Abutments in Modified Complete Dentures

Acute Periodontal Lesions

Capt Allan L. Wallace, DC, USN - Acute Periodontitis and Periodontal Stress
Lt Charles E. Wingard, DC, USNR - Necrotizing Ulcerative Gingivitis
Cdr Peter F. Fedi, Jr., DC, USN - Surgical Elimination of Deep Periodontal Pockets
Lt Richard G. Lord, DC, USNR,
Lt James N. Matchefts, DC, USNR, and
Lt Charles E. Taggart, DC, USNR - Amalgam Crowns in One Appointment
Cdr Richard C. D'Vincent, DC, USN, and
Lt Robert E. Pike, DC, USN - Emergency Treatment for Respiratory Failure
Capt Charles E. Rudolph, Jr., DC, USN, and
Lt Charles N. Clark, DC, USN - Endodontic Case Selection

The following seminar was presented but not included in the Military Symposium: J. C. Metcalf Gold Foil Seminar of San Diego
Capt William A. Monroe, DC, USN,
Cdr Carlo A. DeLaurentis, DC, USN, and
Lt Harry Nadler, DC, USNR - Gold Foil is for Everyone

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OCCUPATIONAL MEDICINE

Freezer Explodes

Department of Preventive Medicine, School of Medicine, University of Washington, Seattle, Wash. Occupational Health Newsletter 11(3), April, 1962.

At five A.M. on March 15, 1962, in the Health Sciences Building, University of Washington, a freezer exploded, causing considerable damage to the surrounding areas. The freezer, used to store chemicals and sacrificed animals, was located in a small room adjacent to a teaching laboratory. Some 21 windows in the laboratory were broken, a number of which were located as far as 50 feet away from the freezer. The door to the freezer was blown off and the

frame was bowed out of shape. One of the solid core doors leading to the room in which the freezer was located was split in half, and in addition other doors and door jambs were damaged.

The explosion was apparently caused when ether vapors were ignited by the thermostatically controlled switch. Some mice had been sacrificed previously and placed in a bag. Ether-saturated cotton was also placed in the bag after which bag and contents were placed in the freezer. There was apparently enough ether in the cotton to produce an explosive mixture.

An article in the National Safety Council Newsletter, Chemical Section (February 1962), reported an explosion involving a refrigerator in which a flammable solvent was stored and stated that these accidents, even though much publicized, continue with amazing regularity. In order to prevent the occurrence of these fires and explosions, it is of utmost importance that all refrigerators and freezers utilized for flammable chemical storage be free from internal sources of ignition. To assist in accomplishing this, all electrical switches and controls should be located outside the box proper. If the refrigerator is not or cannot be made explosion-proof, then the internal wiring can be modified to permit the storage of well-stoppered flammable or explosive materials. In any event, each box should contain adequate warning notices attached to the door. This admonition should contain one of the following statements:

1. Do not store flammable material in this box.
2. Caution - Box not explosion-proof. Modified so that only well-stoppered flammable materials may be stored. No Smoking.
3. Explosion Proof. No Smoking.

The Safety Newsletter further stresses the fire potential of plastic-lined boxes and advises that domestic refrigerators and freezers used in the laboratory include steel boxes and door liners; fiberglass insulation rather than organic; flame retardant silicone rubber door gaskets; depressed floor shelf to retain spilled liquids; and an automatic door-closing device to smother fire upon reclosing after an explosion.

Since the use and storage of flammable materials presents a potential fire and explosion hazard, it behooves each and every person handling hazardous materials to have an understanding of at least some of the characteristics associated with the fire potential. First of all, a flammable liquid does not in itself burn; it is the vapors which are continuously given off which burn. All liquids do not vaporize at the same rate. These rates differ greatly and depend upon vapor pressure as well as the associated temperatures; the higher the temperature the greater the evaporation rate. The fire and explosion potential of flammable liquids also varies and a number of measurements have been devised to indicate the degree of hazard. The flash point and explosive limits are two such measurements.

Flash Point is defined as the lowest temperature at which enough vapors are given off to form a flammable mixture of vapor and air immediately above the surface of the liquid. The National Safety Council has established three classifications of flammable liquids based upon their flash points. They are:

Class I - Liquids with a flash point at or below 20° F (Ethyl ether, gasoline, benzol, acetone).

Class II - Liquids with a flash point above 20° F and below 70° F (Amyl acetate, alcohol except amyl, solvent naphtha, toluol).

Class III - Liquids with a flash point above 70° F but below 200° F (Amyl alcohol, kerosene, stoddart solvent, fuel oil, turpentine).

The fire potential can be considered as being extreme for Class I, high for Class II, and moderate for Class III. Any liquid with a flash point above 200° F can be considered as having a low fire potential while non-flammable materials present no fire hazard. There are, however, limitations to the flash point values which must be kept in mind. W. Poppe, Industrial Hygiene Engineer, Boeing Airplane Company, in a report entitled "Some Facts and Fallacies Concerning Flammable Liquids and Gases," states that while flash point values provide a convenient yardstick to determine safety requirements in handling and storage of flammable solvents, the flash point of solvent mixtures may not be a constant value since this value may change as solvents evaporate from the mixture. One such solvent encountered was advertized as non-flammable and was in fact non-flammable as received. Its flash point, however, dropped to approximately 70° F after only 20% had evaporated.

Explosive Limits: When a combustible vapor is mixed in air in the proper proportions, ignition can produce an explosion. The upper and lower boundaries are termed the explosive limits and are usually indicated by percentage by volume of vapor in air. (Table I lists explosive limits and flash points for some common solvents.) The source of ignition need only be a spark and unfortunately it is almost impossible to eliminate all sparks. Consequently it is important that all electrical controls in refrigerators and freezers used to store flammable materials be located outside the box since electrical equipment is notorious for producing sparks and thereby providing a source of ignition.

All solvents that present fire and explosion hazards are also hazardous to health. The atmospheric concentrations necessary to produce harmful effects to health are much lower than the fire and explosion potentials. All in all, it is worth while to remember that no liquid which will burn is ever completely safe and should therefore be treated with respect. (See table on page 30.)

* * * * * *

A 75-patient Alcoholic Treatment Center opened in February at Central Islip State Hospital, Long Island, New York, with a program of research and rehabilitation for alcoholics who are not psychotic. Each patient will receive a week of concentrated treatment—psychotherapy, medical help, religious counseling, and Alcoholics Anonymous techniques—and then a staff conference will be held to determine which specific treatment has proved most suitable. (US DHEW PHS Public Health Reports 77(5): 452, May 1962)

Flash Point and Explosive Limits of Some Common Solvents

Name	Flash Point °F	Explosive Limits: % By Volume in Air	
		Lower Explosive Limit	Upper Explosive Limit
Acetone	0	3.0	11.0
Allyl Alcohol	70	4	2.5
Benzene	12	1.4	7.1
Carbon Disulfide	-22	1.25	44.0
Cellosolve	104	2.6	15.7
Carbon Tetrachloride	Non-Flammable		
Ethyl Alcohol	55	4.3	19.0
Ethyl Ether	-49	1.9	48.0
Gasoline	-50	1.3	6.0
Methyl Alcohol	54	7.3	36.0
Isopropyl Ether	-18*	1.4	21.0
Methyl Ethyl Ketone	30	1.8	11.5
Pyridine	68	1.8	12.4
Perchlorethylene	Non-Flammable		
Toluene	40	1.4	6.7
Xylol	63	1.0	6.0

* Note: Can form explosive peroxides.

Table I.

Individual Differences in Noise Susceptibility

Industrial Hygiene News Report, Vol. V, No. 6, June, 1962.

How to distinguish "tin" ears from "tough" ears before it is too late to do anything useful about it was discussed by Emanuel S. Mendelson of the Air Crew Equipment Laboratory, Naval Air Material Center, Philadelphia, at the Aerospace Medical Association's annual meeting in Atlantic City, April 9-12. In an attempt to identify and cope with the auditory hazards encountered in jet engine test cells, a joint series of experiments was conducted at Fort Knox by members of the U. S. Army Medical Research Laboratory and the Air Crew Equipment Laboratory. Some of Mr. Mendelson's information is presented below:

Earlier tests at Fort Knox indicated (1) that experimentally-induced hearing losses could be averted by the intentional elicitation of the reflex contractions of the middle ear muscle before and during exposure to fatiguing sounds, and (2) that contralateral shifts of auditory sensibility resulted when acoustic reflex activating stimuli were delivered to one ear; however, in each case, individual variability was great. A comparison study of the two psychophysical methods and of the physiological method was conducted on a single group of 21 men to see whether there would be a characteristic parallelism of results. The results of combined testing turned out to be so variable that each set of data first appeared unrelated to each of the other sets. Upon closer examination, however, important implications were extracted, which bear upon noise tolerance.

The present results are based upon rather tenuous evidence on a small group of subjects, nevertheless, they indicate that it is reasonable and likely that persons differ in the ease with which they become adapted to noise situations, in accordance with (1) the innate abilities of their middle ear muscles to attenuate extraneous sounds, (2) their habitual needs for persistent maximal protection or for intermittent accommodative tuning, and (3) their acquired capacities to adapt the resting and the reflex actions of the muscles to these ends. Relevant findings concerning permanent and temporary hearing losses in the combined tests refute the theory sometimes proposed (usually outside the medical profession) that persons with poorer hearing should be placed in noisy work, on the alledgedly logical ground that people who have already lost some auditory sensitivity should have less to lose.

Empirical findings of these studies suggest that in the case of explosive noise (gunfire), the resting activity of the middle ear muscles may be a critical factor for differentiating individuals. In steady noise, the difference between people might depend also upon reflex thresholds and upon the ability to maintain the muscles in a state of maximal contraction during the continuous auditory insult. Tympanomanometry, especially when combined with other techniques, appears to be one of the promising tools for distinguishing objectively those who are inclined to suffer least from their more susceptible

brethren. Regardless of possible systematic and random errors, the analysis of the data suggests that individual susceptibility to noise injury may be sought profitably in a battery of tests including various biophysical, psychophysical, and otological examinations.

* * * * * *

Watch for Misleading Advertising on Respirators

Lawrence Radiation Laboratory, University of California, Livermore, Calif. Hazards Control Information Exchange Bulletin, Vol. 2, No. 2, February 1962.

The potential inhalation health hazards of paint spraying arise from the solvents. In every case where paints contain volatile solvents (other than water) there is a very real potential hazard from the inhalation of the vapors of these paints. Depending upon the solvent used, symptoms can range from narcosis to death if the painter is not protected from inhalation of excess amounts of the vapor arising from spraying. The pigments in many paints, on the other hand, are comparatively inert toxicologically; however, some do contain toxic materials such as lead.

It pays to review carefully all claims for "positive protection against paint spray." Such advertising claims can be misleading since they are seldom qualified and often leave the reader convinced that he is protected from all potential hazards of paint spray, both pigment and vapors. This is not always the case.

Another claims, "Look at the test results - the operator found no decrease in efficiency." No matter how well trained the operator, equipment is necessary to determine the efficiency. Again the flyer states, "Laboratory tested and approved," by whom? Be sure you know the product before you stake your life on its performance.

Until recently, the accepted respiratory protection for spray painting has been either air-supplied masks or respirators equipped with Bureau of Mines approved cartridges for protection against vapors. In addition, a filter was placed over the cartridge to keep the cartridge from clogging with particulate material. Now, the Bureau of Mines has approved combination respirators for full protection against paint spray. At least 3 major manufacturers have these on the market. Look for the Bureau of Mines approval, "Permissible Non-Emergency Gas Respirator for Organic Vapors or Organic Vapor and Paint, Lacquer, and Enamel Mists" before buying a respirator for this purpose.

* * * * * *

Hobby Shop Health Hazards

Reported by H. J. Worsham, Industrial Hygienist, Norfolk Naval Air Station, for the Quarterly Release.

Toluene diisocyanate is an ingredient of "foam-in-place" mix used in the Hobby Shop in the building of boats. A 55 gallon drum of the resin and a 55 gallon drum of the catalyst containing the TDI were purchased by the Hobby Shop for the use of the patrons. The situation was uncovered during a routine inspection trip. From the condition of the deck near the drums it was apparent that spills were frequent. Personnel drawing the materials from the drums all complained of the disagreeable effects of the vapors. No precautionary measures of any kind were employed by anyone handling the materials in spite of the clearly printed warning labels on the drums. The personnel in charge of the Hobby Shop were immediately notified of the severe health hazard and a safe handling procedure was worked out. The 2 regular employees of the Hobby Shop will be the only individuals permitted to dispense and apply the mix and they will be furnished and required to wear the mandatory protective gear. The drum containing the TDI will be stored in a secure place.

The discovery of TDI in the Hobby Shop prompted further investigation into the materials inventory. It developed, then, that fairly large quantities of epoxy resins, amine hardener, methyl ethyl ketone peroxide, styrene, polyester resins and fiberglass were routinely being used by the customers. There were, apparently, several cases of dermatitis from these materials as well as some "trouble" from inhalation of dust during the power sanding. Proper personal protective gear was recommended.

* * * * * *

Cholinesterase Inhibitors

Reported by Mr. Harry Gilbert, Industrial Hygienist, New York Naval Shipyard.

A laboratory room has been constructed and equipped on the roof of the Material Laboratory for testing instruments designed to detect extremely toxic cholinesterase inhibitors in air. Local exhaust hoods with stainless steel working surfaces, activated and mechanical filters in exhaust ducts for removal of aerosol and vapors, and fiberglass filters in an air intake duct have been installed. A separate small exhaust hood with filter has been installed in one of the hoods for removal of the most toxic of cholinesterase inhibitors prior to their passing into the main exhaust duct. The room is maintained under negative pressure so that none of these toxic agents will escape from the room to the outside atmosphere without passing through the filter system. Nitrogen gas is bubbled through a special tube containing the toxic liquid to create an aerosol mist for tests. This bubbler system is interlocked with the system on

the hood so that, if the exhaust system stops working, the nitrogen gas stops bubbling. The exhaust hoods are kept operating continuously 24 hours a day, and if they should stop working an alarm is actuated at the door of the room. Standard operating procedures are being formulated to minimize the hazard to employees from operations in this room. Personnel protective clothing to safeguard against clothing or skin contamination is of course mandatory in working with these highly toxic materials. The room has also had an emergency eye wash fountain and shower installed. Cholinesterase activity levels were determined for 6 employees working with these toxic organic phosphorus compounds. The red cell and plasma activity levels were within normal limits.

* * * * * *

Carcinoma of the Skin in Machine Tool Setters

J. G. Fife. From H.M. Medical Inspectorate of Factories, Ministry of Labour. Brit J Industr Med 19(2): 123-125, April 1962.

For many years it has been known that carcinoma of the skin occurs through prolonged contact with mineral oils, and on January 1, 1920, this disease was added to the list of notifiable diseases under the Factories Acts. In 1930 statutory recognition was given to the disease for compensation purposes, and it is now one of the Prescribed Diseases (No. 23(c)) under the National Insurance (Industrial Injuries) Acts.

Cruickshank and Squire (1950) reported the results of their research into skin cancer in the engineering industry arising from the use of mineral oil. They described hyperkeratotic lesions on the arms of 60% of workers exposed to mineral oils for more than 15 years, and carried out biological tests which showed that a sample of cutting oil produced a benign tumour in rabbits.

Six cases of squamous-cell carcinoma in machine tool workers in one plant were reported by Mastromatteo (1955), and an experimental study of the carcinogenicity of cutting oils was carried out by Gilman and Vesselinovitch (1955).

The 2 cases of squamous epithelioma described in this paper were notified in 1961 and occurred in capstan tool setters from the same large engineering works.

Investigation of Working Conditions

The 2 men were working together in the same machine shop and were personal friends. The machine shop was large and contained many rows of machine tools, mostly capstan lathes. Over 200 people (men and women) worked in the shop.

Examination of the lathes showed that large amounts of cutting oils and coolants were used, and were sprayed from the work on to the workers' clothes,

especially in high speed operations. In some cases attempts had been made to fit splash guards, but these were not used consistently. Neoprene aprons were provided and most of the women were wearing them, but the men were wearing their own clothes which, in most cases, were soaked with oil.

The oils were of a type in common use in industry; one was mixed with 20 parts of water to one of oil, and the other was used undiluted.

Case Reports

Case 1. —Male, aged 48 years (born December 18, 1912), had been a capstan lathe setter in the same factory since 1948, and had been a lathe worker or machine tool operator in various other engineering firms from 1930 to 1948.

Over his ordinary clothes, he wore a boiler suit which he changed weekly, and he did not wear the apron provided.

Medical History. —In 1946 a wart appeared on his scrotum. He removed the wart with a patent ointment.

Early in 1960 he noticed a "sore" under his scrotum on the site of the previous wart. Six months later this began to bleed, and in August 1960 he noticed that the glands in his groin were enlarged, but was too embarrassed to see his doctor. The "sore" was 2 in. in diameter.

In January 1961 he consulted his general practitioner who referred him to the Liverpool Royal Infirmary where he was operated on by Mr. Helsby in February 1961. The scrotum, left testicle, and inguinal glands were removed from both groins. Skin grafting was needed to assist healing.

The pathological report showed a keratinizing squamous carcinoma of the scrotum.

In July 1961 examination revealed some oedema of the lower abdominal wall and upper thighs. There were no signs of any hyperkeratosis on the arms or elsewhere on the body.

Case 2. —A male, aged 52 years (born January 5, 1909), had been a capstan lathe setter in the same factory for 20 years. He started work as a linotype apprentice in 1923, but then worked as a machine tool operator from 1925 to 1930 and 1939 to 1940 in other factories.

He did not regularly wear the apron provided but washed his working clothes at home once a week.

Medical History. —He noticed an irritation of his groin and crotch early in 1960 but was too shy to report this to his own doctor (a woman). He treated it with a patent ointment.

In April 1961 he noticed a warty swelling at the back of the scrotum, 3 in. in diameter, which ulcerated. He was admitted to Liverpool Royal Infirmary where he was operated on by Mr. Brewer who removed the scrotum and testes in toto on June 2, 1961. The inguinal glands were not removed. Pathological examination showed a squamous carcinoma.

On examination in July 1961 it was noticed that he had hyperkeratotic patches on the back of his right forearm.

TABLE 1

NUMBERS OF CASES OF SKIN CANCER NOTIFIED TO H.M. CHIEF INSPECTOR OF FACTORIES, 1944 TO 1959

Year	Total		Due to Tar and Pitch		Due to Mineral Oil			
					Cotton Industry		Other Industries	
	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths
1944	205	20	160	3	43	17	2	—
1945	215	9	176	1	39	8	—	—
1946	245	32	201	4	38	25	6	3
1947	203	15	173	5	25	9	5	1
1948	233	18	199	6	32	12	2	—
1949	190	13	162	3	26	10	2	—
1950	195	13	167	5	22	8	6	—
1951	178	1	159	—	13	1	6	—
1952	157	2	121	1	32	1	4	—
1953	256	70	196	26	57	43	3	1
1954	173	12	143	3	23	6	7	3
1955	211	18	163	5	40	11	8	2
1956	199	23	154	12	36	8	9	3
1957	197	12	172	9	21	1	4	2
1958	176	16	136	3	24	6	16	7
1959	226	9	190	—	20	4	16	5

TABLE 2

BODY DISTRIBUTION OF SKIN CANCER DUE TO MINERAL OIL IN INDUSTRIES OTHER THAN COTTON, 1950 TO 1959

Year	Total		Scrotum		Leg		Hands and Arms		Face	
	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths
1950	6	—	3	—	—	—	3	—	—	—
1951	6	—	4	—	—	—	—	—	2	—
1952	4	—	3	—	—	—	1	—	—	—
1953	3	1	1	1	—	—	2	—	—	—
1954	7	3	6	2	1	1	—	—	—	—
1955	8	2	4	2	—	—	4	—	—	—
1956	9	3	5	2	—	—	3	—	1	1
1957	4	2	3	2	—	—	—	—	1	—
1958	16	7	11	7	—	—	5	—	—	—
1959	16	5	10	4	—	—	4	1	2	—
Totals	79	23	50	20	1	1	22	1	6	1

Incidence of Skin Cancer Due to Mineral Oils

Examination of the statistics reveals an increasing number of cases of skin carcinoma due to mineral oils associated with work other than the cotton industry, by far the most frequent occupation being that of machine tool setter or operator. It also shows the large proportion of fatal cases compared with skin cancer due to pitch and tar. The scrotum is the commonest site, and details of the 54 cases notified between 1920 and 1943 are given in Henry's classic "Carcinoma of the Scrotum in Relation to Occupation" (Henry, 1946).

The number of cases of skin cancer notified to H. M. Chief Inspector of Factories from 1944 to 1959 is shown in Table 1. The large number of fatal cases in 1953 includes several cases from previous years revealed by examination of the Registrar-General's records.

The body distribution of the cases of skin cancer due to mineral oils in occupations other than the cotton industry from 1950 to 1959 is given in Table 2. This shows the preponderance of scrotal cases.

The occupations of the cases of skin cancer occurring outside the cotton industry are shown in Table 3. Clinical details of many of the cases are given in the Annual Reports of H. M. Chief Inspector of Factories.

Discussion. —Details of the early employment history could not be obtained more accurately. The induction time in Case 1 was probably about 30 years,

TABLE 3
OCCUPATIONS OF CASES IN TABLE 2

Occupation	No. of Cases	Deaths
Machine tool setters and operators	57	15
Jute workers	4	1
Oil converters	3	—
Shale oil stillmen	2	—
Other occupations (one case each)*	13	7

*Labourer, chain assembler, boiler (coke-fired), and oil lubricator attendant; power press operator; carriage and wagon examiner; carburetted water gas operator; cleaner and oiler in card-room; cooper and drum repairer; metal turner; gear cutter; wire drawer; burning, rivetting, and drilling in ships and boilers; rolling mill operator.

assuming that the wart in 1946 was non-malignant, and in Case 2 about 36 years.

The tragedy of the 2 cases described in this paper is that both men were working with a known carcinogen and that, owing to personal reticence, neither of them consulted a doctor until the condition had been present for over a year. By this time the disease had progressed so far that a severe mutilating operation was necessary. Both cases had used self-medication with a patent ointment, a practice which should be wholeheartedly condemned.

Periodic medical examination, if undertaken with sufficient frequency, would have revealed the disease in an early stage when treatment would have been simple and might have resulted in a complete cure. The ultimate prognosis in the 2 cases reported is not good. No legal action has been taken in these cases.

Senior executives and works' managers in the engineering industry generally and the men on the shop floor do not seem to be aware, on the whole, of the possibility that cutting oils may cause cancer. In the cotton industry "mule spinners' cancer" is well known, and precautions are taken accordingly; the use of a non-carcinogenic oil is obligatory under The Mule Spinning (Health) Special Regulations, 1953. There is a compulsory periodic medical examination for mule spinners, and voluntary examinations have been instituted in other industries such as tar distilleries.

There was an increase in 1958 and 1959 in the numbers of cases of skin cancer due to mineral oil among machine tool setters and operators. The account of these 2 men, working side by side, who underwent mutilating operations draws attention to the need for preventive measures. The working conditions in machine shops vary greatly. In some factories the lathes are fitted with adequate well-designed splash guards, and the operators' clothes are only slightly soiled. In other shops the machines spray oil all around and the lathes and floors become covered with oil and the workers' clothes become soaked. High speed machines particularly need attention, for these use more oil and coolants which tend to be thrown off by centrifugal force.

Personal cleanliness, the supply of clean protective clothing, the design of efficient splash guards on machines, and the use of non-carcinogenic oils, are needed; but above all it is only by the periodic medical examination of all machine tool setters and operators that the number of severe and fatal cases of skin cancer can be reduced. Retired workers must not be forgotten, for the period of contact before cancer develops may often be over 30 years. In the factory concerned, voluntary periodic medical examinations of all machine tool workers have been instituted.

A useful summary of the problem is given in the leaflet "Effects on the Skin of Mineral Oil" issued free by the Ministry of Labour, H. M. Factory Inspectorate (Form 295), which is suitable for distribution to all people who are working in contact with mineral oil.

RESERVE SECTION

Functional Mission and Functions of Commanding Officers (Officers in Charge) of Naval Reserve Training Activities

(1) Functional Mission. The functional mission of the commanding officer (officer-in-charge) of a Naval Reserve training activity is to advise, assist and support all assigned Naval Reserve units in order to ensure effective training, administration, recruiting and mobilization readiness within the units assigned and to cultivate and maintain friendly and cooperative community relations.

(2) Functions.

(a) Perform the duties of a commanding officer (officer-in-charge) as prescribed by Navy Regulations, with respect to the training activity, its equipment and assigned active duty personnel.

(b) Represent the Commandant with regard to the fulfillment of his responsibility for the conduct of effective training and community relations programs.

(c) Provide maximum training support by active duty personnel to assigned Naval Reserve units.

(d) Provide maximum logistic and administrative support to assigned units with respect to shops, training equipment, and material, including assistance by active duty personnel.

(e) Provide logistic support including minor repair services, and shop and training facilities for Naval Reserve training ships assigned under his cognizance.

(f) Promote a spirit of mutual cooperation and undivided effort between active and inactive duty personnel, and among units under his cognizance, to further the fulfillment of the mission of the Naval Reserve.

(g) Exercise surveillance and conduct informal inspections as necessary of assigned Naval Reserve units to the extent of being currently knowledgeable of the status of personnel, their preparation for advancement, and state of training in maintaining readiness for mobilization.

(h) Advise and assist commanding officers of assigned units to ensure that training is conducted in accordance with current directives, that full and efficient use is made of prescribed methods, curricula and training materials, and that reservists are assigned to units most appropriate to their qualifications and the needs of the Navy.

(i) Advise and assist commanding officers of assigned units to ensure compliance with current directives with regard to administration of Naval Reserve matters.

(j) Designate qualified personnel to check out trainees in practical factors.

(k) Coordinate unit recruiting efforts. Coordinate Naval Reserve recruiting with the local Navy recruiting services. Actively participate in Naval Reserve recruiting, making full use of assigned active duty personnel, in order to maintain personnel strengths of units assigned, through an effective recruitment program.

(l) Give first priority in recruiting and reaffiliation to filling vacancies in Reserve Crews of Naval Reserve training ships berthed in the vicinity of his training activity.

(m) Recommend to the commandant actions considered necessary or advisable for fulfillment of the mission of the Naval Reserve when such actions are beyond the authority of the commanding officer (officer-in-charge).

(n) Maintain liaison with local civic and military officials and activities, including high school counselors, in conjunction with unit commanding officer.

(o) Perform such other duties as may be directed by the commandant or higher authority.

* * * * * *

Mission and Functions of Commanding Officers of Naval Reserve Units

(1) Mission. The mission of the commanding officer of a Naval Reserve unit is to administer an effective training program for all personnel under his command in support of the stated mobilization requirements of the program to which attached.

(2) Functions.

(a) Perform the duties of a commanding officer as prescribed by Navy Regulations.

(b) Promote a spirit of mutual cooperation and coordinated effort among personnel of his unit, of other units in the area and towards assigned active duty personnel, to further the fulfillment of the mission of the Naval Reserve.

(c) Direct the training program of his unit in accordance with current directives, ensuring that personnel make full and efficient use of prescribed methods, curricula and training materials to attain maximum effectiveness in the accomplishment of its mission.

(d) Exercise forceful leadership over-all, and in particular be current and knowledgeable of details with respect to the status of personnel, their preparation for advancement, and the effectiveness of training towards maintaining readiness for mobilization duties .

(e) Direct the administration of his unit in accordance with current directives.

(f) Conduct a vigorous recruiting program to maintain unit strength, in cooperation with the commanding officer or officer-in-charge of the supporting Naval Reserve training activity.

(g) Avail himself of the advice of the commanding officer or officer-in-charge of the supporting Naval Reserve training activity; effectively use the assistance provided by active duty personnel; and advise the commanding officer or officer-in-charge of the supporting Naval Reserve training activity in a timely manner of logistic support requirements, including training materials and equipment.

(h) Make regular reports to the commandant with respect to the general progress of his unit, including the state of training, efficiency of administration, effectiveness of recruiting and adequacy of active duty support, and the existence of any problems affecting the mission and mobilization readiness.

(i) Maintain liaison with local civic and military officials and activities, including high school counselors, to promote a climate favorable to the Navy and the Naval Reserve within the community, in cooperation with the commanding officer or officer-in-charge of the supporting Naval Reserve training activity, and the commanding officers of other units in the area.

(j) Perform such other duties as may be directed by the commandant or higher authority.

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