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MEETING OF JOINT PANEL

MEDICAL ASPECTS OF ATOMIC WARFARE

RESEARCH AND DEVELOPMENT BOARD

Summary of Work

Division of Medical Services

Rochester Atomic Energy Project

Submitted by
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January 25, 1951

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ORGANIZATION & MANAGEMENT

I. Isotopes and Services - R. Hayes

Isotope Program - Hospitals

Clinical Research Program

1. Na^{24} - Diffusion Joint Spaces - R. F. Jacox

2. I^{131} - Diabetes - J. Izzo

3. I^{131} - Cardiac Disease - W. S. McCann, F. W. Lovejoy

4. Diiodofluorescein - Brain Tumors - W. P. Van Wagenen

5. Protein-bound Iodine - Thyroid Disease - General

Accountability - Isotope Procurement

1. Atomic Energy Project

2. University of Rochester

II. Medical Physics - H. Mermagen

1. Neutron Monitoring

Film Monitoring Method - Rhodium, silver, cadmium, lead and direct exposure used. Rhodium - Straight line relationship up to 4 times maximum allowable exposure. Polonium-beryllium energies roughly equivalent to small cyclotron energies (>4 Mev). Useful Range - 20 $n/cm^2/sec.$ to 500 $n/cm^2/sec.$ over an 8 hour daily exposure, 5 days weekly. Maximum permissible dose - 45 $n/cm^2/sec.$

Fast Neutron Counter - Methane proportional - capable in some degree to be energy conscious in polonium-beryllium region by voltage adjustment on counter. Small cyclotron used in further testing.

Crystal Counter for Neutron Detection and Measurement - Stilbene, anthracene, terphenyl, solid and liquid. Not yet thoroughly

1153824

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tested against sources or cyclotron energies. Incorporation of scintillating crystals in polymers equivalent to body element in distribution. Lucite chambers for depth dose in a lucite phantom containing bacteria. Biological dosage measurement.

C^{14} and S^{35} - low energy measurement on crystal counters.

Improved Clinical Counters and Rate Meters - Thyroid, brain, joint, etc.

Iodine Fluid Counter - Multiple GM tube - low background counter.

2. Routine HP Monitoring - University / Atomic Energy Project } -Health and HP

1. Photographic Monitoring
2. Finger Ridge Monitoring

III. Hematology and Project Health - M. Ingram

1. Research - Study of the production of abnormal bilobed lymphocytes (cyclotron cells) in humans and dogs exposed to high energy generators (cyclotrons). Ratio of normal to abnormal cells significant (number of abnormals in 1000 cells counted). Demonstration of cells. Not present in low voltage exposure (20-200 KV). Experiments on type of energy which acts as causative factor. Use in biological monitoring of high energy equipment.

   Air Force - Interest in Cosmic Ray Effect

2. Routine Health Examinations - Interest in chronic effects of ionizing irradiation stressed.

1153825

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IV. Therapy (Acute Radiation Physiology and Therapy) - J. W. Howland

Organization - Bacteriology and Clinical Physiology - F.W.Furth, M. Coulter

Metabolism and Nutrition - T. R. Noonan

Endocrinology - B. J. Duffy, Jr.

Clinical Chemistry - W. B. Mason

Rat Program - Exposure: 700 r (LD 80-90/150 rats) at 250 r. Rate 16 r/min. Filtration - aluminum and copper. 30 animal groups, individually housed, fed with standard diet.

Medications oral(food and/or water)

30 day study period

Observations

Morbidity

Mortality

Weight change

Diarrhea

Bacteriology

Materials Tested (Rats) - Penicillin, Streptomycin, Chloromycetin, Aureomycin, Terramycin, Tyrothricin. Polymixin and Neomycin arranged for.

Sulfadiazine, Sulfaphthaladine, Nisulfazole

Oral vs. parenteral routes - Streptomycin, Penicillin, Aureomycin.

High and low concentrations - Aureomycin, Terramycin

Delayed medication

Pre-radiation medication - Aureomycin

1153826

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Vitamin E - Gyorgy

Diets Tested - High protein, low protein, low fat, high Cho. No effect on various diets.

Results - Slight to moderate improvement morbidity and mortality - terramycin, aureomycin.

Weight loss - gain increased post-radiation - aureomycin, terramycin, mash superior to crystallized.

Improvement in diarrhea - all antibacterial medications, aureomycin and terramycin in general superior.

No effect - Vitamin E, tyrothricin, nisulfazole.

Dog Program - Exposure - 450 r (LD/80-90) at 250 KV. Rate 7-8 r/min.

Filtration - 0.5 mm. Cu and parabolic aluminum.

Observations

Morbidity

Mortality - 90 day

Weight

Clinical condition

Hematology

Bacteriology - Blood, stool, sensitivity of organisms

Observations on hemorrhage

Pathology - Gross, microscopic

Fluid and electrolyte balances

Steroid Excretion

Materials Tested - Aureomycin, Terramycin, Penicillin, Streptomycin, Chloromycetin, Rutin, Protamine, Re-radiation, direct transfusion.

1153827

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Results - Improvement in morbidity and mortality - Aureomycin and terramycin.

Alteration in bacterial flora of intestine - aureomycin more than terramycin. Depression with combined.

No effect on blood changes - any material so far tested.

No marked effect on hemorrhage as causative factor in death.

Improvement in frequency, amount and extent of bowel hemorrhage.

Pathology - as of time of death. Pathological signs of infection reduced or absent in treated animals. Changes due to Pseudomonas and Proteus unaffected.

Re-radiation of surviving animals (20) - death in 19 of 20. No effect of therapy noted. No development of tolerance.

One survivor to 900 r in 5 month period.

Chloromycetin questionably toxic. Retesting planned.

No effect Rutin and Protamine.

Direct transfusion maintaining hemoglobin at 80% of control values - not beneficial. Animals died more rapidly than controls. 4 animals only.

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