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AMERICAN REGISTRY OF PATHOLOGY

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8 June 1955



Dr. John C. Bugher  
Chief, Division of Biology & Medicine  
Atomic Energy Commission  
Washington, D. C.

Dear John:

We are forwarding for your examination the available material on the Japanese fallout case. The record is represented by several appendices and promises to become somewhat lengthy. The essential elements, however, I believe you will find in Appendix A, Clinical Summary. Under separate cover, we are forwarding a set of slides.

We look forward to any comments which you may have on the enclosed material.

Sincerely yours,

*J. DeCoursey*  
ELMER DeCOURSEY  
Brig Gen, MC, USA  
The Director

- 6 Encls. . .
1. Appendix A, Clinical Summary
  2. Microscopic Exam.
  3. Consultant Comment
  4. Report of Autopsy Observation (Col J. L. Hansen)
  5. Pathologic Findings on late Mr. Kuboyama (S. Chashi)
  6. Photographs - Skin Lesions

US DOE ARCHIVES	
326 US ATOMIC ENERGY COMMISSION	
Collection DBM	
376-78-3 Box-3	
MRA Radiation Exposures JP Fishing Trade 1955	

NON-CCRP 50-103

US DOE ARCHIVES

MILITARY MEDICAL & APPL. 1-6

STATUS VERIFIED UNCL  
BY Jan Diaz DATE 4/15/81

PHYSICAL EXAM

Japanese male, age 40, exposed 1 March 1954 to radioactive fallout at a point approximately 100 miles east of Bikini. Visible ash-like material fell for about 5 hours on boat on which patient was wireless operator. Some period after exposure to ash-like material, patient experienced nausea, vomiting and anorexia. Severe conjunctivitis also reported. Apparently there was no specific knowledge of nature of fallout and no specific decontamination procedure. First seen by Japanese physician 16 March 1954, 2 days after returning to port. Admitted to local hospital on this date. General pigmentation of exposed body surfaces was noted and ulceration at sites of clothing restrictions, such as around the waist, neck and inside boots. Ulceration also present in outer ear and at back of head. Partial epilation was noted. Patient complained of weakness, anorexia, and nausea upon ingestion of food. Diagnosis of radiation sickness made. Petechiae and mucous membrane hemorrhages noted.

Transferred 28 March 1954 to First Tokyo National Hospital. HGB 3.0H, WBC 9,100, platelets 43,000, bone marrow 18,000 cells/cm<sup>3</sup>. Liver palpable. No jaundice.

Within a week HGB 3.4, WBC 19000 of which 11% were nucleated red cells. Platelets 30,000 (est.).

Treatment included fresh whole blood transfusions at this point for 6 consecutive days (once 200 cc, others unspecified but probably 50 - 100 cc), then daily plasma transfusions during a period of almost 6 weeks, with 5 more units of whole blood during this period. Total dry plasma = 61 liters. HGB to 4.5H and WBC to 5000 - 6000.

Jaundice noted 26 June, 83 days after first transfusion, and after a 45 day period practically asymptomatic. Jaundice progressively and gradually worse.

Terminal 14 days characterized by periods of coma, elevated temperature, elevated HGB. Developed pulmonary edema, pneumonia, cardiac failure, died 23 Sept - 207 days after exposure to fallout.

Related history - patient apparently had two previous episodes of jaundice several years previously. Two brothers of patient, one older, one younger, had died with jaundice.

PHYSICIAN'S GENERAL APPEARANCE

Marked jaundice present. Nutrition fair. Edema of extremities and dependent portions of body. Areas of alopecia posterior occipital area, with slight sparing of hair in some areas. Healed scars around mid-abdominal region with variable skin color. Scars on chest penis probably representing healed ulcers.

Yellow fluid all body cavities, 500 - 700 in pleural cavities, 3000 cc in abdominal cavity. Pericardial sac distended.

Spleen 16 grams.

Lungs - marked edema. Suppurative confluent pneumonia with focal abscess areas.

... (S...)

... 100 gms, pulp fibrous and dry.

... yellow, surface scarred and lobular. Cut surface mottled showing  
... hemorrhagic areas. Weight 660 gms.

... gms. Pale, swollen.

... appearing atrophic.

... narrow in ribs and vertebrae. Upper third femur red and active  
... decrease, central and lower portion of shaft yellow and fatty.

Data (Iryo, Journal of Medical Affairs, Bureau Ministry of Health  
& Welfare) (Japan Analyst - Japan Society for Analytical  
Chemistry)

... of fall-out caesium hydroxide, activity 23 April, reported to be  
... 23 nuclides identified, including Iodine, Strontium, Barium,  
... Plutonium. Decay stated to be 100%<sup>137</sup>. Remaining radionu-  
... clides reported to be about 100 mR/hr on 17 Mar. Radioactivity was found  
... in the crew. Total dose to crew members estimated by Japanese  
... to 400 r gamma external whole body, not including additional

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## MICROSCOPIC EXAMINATION

BONE MARROW SITE OF SPECIMEN NOT KNOWN. THERE ARE LOCALIZED AREAS OF MODERATE HYPERPLASIA OF BOTH ERYTHROID AND LYELOID ELEMENTS, ALL STAGES OF MATURATION BEING REACHED. THERE ARE SLIGHTLY INCREASED NUMBERS OF MITOTIC FIGURES. THE MEGAKARYOCYTES ARE NORMAL IN APPEARANCE AND NUMBER. PIGMENT IS PRESENT IN SMALL AMOUNTS, MOST BEING IRON POSITIVE. NO EXCESSIVE ERYTHROPHAGOCYTOSIS, NUCLEAR FRAGMENTATION OR OTHER EVIDENCE OF ACUTE DEGENERATIVE CHANGE IS NOTED. THE VESSELS SHOW NO SIGNIFICANT FINDINGS.

LYMPH NODE SITE OF SPECIMEN NOT KNOWN. THE LYMPHOID TISSUES IN THIS SECTION ARE NOT VERY ACTIVE. THERE APPEARS TO BE SOME REDUCTION IN LYMPHOCYTES AND MODERATE RETICULUM PROLIFERATION, BUT WITHIN NORMAL VARIATION OF THESE TISSUES. THERE ARE NO SIGNIFICANT AMOUNTS OF PIGMENT OTHER THAN SCATTERED IRON NEGATIVE YELLOW GRANULES IN THE PERIPHERAL SINUSES.

SPLEEN THERE IS MODERATE INCREASE IN THE RETICULUM WITH SOME THICKENING OF THE SINUS WALLS AND ACCENTUATION OF THE SINUSOIDAL AREAS, WITH IRREGULAR MODERATE DISTENTION. PIGMENT OCCURS AS FREQUENT LARGE INTERCELLULAR GRANULES MOSTLY NEGATIVE BY PRUSSIAN BLUE REACTION. THE CAPSULE IS NOT REMARKABLE. THE FOLLICLES GENERALLY ARE SMALL WITH A FEW AREAS OF HYALINIZATION. NO ACTIVE GERMINAL CENTERS ARE SEEN.

LIVER THE LIVER TISSUES PRESENT EXTENSIVE CHANGES WITH A PATTERN OF IRREGULAR ATROPHY AND NECROSIS. THE PERIportal AREAS SHOW BOTH ACUTE AND CHRONIC INFILTRATE, DUCT PROLIFERATION, CONNECTING BANDS OF CONDENSED STROMA WITH PERHAPS SOME CONNECTIVE TISSUE INCREASE. THE LIVER CORDS ARE INTERRUPTED WITH MODERATE VARIATION IN CELLULAR APPEARANCE AND A HIGH PIGMENT CONTENT. THERE ARE NUMEROUS LARGE BILE THROTTI. THE RETICULUM CELLS ARE SWOLLEN AND VACUOLAR WITH LARGE AMOUNTS OF PIGMENT, FREQUENTLY IRON POSITIVE. THE LIVER PRESENTS A SMALL LOBULAR IRREGULAR PATTERN WITHOUT SIGNIFICANT REGENERATIVE LOBULES. THERE ARE SMALL IRREGULAR AREAS OF RED CELL EXTRAVASATION IN THE NECROTIC AREAS WHICH CONSIST LARGELY OF REMAINING RETICULAR STROMA.

HEART THE CARDIAC TISSUE SHOWS FINDINGS ATTRIBUTABLE TO TERMINAL TOXIC EFFECTS, WITH INTERSTITIAL EDEMA AND SCATTERED MONONUCLEAR CELLS. CHANGES ARE PARTICULARLY SEVERE THROUGH THE RIGHT VENTRICULAR AREA. A SMALL SUBENDOCARDIAL HEMORRHAGIC AREA IS PRESENT. A MILD MONONUCLEAR INFILTRATE IS PRESENT IN THE SUBEPICARDIAL REGION.

TESTES THERE IS GENERAL ATROPHY OF THE GERMINAL TISSUE. OCCASIONAL GROUPS OF CELLS IN THE BASAL AREA OF THE TUBULES RESEMBLE GERMINAL EPITHELIUM. SPERMATOGONIA ARE NOTED OCCASIONALLY NEAR THE BASAL AREA. LATER STAGES ARE NOT PRESENT. THE BASEMENT MEMBRANE IS IRREGULAR, FIBRILLAR AND FREQUENTLY THICKER THAN NORMAL. GREATER CELLULARITY IS NOTED IN PORTIONS OF THE INTRATUBULAR AREA. THERE ARE NO SIGNIFICANT VASCULAR CHANGES.

KIDNEY SECTIONS OF KIDNEY SHOWED GENERALLY CONGESTED VESSELS. TUBULES ARE DILATED AND FREQUENTLY CONTAIN BILE CASTS AND PROTEIN COLLECTIONS. IN THESE AS WELL AS OTHER AREAS THERE ARE MORE OR LESS FOCAL AREAS OF EXTENSIVE TUBULAR EPITHELIAL DEGENERATION ACCOMPANIED BY ACUTE INFLAMMATORY CELLS BOTH WITHIN THE TUBULE AND FREQUENTLY IN ADJACENT INTERSTITIAL AREAS. ALMOST THE ENTIRE REMAINING TUBULAR EPITHELIUM, BUT PARTICULAR THE PROXIMAL CONVOLUTED AREA, SHOWS EXTENSIVE

KINLEY (CONT'D) SWELLING, GRANULAR DEGENERATION AND LOSS OF CELLULAR DETAIL, INDICATIVE OF PROFOUND TOXIC CHANGES. TUBULES ALSO CONTAINED BASOPHILIC CONCENTRIC BODIES WHICH WERE NOT IDENTIFIED. THE GLOMERULI WERE SOMEWHAT ENLARGED AND THE CAPSULES DISTENDED AS THE RESULT OF LARGE AMOUNTS OF PROTEIN CONTAINING FLUID IN THE CAPSULAR SPACE. NO SIGNIFICANT CHRONIC DEGENERATIVE CHANGES WERE NOTED IN THE GLOMERULI.

HISTOPATHOLOGIC DIAGNOSES

HYPERPLASIA OF BONE MARROW (MILD).  
SPLENIC FIBROSIS (MILD).  
ATROPHY AND DEGENERATION OF LIVER, ACUTE AND CHRONIC.  
MYOCARDIAL DEGENERATION.  
TESTICULAR ATROPHY.  
NEPHROSIS, ACUTE, TOXIC.  
NEPHROSIS LOWER NEPHRON.

COMMENT

THIS CASE REPRESENTS APPARENTLY A FINAL CLINICAL PICTURE OF HEPATO-RENAL FAILURE WITH A TERMINAL PICTURE OF PNEUMONIA. (LUNG TISSUE NOT SUBMITTED). IN SEARCHING FOR THE INITIAL RADIATION DAMAGE IN THIS CASE, THERE IS NO FINDING OR COMBINATION OF FINDINGS IN THIS MATERIAL TO ESTABLISH PRESENT OR PREVIOUS RADIATION DAMAGE UNEQUIVOCALLY. OF THE PRESENT FINDINGS, THOSE WHICH COULD BE ATTRIBUTABLE TO RADIATION ARE THE TESTICULAR ATROPHY, MILD SUPPRESSION OF LYMPHOID ELEMENTS, AND PERHAPS PIGMENT DEPOSIT AS EVIDENCE OF PREVIOUS DEGENERATIVE CHANGES. IT MUST BE EMPHASIZED HOWEVER THAT NONE OF THESE, OR THE COMBINATION OF FINDINGS, IS SPECIFIC FOR RADIATION, AND FURTHERMORE ARE FINDINGS FREQUENTLY SEEN IN THE SECONDARY CONDITIONS OCCURRING IN THIS CASE, NAMELY SEVERE HEPATITIS, NEPHROSIS, AND A TERMINAL TOXIC INFECTION. NO SKIN MATERIAL HAS BEEN AVAILABLE FOR EXAMINATION AND THE EXTENT OF DAMAGE CAN ONLY BE INFERRED. THIS GENERAL PICTURE LEAVES ESSENTIALLY UNDETERMINED THE DEGREE OF TOTAL BODY DAMAGE ATTRIBUTABLE TO RADIATION. THERE IS UNEQUIVOCABLE EVIDENCE THAT THIS CASE DOES NOT REPRESENT DEATH FROM THE INITIAL AND PROGRESSIVE CHANGES DUE TO RADIATION. THERE SEEMS TO BE EQUALLY NO DOUBT THAT THE INITIAL PHASES WERE THOSE OF ACUTE RADIATION INJURY WITH SUBSEQUENT RECOVERY, FURTHER COMPLICATED BY SOME PROCESS OR PROCESSES OCCURRING DURING TREATMENT. THE BEST ESTIMATE IN THIS REGARD IS THE SUPER POSITION (OR COMPLICATION) OF HOMOLOGOUS SERUM HEPATITIS FOLLOWED BY RENAL FAILURE AND PNEUMONIA, PRESUMABLY AT THE SAME TIME, WITH TERMINAL CARDIAC FAILURE.