HEALTH RECORD	CHRONOLOGICAL RECORD OF MEDICAL CARE
DATE	SYMPTOMS, DIAGNOSIS, TREATMENT, TREATING ORGANIZATION (*Sign each entry*)
	SPECIAL 600 DO NOT REMOVE FROM RECORD 721521
6 AUG 81	NMRI, Bethesda, Maryland 20814

On 10 SEP 80, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emmiter, $T_{1/2}$ = 10 min, effective energy deposition in lung tissue = 0.531 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/l, and allowed to decay for 19 min while the activated gas was analyzed (O_3 <0.3 ppm, NO_2 <5 ppm). 50 l of the N-13 was mixed with 13.3 l of O_2 and then 20 l room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 60 min room air breathing followup; all while being studied positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded 0 dose; a whole body count showed only normal amounts of K-40 after the experiment. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annhilation were under 10 mrad. Tracheal exposure was estimated as 140 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 300 mrad from the following calculation:

Specific activity = (1.75 mCi/l N-13)x(50 l N-13 / 83.3 l gas)
x exp ((-19)(.693)/(10))
= 0.28 mCi/l

Assuming a lung mass of 1000g and mid-tidal volume of 4.5 l;
Initial dose rate = (0.28 mCi/l)x(4.5 l/lung)x(.531MeV/d)x(3.7×10^{7} d/s-mCi)
x(1.6×10^{-6} erg/MeV) / (100 erg/g-rad)(1000 g/lung)
D(0) = 4.0×10^{-4} rad/s

Total Exposure = D(0) x (10min/.693) x (1 - exp((-30)(.693)/10)
x 60 sec/min x 1000 mrad/rad
= 300 mrad

P.K. Weathersby
P.K. WEATHERSBY
LCDR, MSC, USN

E.T. Flynn
E.T. FLYNN
CAPT, MC, USN

REPOSITORY LLNL
COLLECTION Paul Meyer's papers
BOX No. Human Research Navy / Decomp. Sickness Exper. Study / Files
FOLDER N/A

PATIENT'S IDENTIFICATION (*Use this Space for Mechanical Imprint*)

PATIENT'S NAME (*Last, First, Middle initial*)			SEX
[redacted]			M
YEAR OF BIRTH	RELATIONSHIP TO SPONSOR	COMPONENT OR STATUS	DEPARTMENT OR SERVICE
[redacted]		U.S. Navy	DOD
SPONSOR'S NAME			RANK/GRADE
			HM1(DV)
SVC OR IDENTIFICATION NO.		ORGANIZATION	
[redacted]		NMRI	

CHRONOLOGICAL RECORD OF MEDICAL CARE
Standard Form 600
February 1969
General Services Administration and
Interagency Comm. on Medical Records
FPMR 101-11.809-3
600-103

P. Meyer copies

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U.S. GOVERNMENT PRINTING OFFICE: 1976 - 221-205

GENERAL SERVICES ADMINISTRATION AND
INTERAGENCY COMMITTEE ON MEDICAL RECORDS
FPMR 101-11.806-8
OCTOBER 1975

Research Work Unit:63713N.M0099PN.01A

CLINICAL RECORD	NARRATIVE SUMMARY	
DATE OF ADMISSION	DATE OF DISCHARGE	NUMBER OF DAYS HOSPITALIZED
-NA-	-NA-	-NA-

(Sign and date at end of narrative)

On 6 May 1982, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed a normoxic mixture of N_2, Ar, and O_2 from a recirculation system containing the radioisotopes N-13 (positron emitter, $T\frac{1}{2}$=10 min.) and Ar-41 (beta and gamma emitter, $T\frac{1}{2}$=110 min.). The isotopes were simultaneously produced in an accelerator to a specific activity of 0.88 mCi/L of N-13 and 0.030 mCi/L of Ar-41. Less than 0.00001 mCi/L of Ar-39 was also produced but would contribute a negligible dose. During a 16 min period (N-13 decay to 0.29 mCi/L), the activated gas was analyzed (O_3<0.3 ppm, NO_2<5 ppm) and 50/L of it was mixed with 12.5/L of O_2 and then 20/L of room air (dilution factor of 50/82.5=0.61). The experiment consisted of 120 min. quiet breathing of the gas mixture, maintained normoxic, while the subject was studied with gamma detectors.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded <10 mrad; a whole body count showed only normal amounts of K-40 after the experiment. Calculated internal exposures were under 5 mrad to non-lung tissues including gonads; 155 mrad to trachea with large airways expected to be lower; and 185 mrad to the lungs.

Exposure calculations are given below:

Dose=SA(mCi/L) Te(min) [V(1)/M(g)] E(MeV/dis) K(35500 mrad-g/mCi-min)

SA is maximum inspired specific activity as given above, Te is effective exposure time, E is energy per disintgration, V is organ volume of distribution M is organ mass, and K is a radiologic constant:

$$K=(3.7X10^{7}\ dis/sec\text{-}mCi)(60\ sec/min)(1.6X10^{-6}\ erg/MeV)/(0.1\ erg/g\text{-}mrad)$$

For time calculations, lung and trachea were assumed to equilibrate instantly, while internal organs were assumed to follow exponential exchange kinetics, (Biological time constant [Tb] equals tissue-blood partition cofficient divided by specific blood flow rate). The Tb was used together with the radiological decay time constant ($T\frac{1}{2}/\ln 693$) in an integration over both uptake and elimination phases to produce a single effective organ exposure time (Tc) for use with initial exposure rate. Energy deposited in tissue per disintegration (E) was obtained by adding average beta and positron energy (all tissues) plus gamma (including annihilation photons) energy absorption through 10 cm of 0.25 g/ml tissue (lung) or 1 cm of 1.0 g/ml tissue (marrow and gonad). Organ volume (V) and mass (M) were obtained by measured supine mid-tidal lung volume (FRC+.5V_T) and assumed lung mass of 1000/g; assumed volume of 30 ml and assumed mass of

(Continued)

(Use additional sheets of this form (Standard Form 502) if more space is required)

SIGNATURE OF PHYSICIAN	DATE	IDENTIFICATION NO.	ORGANIZATION
			NMRI, Bethesda, MD

PATIENT'S IDENTIFICATION *(For typed or written entries give: Name - last, first, middle; grade; date; hospital or medical facility)*	REGISTER NO.	WARD NO.
Research Work Unit:63713N.M0099PN.01A		

[redacted]

BM1(DV)/AD/USN

NARRATIVE SUMMARY
Standard Form 502
502-112

1157340

Research Work Unit:63713N.M0099PN.01A

CLINICAL RECORD	NARRATIVE SUMMARY	
DATE OF ADMISSION -NA-	DATE OF DISCHARGE -NA-	NUMBER OF DAYS HOSPITALIZED -NA-

(Sign and date at end of narrative)

13.6 g for trachea; and assumed density of 1.0 for gonad and marrow with tissue/gas partition coefficients of 0.02 in gonad and 0.05 in marrow.

Tissue		SA(mCi/L)	E(MeV)	V/M(l/g)	Tb(min)	Te(min)	Dose(mrad)
Lung	N-13	0.177	0.574	2.3/1000	<1	14.4	113
	Ar-41	0.0183	0.550	"	"	83.9	69
Trachea	N-13	0.177	0.500	.03/13.6	"	14.4	100
	Ar-41	0.0183	0.462	"	"	83.9	55
Gonad	N-13	0.177	0.530	0.00002	17	6.6	0.4
	Ar-41	0.0183	0.498	"	"	70	0.5
Marrow	N-13	0.177	0.530	0.00005	6.6	10	1.6
	Ar-41	0.0183	0.498	0.00005	"	78	1.3

P. K. WEATHERSBY
LCDR, MSC, USN

E. T. FLYNN, Jr.
Capt., MC, USN

(Use additional sheets of this form (Standard Form 502) if more space is required)

SIGNATURE OF PHYSICIAN	DATE	IDENTIFICATION NO.	ORGANIZATION
			NMRI, Bethesda, MD

PATIENT'S IDENTIFICATION *(For typed or written entries give: Name - last, first, middle; grade; date; hospital or medical facility)*	REGISTER NO.	WARD NO.
Research Work Unit:63713N.M0099PN.01A		

[redacted]
BM1(DV)/AD/USN

NARRATIVE SUMMARY
Standard Form 502
502-112

157341

HEALTH RECORD	CHRONOLOGICAL RECORD OF MEDICAL CARE
DATE	SYMPTOMS, DIAGNOSIS, TREATMENT, TREATING ORGANIZATION *(Sign each entry)*

SPECIAL 600 DO NOT REMOVE FROM RECORD

6 AUG 81 NMRI, Bethesda, Maryland 20814

On 12 SEP 80, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emmiter, $T_{1/2}$ = 10 min, effective energy deposition in lung tissue = 0.531 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/l, and allowed to decay for 18 min while the activated gas was analyzed (O_3 <0.3 ppm, NO_2 <5 ppm). 50 l of the N-13 was mixed with 13.3 l of O_2 and then 20 l room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 60 min room air breathing followup; all while being studied positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded 0 dose; a whole body count showed only normal amounts of K-40 after the experiment in addition to a smal residual N-13 signal. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annhilation were under 10 mrad. Tracheal exposure was estimated as 150 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 290 mrad from the following calculation:

Specific activity = (1.75 mCi/l N-13)x(50 l N-13 / 83.3 l gas)
x exp ((-18)(.693)/(10))
= 0.30 mCi/l

Assuming a lung mass of 1000g and mid-tidal volume of 4.0 l;
Initial dose rate = (0.30 mCi/l)x(4.0 l/lung)x(.531MeV/d)x(3.7×10^{7} d/s-mCi)
x(1.6×10^{-6} erg/MeV) / (100 erg/g-rad)(1000 g/lung)
D(0) = 3.8×10^{-4} rad/s

Total Exposure = D(0) x (10min/.693) x (1 - exp((-30)(.693)/10)
x 60 sec/min x 1000 mrad/rad
= 290 mrad

P.K. WEATHERSBY
LCDR, MSC, USN

PRIVACY ACT MATERIAL REMOVED

E.T. FLYNN
CAPT, MC, USN

PATIENT'S IDENTIFICATION *(Use this Space for Mechanical Imprint)*

PATIENT'S NAME *(Last, First, Middle initial)*			SEX
[redacted]			M
YEAR OF BIRTH	RELATIONSHIP TO SPONSOR	COMPONENT OR STATUS	DEPARTMENT OR SERVICE
[redacted]		U.S. Navy	DOD
SPONSOR'S NAME			RANK/GRADE
			CAPT, MC
SVC OR IDENTIFICATION NO.		ORGANIZATION	
[redacted]		NMRI	

CHRONOLOGICAL RECORD OF MEDICAL CARE
Standard Form 600
February 1969
General Services Administration and
Interagency Comm. on Medical Records
FPMR 101-11.809-3
600-103

1157342

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HEALTH RECORD	CHRONOLOGICAL RECORD OF MEDICAL CARE
DATE	SYMPTOMS, DIAGNOSIS, TREATMENT, TREATING ORGANIZATION *(Sign each entry)*

SPECIAL 600 DO NOT REMOVE FROM RECORD

6 AUG 81 NMRI, Bethesda, Maryland 20814

On 10 SEP 80, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emmiter, $T_{1/2}$ = 10 min, effective energy deposition in lung tissue = 0.531 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/l, and allowed to decay for 20 min while the activated gas was analyzed (O_3 <0.3 ppm, NO_2 <5 ppm). 50 l of the N-13 was mixed with 13.3 l of O_2 and then 20 l room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 60 min room air breathing followup; all while being studied positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded 0 dose; a whole body count showed only normal amounts of K-40 after the experiment. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annhilation were under 10 mrad. Tracheal exposure was estimated as 130 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 280 mrad from the following calculation:

Specific activity = (1.75 mCi/1 N-13)x(50 1 N-13 / 83.3 1 gas)
x exp ((-20)(.693)/(10))
= 0.26 mCi/1

Assuming a lung mass of 1000g and mid-tidal volume of 4.5 l;
Initial dose rate = (0.26 mCi/1)x(4.5 1/lung)x(.531MeV/d)x(3.7×10^7 d/s-mCi)
x(1.6×10^{-6} erg/MeV) / (100 erg/g-rad)(1000 g/lung)
D(0) = 3.7×10^{-4} rad/s

Total Exposure = D(0) x (10min/.693) x (1 - exp((-30)(.693)/10)
x 60 sec/min x 1000 mrad/rad
= 280 mrad

P.K. Weathersby
P.K. WEATHERSBY
LCDR, MSC, USN

PRIVACY ACT MATERIAL REMOVED

E.T. Flynn
E.T. FLYNN
CAPT, MC, USN

PATIENT'S IDENTIFICATION *(Use this Space for Mechanical Imprint)*

PATIENT'S NAME *(Last, First, Middle initial)*			SEX
[redacted]			M
YEAR OF BIRTH	RELATIONSHIP TO SPONSOR	COMPONENT OR STATUS	DEPARTMENT OR SERVICE
[redacted]		U.S. Navy	DOD
SPONSOR'S NAME			RANK/GRADE
			HT1(DV)
SVC OR IDENTIFICATION NO.		ORGANIZATION	
[redacted]		NMRI	

CHRONOLOGICAL RECORD OF MEDICAL CARE
Standard Form 600
February 1969
General Services Administration and
Interagency Comm. on Medical Records
FPMR 101-11.809-3
600-103

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GENERAL SERVICES ADMINISTRATION AND
INTERAGENCY COMMITTEE ON MEDICAL RECORDS
FPMR 101-11.808-6
OCTOBER 1975

Research Work Unit 63713N.M0099PN.01A

CLINICAL RECORD	NARRATIVE SUMMARY	
DATE OF ADMISSION	DATE OF DISCHARGE	NUMBER OF DAYS HOSPITALIZED
-NA-	-NA-	-NA-

(Sign and date at end of narrative)

On 28 April 1982, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emitter, $T_{1/2}$=10 min, effective energy deposition in lung tissue = 0.574 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/L, and allowed to decay for 15 min. while the activated gas was analyzed (O_3<0.3 ppm, NO_2<5 ppm). 50/L of the N-13 was mixed with 12.5/L of O_2 and then 20/L of room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 90 min room air breathing followup; all while being studied with a positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded <10 mrad; a whole body count showed only normal amounts of K-40 after the experiment. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annihilation were under 10 mrad. Tracheal exposure was estimated as 195 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 220 mrad from the following calculation:

Specific activity = (1.75 mCi/L N-13)x(50L N-13/83L gas)
x exp[(-15)(.693)/(10)]
= 0.37 mCi/L

Assuming a lung mass of 1000g and a measured supine mid-tidal volume of 2.3/L,

Initial dose rate = (0.37 mCi/L)x(2.3L/lung)x(.574 MeV/d)x(3.7×10^{7} d/s-mCi)
x(1.6×10^{-6}erg/MeV)/(100 erg/g-rad)(1000g/lung)

D(0) = 2.9×10^{-4}rad/s

Total exposure = D(0)x(10min/.693)x(1-exp[(-30)(.693)/10])
x 60 sec/min x 1000 mrad/rad
= 220 mrad

P. K. WEATHERSBY
LCDR, MSC, USN

E. T. FLYNN, Jr.
CAPT., MC, USN

(Use additional sheets of this form (Standard Form 502) if more space is required)

SIGNATURE OF PHYSICIAN	DATE	IDENTIFICATION NO.	ORGANIZATION
			NMRI, BETHESDA, MD.

PATIENT'S IDENTIFICATION *(For typed or written entries give: Name - last, first, middle; grade; date; hospital or medical facility)*	REGISTER NO.	WARD NO.
Research Work	Unit 63713N.M0099PN.01A	

NARRATIVE SUMMARY
Standard Form 502
502-112

[redacted] 1157344

HTC(DV)/AD/USN

000250

HEALTH RECORD	CHRONOLOGICAL RECORD OF MEDICAL CARE
DATE	SYMPTOMS, DIAGNOSIS, TREATMENT, TREATING ORGANIZATION *(Sign each entry)*

SPECIAL 600 DO NOT REMOVE FROM RECORD

6 AUG 81

NMRI, Bethesda, Maryland 20814

On 10 SEP 80, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emmiter, $T_{1/2}$ = 10 min, effective energy deposition in lung tissue = 0.531 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/l, and allowed to decay for 20 min while the activated gas was analyzed (O_3 <0.3 ppm, NO_2 <5 ppm). 50 l of the N-13 was mixed with 13.3 l of O_2 and then 20 l room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 60 min room air breathing followup; all while being studied positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded 0 dose; a whole body count showed only normal amounts of K-40 after the experiment. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annhilation were under 10 mrad. Tracheal exposure was estimated as 130 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 250 mrad from the following calculation:

Specific activity = (1.75 mCi/l N-13)x(50 l N-13 / 83.3 l gas)
x exp ((-20)(.693)/(10))
= 0.26 mCi/l

Assuming a lung mass of 1000g and mid-tidal volume of 4.0 l;
Initial dose rate = (0.26 mCi/l)x(4.0 l/lung)x(.531MeV/d)x(3.7×10^{7} d/s-mCi)
x(1.6×10^{-6} erg/MeV) / (100 erg/g-rad)(1000 g/lung)
D(0) = 3.3×10^{-4} rad/s

Total Exposure = D(0) x (10min/.693) x (1 - exp((-30)(.693)/10))
x 60 sec/min x 1000 mrad/rad
= 250 mrad

P.K. WEATHERSBY
LCDR, MSC, USN

PRIVACY ACT MATERIAL REMOVED

E.T. FLYNN
CAPT, MC, USN

PATIENT'S IDENTIFICATION *(Use this Space for Mechanical Imprint)*

PATIENT'S NAME *(Last, First, Middle initial)*			SEX
[redacted]			M
YEAR OF BIRTH	RELATIONSHIP TO SPONSOR	COMPONENT OR STATUS	DEPARTMENT OR SERVICE
[redacted]		U.S. Navy	DOD
SPONSOR'S NAME			RANK/GRADE
			ET2(DV)
SVC OR IDENTIFICATION NO.		ORGANIZATION	
[redacted]		NMRI	

GENERAL SERVICES ADMINISTRATION AND
INTERAGENCY COMMITTEE ON MEDICAL RECORDS
FPMR 101-11.808-8
OCTOBER 1975

Research Work Unit:63713N.M0099PN.01A

CLINICAL RECORD	NARRATIVE SUMMARY	
DATE OF ADMISSION	DATE OF DISCHARGE	NUMBER OF DAYS HOSPITALIZED
-NA-	-NA-	-NA-

(Sign and date at end of narrative)

On 5 May 1982, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed a normoxic mixture of N_2, Ar, and O_2 from a recirculation system containing the radioisotopes N-13 (positron emitter, $T\frac{1}{2}$=10min.) and Ar-41 (beta and gamma emitter, $T\frac{1}{2}$=110min.). The isotopes were simultaneously produced in an accelerator to a specific activity of 0.88 mCi/L of N-13 and 0.030 mCi/L of Ar-41. Less than 0.00001 mCi/L of Ar-39 was also produced but would contribute a negligble dose. During a 20 min. period (N-13 decay to 0.22 mCi/L), the activated gas was analyzed (O_3<0.3ppm, NO_2<5ppm) and 50/L of it was mixed with 12.5/L of O_2 and then 20/L of room air (dilution factor of 50/82.5=0.61). The experiment consisted of 120 min. quiet breathing of the gas mixture, maintained normoxic, while the subject was studied with gamma detectors.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded <10 mrad; a whole body count showed only normal amounts of K40 after the experiment. Calculated internal exposures were under 5 mrad to non-lung tissues including gonads; 136 mrad to trachea with large airways expected to be lower; and 160 mrad to the lungs. Exposure calculations are given below:

$$\text{Dose} = SA(mCi/L)\ Te(min)\ [V(L)/M(g)]\ E(MeV/dis)\ K(35500\ mrad\text{-}g/mCi\text{-}min)$$

SA is maximum inspired specific activity as given above, Te is effective exposure time, E is energy per disintegration, V is organ volume of distribution, M is organ mass, and K is a radiologic constant:

$$K = (3.7\times10^{7}\ dis/sec\text{-}mCi)(60\ sec/min)(1.6\times10^{-6}\ erg/MeV)/(0.1\ erg/g\text{-}mrad)$$

For time calculations, lung and trachea were assumed to equilibrate instantly, while internal organs were assumed to follow exponential exchange kinetics. (Biological time constant (Tb) equals tissue-blood partition coefficient divided by specific blood flow rate). The Tb was used together with the radiological decay time constant ($T\frac{1}{2}$/.693) in an integration over both uptake and elimination phases to produce a single effective organ exposure time (Te) for use with initial exposure rate. Energy deposited in tissue per disintegration (E) was obtained by adding average beta and positron energy (all tissues) plus gamma (including annihilation photons) energy absorption through 10 cm of 0.25 g/ml tissue (lung) or 1 cm of 1.0 g/ml tissue (marrow and gonad). Organ volume (V) and mass (M) were obtained by measured supine mid-tidal lung volume (FRC+.5V_T) and assumed lung mass of 1000 g: assumed volume of 30/ml and assumed mass

(Continued)

(Use additional sheets of this form (Standard Form 502) if more space is required)

SIGNATURE OF PHYSICIAN	DATE	IDENTIFICATION NO.	ORGANIZATION
			NMRI, Bethesda, MD

PATIENT'S IDENTIFICATION *(For typed or written entries give: Name - last, first, middle; grade; date; hospital or medical facility)*	REGISTER NO.	WARD NO.
Research Work Unit:63713N.M0099PN.01A		

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HM2/AD/USN

NARRATIVE SUMMARY
Standard Form 502
502-112

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GENERAL SERVICES ADMINISTRATION AND
INTERAGENCY COMMITTEE ON MEDICAL RECORDS
FPMR 101-11.806-8
OCTOBER 1975

Research Work Unit:63710N.M0099PN.01A

CLINICAL RECORD	NARRATIVE SUMMARY	
DATE OF ADMISSION	DATE OF DISCHARGE	NUMBER OF DAYS HOSPITALIZED
-NA-	-NA-	-NA-

(Sign and date at end of narrative)

of 13.6 g for trachea; and assumed density of 1.0 for gonad and marrow with tissue/gas partition coefficients of 0.02 in gonad and 0.05 in marrow.

Tissue		SA(mCi/L)	E(MeV)	V/M(L/g)	Tb(min)	Te(min)	Dose(mrad)
Lung	N-13	0.134	0.574	2.3/1000	<1	14.4	91
	Ar-41	0.0183	0.550	"	"	83.9	69
Trachea	N-13	0.134	0.500	.03/13.6	"	14.4	81
	Ar-41	0.0183	0.462	"	"	83.9	55
Gonad	N-13	0.134	0.530	0.00002	17	6.6	0.3
	Ar-41	0.0183	0.498	"	"	70	0.5
Marrow	N-13	0.134	0.530	0.00005	6.6	10	1.3
	Ar-41	0.0183	0.498	0.00005	"	78	1.3

P. K. WEATHERSBY
LCDR, MSC, USN

E. T. FLYNN, Jr.
CAPT., MC, USN

(Use additional sheets of this form (Standard Form 502) if more space is required)

SIGNATURE OF PHYSICIAN	DATE	IDENTIFICATION NO.	ORGANIZATION
			NMRI, Bethesda, MD

PATIENT'S IDENTIFICATION *(For typed or written entries give: Name - last, first, middle; grade; date; hospital or medical facility)*	REGISTER NO.	WARD NO.
Research Work Unit:63713N.M0099PN.01A		

[redacted]

HM2/AD/USN

NARRATIVE SUMMARY
Standard Form 502
502-112

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U.S. GOVERNMENT PRINTING OFFICE: 1976 - 221-205

GENERAL SERVICES ADMINISTRATION AND
INTERAGENCY COMMITTEE ON MEDICAL RECORDS
FPMR 101-11.506-8
OCTOBER 1975

Research Work Unit:63713.NM0099PN.01A

CLINICAL RECORD	NARRATIVE SUMMARY	
DATE OF ADMISSION	DATE OF DISCHARGE	NUMBER OF DAYS HOSPITALIZED
-NA-	-NA-	-NA-

(Sign and date at end of narrative)

On 29 April 1982, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emitter, $T_{\frac{1}{2}}$=10 min, effective energy deposition in lung tissue = 0.574 MeV), in a normoxic mixture of N_2 and O_2. the isotope was accelerator produced to a specific activity of 1.75 mCi/L, and allowed to decay for 15 min. while the activated gas was analyzed (O_3<0.3 ppm, NO_2<5 ppm). 50 L of the N-13 was mixed with 12.5 L of O_2 and then 20 L of room air at the start of the inhalation period. The experiment consisted of 30 min. quiet breathing of the N-13 mixture, and a 90 min. room air breathing follow-up; all while being studied with a positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded <10 mrad; a whole body count shortly after the experiment showed normal amounts of K-40 and a small amount of N-13. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annihilation were under 10 mrad. Tracheal exposure was estimated as 195 mrad, and large airways were expected to recieve a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 230 mrad from the following calculation:

$$\text{Specific activity} = (1.75\ \text{mCi/L N-13})\times(50\text{L N-13}/83\text{L gas}) \times \exp[(-15)(.693)/(10)] = 0.37\ \text{mCi/L}$$

Assuming a lung mass of 1000g and a measured supine mid-tidal volume of 2.4L;

$$\text{Initial dose rate} = (0.37\ \text{mCi/L})\times(2.4\text{L/lung})\times(.574\ \text{MeV/d})\times(3.7\times10^{7}\ \text{d/s-mCi}) \times(1.6\times10^{-6}\ \text{erg/MeV})/(100\ \text{erg/g-rad})(1000\text{g/lung}) = 3.0\times10^{-4}\ \text{rad/s}$$

$$\text{Total exposure} = D(0)\times(10\ \text{min}/.693)\times(1-\exp[(-30)(.693)/10]) \times 60\ \text{sec/min}\times 1000\ \text{mrad/rad} = 230\ \text{mrad}$$

P. K. WEATHERSBY
LCDR, MSC, USN

E. T. FLYNN, Jr.
CAPT., MC, USN

(Use additional sheets of this form (Standard Form 502) if more space is required)

SIGNATURE OF PHYSICIAN	DATE	IDENTIFICATION NO.	ORGANIZATION
			NMRI, Bethesda, MD

PATIENT'S IDENTIFICATION *(For typed or written entries give: Name - last, first, middle; grade; date; hospital or medical facility)*	REGISTER NO.	WARD NO.
Research Work Unit:63713N.M0099PN		01A

[redacted]
HTC(DV)/AD/USN

NARRATIVE SUMMARY
Standard Form 502
502-112

1157348

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HEALTH RECORD	CHRONOLOGICAL RECORD OF MEDICAL CARE
DATE	SYMPTOMS, DIAGNOSIS, TREATMENT, TREATING ORGANIZATION *(Sign each entry)*

SPECIAL 600 DO NOT REMOVE FROM RECORD

6 AUG 81 NMRI, Bethesda, Maryland 20814

On 10 SEP 80, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emmiter, $T_{1/2}$ = 10 min, effective energy deposition in lung tissue = 0.531 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/l, and allowed to decay for 18 min while the activated gas was analyzed (O_3 <0.3 ppm, NO_2 <5 ppm). 28 l of the N-13 was mixed with 7.4 l of O_2 and then 20 l room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 60 min room air breathing followup; all while being studied positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded 0 dose; a whole body count showed only normal amounts of K-40 after the experiment. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annhilation were under 10 mrad. Tracheal exposure was estimated as 125 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 235 mrad from the following calculation:

Specific activity = (1.75 mCi/l N-13)x(28 l N-13 / 55.4 l gas)
x exp ((-18)(.693)/(10))
= 0.25 mCi/l

Assuming a lung mass of 1000g and mid-tidal volume of 4.0 l;
Initial dose rate = (0.25 mCi/l)x(4.0 l/lung)x(.531MeV/d)x(3.7×10^{7} d/s-mCi)
x(1.6×10^{-6} erg/MeV) / (100 erg/g-rad)(1000 g/lung)
D(0) = 3.1×10^{-4} rad/s

Total Exposure = D(0) x (10min/.693) x (1 - exp((-30)(.693)/10)
x 60 sec/min x 1000 mrad/rad
= 235 mrad

P.K. WEATHERSBY
LCDR, MSC, USN

PRIVACY ACT MATERIAL REMOVED

E.T. FLYNN
CAPT, MC, USN

PATIENT'S IDENTIFICATION *(Use this Space for Mechanical Imprint)*

PATIENT'S NAME *(Last, First, Middle initial)*			SEX
[redacted]			M
YEAR OF BIRTH	RELATIONSHIP TO SPONSOR	COMPONENT OR STATUS	DEPARTMENT OR SERVICE
[redacted]		U.S. Navy	DOD
SPONSOR'S NAME			RANK/GRADE
			HT1(DV)
SVC OR IDENTIFICATION NO.		ORGANIZATION	
[redacted]		NMRI	

CHRONOLOGICAL RECORD OF MEDICAL CARE
Standard Form 600
February 1969
General Services Administration and
Interagency Comm. on Medical Records
FPMR 101-11.809-3
600-103

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HEALTH RECORD	CHRONOLOGICAL RECORD OF MEDICAL CARE
DATE	SYMPTOMS, DIAGNOSIS, TREATMENT, TREATING ORGANIZATION *(Sign each entry)*

SPECIAL 600 DO NOT REMOVE FROM RECORD

6 AUG 81 NMRI, Bethesda, Maryland 20814

On 12 SEP 80, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emmiter, $T_{1/2}$ = 10 min, effective energy deposition in lung tissue = 0.531 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/l, and allowed to decay for 18.5 min while the activated gas was analyzed (O_3 <0.3 ppm, NO_2 <5 ppm). 50 l of the N-13 was mixed with 13.3 l of O_2 and then 20 l room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 60 min room air breathing followup; all while being studied positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded 0 dose; a whole body count showed only normal amounts of K-40 after the experiment in addition to a small residual N-13 signal. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annhilation were under 10 mrad. Tracheal exposure was estimated as 145 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 270 mr from the following calculation:

Specific activity = (1.75 mCi/l N-13)x(50 l N-13 / 83.3 l gas)
x exp ((-18.5)(.693)/(10))
= 0.29 mCi/l

Assuming a lung mass of 1000g and mid-tidal volume of 4.0 l;
Initial dose rate = (0.29 mCi/l)x(4.0 l/lung)x(.531MeV/d)x(3.7×10^{7} d/s-mCi)
x(1.6×10^{-6} erg/MeV) / (100 erg/g-rad)(1000 g/lung)
D(0) = 3.6×10^{-4} rad/s

Total Exposure = D(0) x (10min/.693) x (1 - exp((-30)(.693)/10)
x 60 sec/min x 1000 mrad/rad
= 270 mrad

P.K. Weathersby
P.K. WEATHERSBY
LCDR, MSC, USN

PRIVACY ACT MATERIAL REMOVED

E.T. Flynn
E.T. FLYNN
CAPT, MC, USN

PATIENT'S IDENTIFICATION (Use this space for Mechanical Imprint)

PATIENT'S NAME *(Last, First, Middle initial)*			SEX
[redacted]			M
YEAR OF BIRTH	RELATIONSHIP TO SPONSOR	COMPONENT OR STATUS	DEPARTMENT OR SERVICE
[redacted]		U.S. Navy	DOD
SPONSOR'S NAME			RANK/GRADE
			LCDR, MSC
SVC OR IDENTIFICATION NO.		ORGANIZATION	
[redacted]		NMRI	

CHRONOLOGICAL RECORD OF MEDICAL CARE
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February 1969
General Services Administration and
Interagency Comm. on Medical Records
FPMR 101-11.809-3
600-103

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HEALTH RECORD	CHRONOLOGICAL RECORD OF MEDICAL CARE
DATE	SYMPTOMS, DIAGNOSIS, TREATMENT, TREATING ORGANIZATION *(Sign each entry)*

SPECIAL 600 DO NOT REMOVE FROM RECORD

6 AUG 81 NMRI, Bethesda, Maryland 20814

On 9 SEP 80, after signing informed consent, this individual was a test subject in a joint Naval Medical Research Institute and Lawrence Livermore Laboratory experiment. He breathed from a recirculation system containing the radioisotope N-13 (positron emitter, $T_{1/2}$ = 10 min, effective energy deposition in lung tissue = 0.531 MeV), in a normoxic mixture of N_2 and O_2. The isotope was accelerator produced to a specific activity of 1.75 mCi/l, and allowed to decay for 20 min while the activated gas was analyzed (O_3 <0.3 ppm, NO_2 <5 ppm). 30 l of the N-13 was mixed with 8.0 l of O_2 and then 20 l of room air at the start of the inhalation period. The experiment consisted of 30 min quiet breathing of the N-13 gas mixture, and a 60 min room air breathing followup; all while being studied with a positron camera.

The only risk expected from the experiment was the exposure to ionizing radiation. Externally worn dosimeters recorded 0 dose; a whole body count showed only normal amounts of K-40 after the experiment. Calculated exposures to non-lung tissues, including gonads, from lung gamma emission and from local dissolved N-13 positron annhilation were under 10 mrad. Tracheal exposure was estimated as 115 mrad, and large airways were expected to receive a lower exposure. The pulmonary dose due to positron energy and slight gamma deposition was 220 mrad from the following calculation:

Specific activity = (1.75 mCi/l N-13) x (30 l N-13 / 58 l gas) x exp ((-20)(.693)/(10))
= 0.23 mCi/l

Assuming a lung mass of 1000g and mid-tidal volume of 4.0 l,

Initial dose rate = (0.23 mCi/l)x(4.0 l/lung)x(.531MeV/d)x(3.7×10^{7} d/s-mCi) x (1.6×10^{-6} erg/MeV) / (100 erg/g-rad)(1000 g/lung)

D(0) = 2.9×10^{-4} rad/s

Total exposure = D(0) x (10 min/.693) x (1 - exp((-30)(.693)/10)) x 60 sec/min x 1000 mrad/rad
= 220 mrad

P.K. WEATHERSBY
LCDR, MSC, USN

E.T. FLYNN
CAPT, MC, USN

PATIENT'S IDENTIFICATION *(Use this Space for Mechanical Imprint)*

PRIVACY ACT MATERIAL REMOVED

PATIENT'S NAME *(Last, First, Middle initial)*			SEX
[redacted]			M
YEAR OF BIRTH	RELATIONSHIP TO SPONSOR	COMPONENT OR STATUS	DEPARTMENT OR SERVICE
[redacted]		U.S. Navy	DOD
SPONSOR'S NAME			RANK/GRADE
			HMCS(DV)
SVC OR IDENTIFICATION NO.		ORGANIZATION	
[redacted]		NMRI	

CHRONOLOGICAL RECORD OF MEDICAL CARE
Standard Form 600
February 1969
General Services Administration and
Interagency Comm. on Medical Records
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