TECHNICAL REPORT
16-73
業 績 報 告 書

ABCC-JNIH PATHOLOGY STUDIES, HIROSHIMA AND NAGASAKI

REPORT 3

ABCC－予研病理学的調査，広島・長崎

第3報

THE AUTOPSY PROGRAM AND THE LIFE SPAN STUDY

JANUARY 1951－DECEMBER 1970

剖検プログラムと寿命調査

1951年1月－1970年12月

ARTHUR STEER, M.D.
IWAO M. MORIYAMA, Ph.D.
KIYOSHI SHIMIZU, M.D. 志水 清

ABCC JNIH

ATOMIC BOMB CASUALTY COMMISSION

国立予防衛生研究所－原爆傷害調査委員会

JAPANESE NATIONAL INSTITUTE OF HEALTH OF THE MINISTRY OF HEALTH AND WELFARE

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A Cooperative Research Agency of
U.S.A. NATIONAL ACADEMY OF SCIENCES－NATIONAL RESEARCH COUNCIL
and
JAPANESE NATIONAL INSTITUTE OF HEALTH OF THE MINISTRY OF HEALTH AND WELFARE

with Funds Provided by
U.S.A. ATOMIC ENERGY COMMISSION
U.S.A. NATIONAL CANCER INSTITUTE
U.S.A. NATIONAL HEART AND LUNG INSTITUTE
U.S.A. ENVIRONMENTAL PROTECTION AGENCY
JAPANESE NATIONAL INSTITUTE OF HEALTH

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米国学士院－学術会議と日本国厚生省国立予防衛生研究所
との日米共同調査研究機関

米国原子力委員会，米国癌研究所，米国心臓・肺臓研究所
米国環境保護庁および日本国厚生省国立予防衛生研究所
の研究費による

ACKNOWLEDGMENT

感謝のことば

The data given in this report could not be obtained without the active and constant cooperation and collaboration of many persons. Foremost were the survivors and their relatives in Hiroshima and Nagasaki who gave permission for the postmortem examination. The practicing physicians in Hiroshima and Nagasaki, so many they cannot be named, supported the program actively and were of great assistance in explaining its purpose and needs to the bereaved families. The autopsy contactors who worked so tirelessly and tactfully with deep understanding and sympathy cannot be praised too highly.

The presidents of the Hiroshima and Nagasaki City Medical Associations during the period of this report, Drs. Naoki Todo, Hiroshi Sawachika, Shigenobu Miyagi, and Yoshiharu Abe, gave the prestige of their offices in support of the program. Dr. Fumio Shigeto, Director of the Hiroshima Red Cross and A-Bomb Hospital; Dr. Soichiro Yokota and Dr. Yasushi Mitani, Directors of the Nagasaki A-Bomb Hospital were all of great help. The Professors of Pathology of the two medical schools, Drs. Soichi Iijima, Akira Yamada, Naomasa Okamoto, Kenjiro Yokoro, Shigeru Matsuoka, Ichiro Hayashi, Hideo Tsuchiyama, Issei Nishimori, and the late Toyosuke Watanabe, served as consultants, participated actively in the program and offered advice and suggestions.

Special mention should be made of Professors Hayashi, Tsuchiyama, Watanabe, and Nishimori, who with their junior staff helped ABCC in Nagasaki when the ABCC pathology staff there was unexpectedly depleted. In Hiroshima, Professors Iijima and Yamada participated in cancer investigations and supported the search of surgical files and records. In both Hiroshima and Nagasaki the visiting research associates were constant supporters of the program.

The Pathology Program was heavily and gratefully dependent on the unswerving support given by Dr. Ken Yanagisawa and his staff of the Japanese National Institute of Health including Drs. Hiroshi Maki and Isamu Nagai, the Directors of the JNIH Branch Laboratories in Hiroshima and Nagasaki, respectively and Dr. Tsutomu Yamamoto, the assistant chief of Pathology who so ably provided continuity and direction to the Pathology Department program for more than 15 years. Finally, we wish to acknowledge the continuous and stimulating support given by Drs. Darling and Allen, the Directors, ABCC.

本報に記載している資料は，多くの方々が示された積極的で絶えざる協力がなかったならば，得られなかったと思う．就中，最も重要なのは，剖検を承認された広島・長崎の被爆者およびその遺族の協力であった．枚挙にいとまがない程多くの広島・長崎の開業医の方々が，このプログラムを積極的に支持し，遺族の方々にその目的と必要性を説明する上で多大な貢献をされた．深い理解と同情をもって，根気強く如才なく剖検例入手に従事された剖検連絡員に対して，過大に称讃しすぎることはない．

本報の期間中，広島・長崎両市の医師会の会長を務められた藤堂直樹博士，沢近 宏博士，宮城重信博士，阿部義治博士は，医師会を代表してこのプログラムを支持された．広島赤十字・原爆病院長の重藤文夫博士，長崎原爆病院長の横田素一郎博士および三谷 靖博士は多大な援助を寄せられた．広島・長崎両大学の病理学教授の飯島宗一博士，山田 明博士，岡本直正博士，横路謙次郎博士，松岡 茂博士，林 一郎博士，土山秀夫博士，西森一正博士および故渡辺豊輔博士は，顧問としてこのプログラムに積極的に参加され，有益な助言を惜しまれなかった．

長崎のABCC病理部における医師不足に際して，若い医師を派遣された林，土山，渡辺，西森各教授に対しても，特に謝意を表したい．広島では，飯島・山田両教授が癌調査に参加され，外科材料や記録の調査に助力された．広島と長崎において，客員研究員の方々は常にこの剖検プログラムを支持された．

病理学的調査は，予研所長柳沢 謙博士を始め，広島・長崎の予研支所長である槇 弘博士と永井 勇博士および15年以上にわたって病理部の活動に一貫性を与え立派に指導してこられた病理部副部長の山本 務博士を含む予研の職員の変わらぬご支援に負うところが大きい．記して感謝の意を表したい．最後に，常に熱心な助力を寄せられたABCC所長の Dr. Darling と Dr. Allen に対してお礼を述べたい．

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PREFACE

序

The ABCC-JNIH Pathology Studies, reported herein, form an important link in the Unified Program at ABCC together with the Adult Health Study and Life Span Study. Agreements concerning the conduct of these studies have been exchanged between the Japanese National Institute of Health and ABCC as well as with the local cooperating organizations in Nagasaki in 1961 and in Hiroshima in 1962 (TR 12-62).

If one aspect of science is the publication of spectacular achievements resulting from great creative ability and ceaseless enthusiasm, the other aspect is the groundwork effort of collecting one by one the pieces of truth that lay like fallen grain on the ground and studying them for some systematic order. These collected grains of truth will most probably bear fruit in the hands of others.

The major mission of ABCC, which attempts to elucidate the late effects of radiation in man through the comparative study of diseases by population studies, belongs to this latter category.

This bilingual presentation was authorized on the basis of review by the Japanese and American professional staff of ABCC, the local cooperating organizations in Hiroshima and Nagasaki, and by the Kyogikai appointed by Dr. Ken Yanagisawa, Director of JNIH, and Dr. LeRoy R. Allen, Director of ABCC.

ここに述べられている病理学的業績は，成人健康調査および寿命調査とともにABCCにおける統合研究調査の一環を成すものである．この調査に関してはすでに国立予防衛生研究所とABCCとの間で同意書が交換されており，長崎では1961年，広島では1962年それぞれ地元の共同研究施設との間に協定が成立している（TR 12－62）．

たくましい創造力と絶えることない情熱とによって，大きな成果が世上に発表されるのが科学の一面とすれば，落ち穂のような真実の一つ一つを拾い上げその間に秩序をみいだしていく基礎工事のような努力もまたその一断面であって，拾い集められた事実はおそらく他手に委ねられて結実するであろう．

ABCCの主要任務が人体における放射線の後障害を解明することであり，具体的には人口集団の調査により疾病の比較研究をすることにあるとすれば，その主目的はむしろ後者に属すると思われる．

この日英両語による報告書はABCCの日米専門職員の討議の後に，広島・長崎の各地元共同研究機関の認可を得て，国立予防衛生研究所長柳沢 謙とABCC所長LeRoy R. Allenが委嘱した協議会の審議を経て承認されたものである．

CONSULTANTS TO THE ABCC DEPARTMENT OF PATHOLOGY, 1970

ABCC 病理部顧問，1970年

Michio Hashimoto, M.D.
Emeritus Professor of Pathology, School of Medicine, Kyushu University

橋本美智雄
九州大学医学部病理学名誉教授

Toru Miyaji, M.D.
Professor of Pathology, School of Medicine, Osaka University

宮地　徹
大阪大学医学部病理学教授

Kunio Oota, M.D.
Professor of Pathology, School of Medicine, Tokyo University

太田邦夫
東京大学医学部病理学教授

* Tomizo Yoshida, M.D.
Director, Cancer Institute, Tokyo

*吉田富三
癌研究所所長，東京都

HIROSHIMA

広　島

Soichi Iijima, M.D.
President, Hiroshima University
Professor of Pathology, School of Medicine, Hiroshima University

飯島宗一
広島大学学長
同医学部病理学教授

Naomasa Okamoto, M.D.
Director and Professor, Research Institute for Nuclear Medicine and Biology, Hiroshima University

岡本直正
広島大学原爆放射能医学研究所所長，同教授

Akira Yamada, M.D.
Professor of Pathology, School of Medicine, Hiroshima University

山田　明
広島大学医学部病理学教授

Kenjiro Yokoro, M.D.
Professor of Pathology, Research Institute for Nuclear Medicine and Biology, Hiroshima University

横路謙次郎
広島大学原爆放射能医学研究所病理学教授

NAGASAKI

長　崎

Ichiro Hayashi, M.D.
Professor of Pathology, School of Medicine, Nagasaki University

林　一郎
長崎大学医学部病理学教授

Shigeru Matsuoka, M.D.
Emeritus Professor of Pathology, School of Medicine, Nagasaki University

松岡　茂
長崎大学医学部病理学名誉教授

Issei Nishimori, M.D.
Professor of Pathology, Atomic Disease Institute, School of Medicine, Nagasaki University

西森一正
長崎大学医学部原爆後障害医療研究施設病態生理学部門教授

Hideo Tsuchiyama, M.D.
Professor of Pathology, School of Medicine, Nagasaki University

土山秀夫
長崎大学医学部病理学教授

* Toyosuke Watanabe, M.D.
Professor of Pathology, Research Institute for Tropical Medicine, Nagasaki University

*渡辺豊輔
長崎大学熱帯医学研究所病理学教授

**Deceased*

*死去

Seiya Taura, M.D.
Second Department of Pathology, School of Medicine, Nagasaki University

田浦晴也
長崎大学医学部第二病理学教室

Nobuo Tsuda, M.D.
Department of Pathology, Atomic Disease Institute, School of Medicine, Nagasaki University

津田暢夫
長崎大学医学部原爆後障害医療研究施設病態生理学部門

Tadaie Wakamatsu, M.D.
First Department of Pathology, School of Medicine, Nagasaki University

若松忠家
長崎大学医学部第一病理学教室

ABCC DEPARTMENT OF PATHOLOGY, PROFESSIONAL STAFF 1948-70

ABCC 病理部専門職員，1948－70年

HIROSHIMA 広島

Akamatsu, Y., M.D.	赤松保之		1955-57
Amano, S., M.D.	天野茂三郎		1966-68
Anderson, R.E., M.D.		USPHS 米国公衆衛生局	1962-64, 1966-
*Angevine, D.M., M.D.			1962-63
Bean, M.A., M.D.		USPHS	1969-70
*Black-Shaffer, A.E., M.D.			1950-52
Black-Shaffer, B., M.D.			1950-52
Brown, W.J., M.D.			1959-60
Christensen, R.O., M.D.			1955-57
Cihak, R.W., M.D.		USPHS	1970-
Edgington, T.S., M.D.		USPHS	1960-62
Furuta, M., M.D.	古田睦広		1948-52
*Gould, S.E., M.D.			1966-67
Guttman, P.H., M.D., Ph.D.			1969-
Hiramoto, T., M.D.	平本忠憲	JNIH	1956-67
Hirose, F.M., M.D.		予研	1959-60
Ii, Y., M.D.	井　洋平	JNIH	1964-70
Ishida K., M.D.	石田健蔵	JNIH	1961-66
Iizuka, M., M.D.	飯塚　穣		1952-54
Jordan, S.W., M.D.		USPHS	1963-65
Kambe, S., M.D.	神部誠一	JNIH	1949-53
Katami, K., M.D.	片見憲三	JNIH	1952-55
Kawashima, T., M.D.	川嶋健嗣	JNIH	1969-
Key, C.R., M.D., Ph.D.		USPHS	1966-69
Kimura, K., M.D.	木村和郎	JNIH	1958-68
*Laqueur, G.L., M.D.			1954-57
Liu, P.I., M.D., Ph.D.			1969-
*Madden, S.C., M.D.			1958-59
Mansur, G.P., M.D.		USPHS	1963-65
*Margoles, C., M.D.			1952-54
Matsuyama, H., M.D.	松山春郎	JNIH	1953-56
McGregor, D.H., M.D.		USPHS	1968-
Murata, Y., M.D.	村田吉郎		1957-63
Murphy, E.S., M.D.			1955-57
Niwayama, G., M.D.	庭山　元		1960-63
Oda, T., M.D.	小田富雄		1958-60
Rickert, R.R., M.D.		USPHS	1964-66
Robertson, J.D., M.D.		USPHS	1967-69
Robinson, J.J., M.D.			1954-55
Sampson, R.J., M.D.		USPHS	1966-69
Sato, T., M.D.			1962-66
*Sheldon, W.F., M.D.			1965-66
Shimada, N., M.D.	島田信男		1956-58
Slavin, R.E., M.D.		USPHS	1963-65
Smith, G.S., M.D.		USPHS	1965-67
*Steer, A., M.D.			1967-
*Stoddard, L.D., M.D.			1961-62
*Stone, R.S., M.D.			1959-60
Suzuki, M., M.D.			1960-62
Takamatsu, M., M.D.	高松道雄		1958-60
Tanimura, A., M.D.	谷村　晃		1969-70
Tashiro, T.,	田代　忠		1967-67
Troup, G.M., M.D.		USPHS	1961-63
*Wedemeyer, E.J., M.D.			1948-51
*Will, D.W., M.D.			1963-64
Yasuda, A., M.D.	安田明正		1955-57
Yamamoto, T., M.D.	山本　務	JNIH	1954-
*Zeldis, L.J., M.D.			1960-61

**Department Chief* 部長

NAGASAKI 長崎

Asano, M., M.D.	浅野正英		1958-59
Brown, W.J., M.D.			1959-60
Fujii, H., M.D.	藤井秀治		1965-68
Hasegawa, C.M., M.D.			1961-65
Ii, Y., M.D.	井　洋平	JNIH	1970-
Ishida, K., M.D.	石田健蔵	JNIH	1966-70
Janovski, N.A., M.D.			1956-57
Kaida, S., M.D.	貝田繁雄		1953-55
Kawabe, Y., M.D.	河部康男		1951-57
Kirshbaum, J.D., M.D.			1967-69
Matsunaga, H., M.D.	松永春二		1949-56
Matsuo, T., M.D.	松尾　武		1964-65
Matsuoka, M., M.D.	松岡　研		1956-63
Nakamura, R.M., M.D.			1960-61
Nakayama, I., M.D.	中山　巖		1964-65
Namiki, H., M.D.	並木秀男		1961-66
Nishihara, Y., M.D.	西原康男		1957-57
Nishimura, E.T., M.D.			1957-59
Sakamoto, N., M.D.	坂本信明		1952-57
Samter, T.G., M.D.			1961-63
Sato, K., M.D.	佐藤和義	JNIH	1964-68
Sato, K., M.D.	佐藤和雄		1966-67
Scott, J.K., M.D.			1953-54
Stilwell, B.W., M.D.			1960-61
Thomas, G.D., M.D.		USPHS	1959-61
Tsuchiyama, H., M.D.	土山秀夫		1952-56
Tsukada, Y., M.D.	塚田義明		1965-67

Approved (Kyogikai) 承認 *19 June 1973*

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ARTHUR STEER, M.D.[1]; IWAO M. MORIYAMA, Ph.D.[2]; KIYOSHI SHIMIZU, M.D.（志水　清）[3]

Departments of Pathology,[1] Statistics,[2] and Medical Sociology[3]
病理部，[1] 統計部，[2] および医科社会学部[3]

SUMMARY

Of the 19,701 deaths in the JNIH-ABCC Life Span Study (LSS) cohort which occurred between 1951-70, 4353 or 22% came to autopsy. Until 1961, when the autopsy procurement program was put into operation, the annual number of autopsies was few. The autopsy procurement rate reached the peak of about 45% in 1963. Since then the rate has been declining steadily. By 1970, it had decreased to 25%, an all time low since the establishment of the autopsy procurement program.

The autopsy procurement data show not only the effectiveness of the program, but also some of the problems raised by efforts to secure permission from the next of kin to perform autopsies. In an epidemiologic program such as that being conducted by JNIH-ABCC, any bias, especially with respect to radiation exposure, creates difficulties in interpretation of data. Examination of the procurement rates shows that the autopsy rates are directly associated with radiation dose. This is particularly true of the autopsies in Hiroshima. Great caution needs to be exercised in the analysis of autopsy data by radiation dose for Hiroshima to avoid incorrect inferences on the delayed effects of the bomb.

It has been assumed that because of the rapport established between the ABCC-JNIH Adult Health Study (AHS) sample members and ABCC on the occasion of the biennial medical examinations, greater cooperation is secured from this population on

要　約

1951－70年の間における予研－ABCC寿命調査集団中の死亡者19,701名のうち4353名，すなわち22%について剖検が実施された．1961年に剖検入手プログラムが実施される以前は，寿命調査対象者についての年間剖検例数は少なかった．剖検率は，1963年に約45%の最高値に達した．以後，その率は漸次低下を続けている．1970年には，剖検入手プログラム開始以来の最低値である25%に下降した．

剖検入手に関する資料は，この調査の能率を示すのみならず，遺族から剖検の承諾を求める努力によって提起される若干の問題をも示している．予研－ABCCで実施しているような疫学的調査では，いかなる偏りがあっても，特に放射線被曝に関する偏りがあれば資料の解釈が困難になる．剖検入手についての検討の結果，剖検率は線量と直接関係があると認められている．これは，広島における剖検の場合に顕著である．広島における剖検所見の線量別解析にあたって，原爆の遅発性影響について誤った推論を避けるため，細心の注意が必要である．

ABCC－予研成人健康調査集団では，2年ごとの医学的検診を通じて調査対象者とABCCとの間にできた協力関係のために剖検についての協力が高いであろうと考えられ

the matter of autopsies. While the autopsy rates for the AHS sample appears generally higher than the corresponding rates for the other parts of the JNIH-ABCC sample, the differences do not stand the test of statistical significance. For the high dose group (50 rad or more ATB) it is not possible to state with any certainty that favorable autopsy procurement rates result as a consequence of rapport with the survivors in the AHS sample.

An important use of autopsy data is to evaluate the quality and completeness of diagnostic data returned on medical certification of causes of death. Confirmation and detection rates have been computed and presented. The quality of the underlying cause of death as derived from death certificates varies with the disease, and is generally related to the difficulty of diagnosis.

A broad spectrum of disease was represented in the autopsy sample but influenced by several factors. There was probable selection for cancer which accounted for 33% of the autopsies. Diseases of persons who die at home, diseases of the elderly, and ischemic heart disease and stroke were probably over represented.

A special study was made of stroke, ischemic heart disease, and cancer. Cerebral infarction was the principal autopsy diagnosis in 13%, ischemic heart disease is 5%, and cerebral hemorrhage in 4% of the autopsies. In patients who died of other diseases, cerebral infarction was found in 15%, ischemic heart disease in 26%, and cerebral hemorrhage in 1%. Evidence of cerebral infarction or ischemic heart disease or both was found in more than half the autopsies regardless of cause of death and they were found more frequently in older individuals. However, neither in the brain nor the heart was acute infarction a frequent cause of death or even a frequent finding. These observations are in conflict with widely held opinion that cerebral hemorrhage is the most frequent cause of death in Japanese and that ischemic heart disease occurs infrequently.

The 1440 cancers which were considered the principal disease and the 402 additional cancers found at autopsy were listed. The occurrence by site and cell type is in agreement with other data from Japan except for those cancers known to be associated with prior ionizing radiation. A wide variety of cancer types was present in the autopsy sample.

Examination of estimated radiation exposure data with relation to the autopsy sample so far reveals no significant evidence of association for any disease other than some forms of cancer.

てきた．成人健康調査集団の剖検率が予研－ABCC寿命調査集団中のその他の者より全般的に高いとはいえ，その差は，統計的検定で有意であるとは認められない．高線量被曝群(50 rad 以上)について，剖検率が高いことは，成人健康調査における被爆者との間にできた協力関係のためであると説明できない．

剖検資料の重要な活用方法の一つは，死亡診断書から得られる診断資料の質と完全性の評価である．確認率および発見率を計算し提示した．死亡診断書から求めた原死因の質は，疾病によって差があり，一般に診断決定の困難さと関係がある．

この剖検調査には，広範囲の疾病が含まれているが，いくつかの要因の影響がみられた．癌については，おそらく症例選択があったと思われ，剖検の33%を占めていた．自宅死亡者における疾病，高年齢者における疾病，虚血性心疾患および脳卒中は，おそらく過大に含まれていたことであろう．

脳卒中，虚血性心疾患および癌について特に検討した．脳梗塞症を主要剖検診断とするものが13%あり，虚血性心疾患は5%，脳出血は4%であった．その他の疾病で死亡した患者では，その15%に脳梗塞，26%に虚血性心疾患，1%に脳出血が認められた．死因にかかわらず剖検の過半数に脳梗塞または虚血性心疾患もしくはその両者の形跡が認められ，かつ，高年齢者により多く認められた．しかし，脳あるいは心臓でも，急性の梗塞が死因となることも，所見として認められることさえも少なかった．これらの観察結果は，日本人において脳出血が死因として最も多く，虚血性心疾患が少ないと広く考えられていることと矛盾する．

癌が主要疾患とされた1440例および剖検で発見された付随的な癌402例について記載した．電離放射線被曝と関連があると認められている癌以外は，部位別および細胞型別の発生頻度は日本で報告されているその他の資料に一致している．この剖検調査には，多種類の癌が含まれていた．

推定放射線被曝線量に関する資料と現在までの剖検調査例との関係を検討した結果，ある種の癌を除けば，いずれの疾病にも有意な関連は認められなかった．

BACKGROUND

ABCC-JNIH Pathology Studies Reports 1 and 2 documented the participation of the Pathology Department in the Unified Study Program and its contribution to the study of the fixed samples as defined in the JNIH-ABCC mortality studies particularly beginning with 1961.[1,2] Since then, autopsy procurement has been concentrated on members of the Life Span Study (LSS) sample who died and the autopsy rate for this fixed sample rose from less than 10% to above 40%. Report 1, based on a study of 1215 autopsies, dealt with 3 subjects; (1) the newly introduced autopsy procurement program, (2) the accuracy of death certificate statement of underlying cause of death, and (3) the relation of autopsy findings to radiation exposure expressed as distance from the hypocenter at the time of the atomic bombs (ATB). Report 2, based on 2539 autopsies, extended the discussion of these three subjects using both distance and T65D dose estimates for radiation exposure. The present Report 3 examines 4353 LSS autopsies and present an analysis to further characterize the autopsy population.

The problems described in previous reports, particularly those related to the prolonged interval between death and autopsy and bias in autopsy procurement, remain unresolved. The following are some additional features of the ABCC-JNIH autopsy program which deserve special attention.

1. The ABCC-JNIH autopsy program[3] differs from other autopsy programs in that it is primarily epidemiologically oriented[4] in terms of the sampling frame; (a) the prevalence of pathologic lesions is compared in irradiated survivors and in controls to ascertain delayed radiation effects since no lesions pathognomonic for whole-body irradiation have been found so far in any of the diseases studied; (b) the program provides a tool for evaluation of death certificate diagnoses; and (c) it supports other studies of the fixed samples including the Adult Health, the In Utero, exposure populations, offspring of A-bomb survivors, and the Hematological Study samples.

2. The autopsy sample is in many ways a unique subsample of the deaths in a large sample (the LSS sample).[5] The basic LSS sample is a restricted and a selected fixed sample of A-bomb survivors and controls comprising less than 10% of the present population of Hiroshima and Nagasaki. It is a decreasing, constantly aging sample. Because selection was made on the basis of radiation exposure ATB, the LSS sample probably is not now, if it ever was, representative of the population of the two cities. The autopsy sample is obtained from a portion of the deaths in the LSS sample and, as

背　景

ABCC－予研病理学的調査の第1報と第2報は，統合研究計画における病理部の役割と予研－ABCC寿命調査における固定集団の調査研究に対する同部の特に1961年からの貢献について記述した.[1,2] 1961年以来，剖検入手は寿命調査対象者における死亡例に限定され，この固定集団における剖検率は10%以下から40%を越えるに至った．1215の剖検例に基づく第1報は三つの題目を取り扱った．すなわち，(1) 新しく導入された剖検入手計画，(2) 死亡診断書に記載された原死因の正確性，および(3) 剖検所見と爆心地からの距離を指標とした放射線被曝との関係がこれである．2539の剖検例に基づく第2報では，以上の3題目を放射線被曝の指標として被爆距離とT65D線量を用いてさらに敷衍した．この第3報は，寿命調査集団における4353の剖検例を対象にして剖検例の特徴を一層究明するために行った解析成績を提示するものである．

先の報告に記述した問題，なかでも死亡から剖検までの長い経過時間，剖検入手における偏り等についての問題は未解決のまま残されている．ABCC－予研剖検プログラムにおいて特に注意を要するその他の点としては次のようなものがある．

1．　ABCC－予研剖検プログラム[3]は他の剖検プログラムと異なり，調査対象の枠付からみればプログラムは主として疫学的指向性[4]を有する調査なのである．(a) 調査研究してきたいずれの疾患にも放射線全身照射に特有な病変はまだ発見されていないので，被爆者とその対照者における病変の頻度を比較して放射線の後影響を究明しようとしている．(b) このプログラムは，死亡診断書の記載死因を評価する道具にもなる．(c) このプログラムは，固定集団を対象として行われる成人健康調査，胎内被爆者の調査，被爆者の子孫の調査，血液学的調査など，その他の調査を補強するものである．

2．　剖検例は，いろいろの面において寿命調査集団[5]における死亡例のユニークな副次群である．寿命調査集団は，特別に選んだ被爆者と対照者の固定集団であって，その数は広島・長崎両市の現在人口の10%弱である．この集団は，絶えず減少し老化している．寿命調査の対象者は，原爆放射線被曝に基づいて選定されたもので，恐らく両市の人口を現在も，過去においても代表するものではない．寿命調査集団における死亡者の一部が剖検調査の対象になるもので，後述のように得られる剖検例は種々の面において偏りを示している．したがって，剖検

discussed below, is biased in various directions. Consequently, prevalence of any condition cannot be translated into prevalence in either the living or dead LSS population without consideration of many factors.

3. The autopsy sample differs from most autopsy series in that it is drawn from persons who die at home as well as those dying in hospitals. The data show that the percentage of home versus hospital deaths varies greatly depending on the cause of death. Any comparisons of prevalence of disease at autopsy between the ABCC data and reports from medical institutions in Japan and other countries should consider this source of bias.

4. The autopsy findings given in the two previous reports represent the interpretations of a large number of pathologists who differed greatly in training, experience, and background. Consequently, there was considerable variation in assignment of the principal cause of death at autopsy for different patients with the same disease. This was more likely to be true for some diseases (cardiovascular and stroke) than for others (cancer). Among other reasons, this made it necessary for pathologists to reevaluate original protocols, reexamine formalin fixed specimens, and prepare additional and new histologic sections when undertaking specific organ system investigations. A consequence was that these intensive studies yielded greater uniformity in interpretation, sometimes uncovered new diagnoses, and when combined with an intensive new search for small lesions, led to surprising new observations. Such investigations often produced results which were at variance with the data in the Pathology Studies Reports.

PURPOSE

The periodic publication of ABCC-JNIH Pathology Studies data permits refinement and correction of information, detection of changing trends, and the opportunity to recognize unusual occurrence of disease. As in previous reports,[1,2] the purpose of this report is:

1. To describe the further experience of the autopsy procurement program including various aspects leading to bias in the autopsy sample.

2. To reexamine the consistency between the underlying cause of death as determined from death certificate diagnoses and the autopsy cause of death especially as influenced by age, sex, city, sample, place of death, and radiation exposure.

例に認められる疾患の頻度は，各種の因子を考察しない限り，寿命調査集団中の存命している者あるいは死亡した者における頻度に相当するものとみなすことはできない．

3． 剖検例は，一般の剖検例と異なり，病院における死亡者のみならず自宅死亡者をも対象にしている．得られた資料によれば，家庭で死亡する割合と病院で死亡する割合とは，死因により相当異なるのである．そこで，ABCCの剖検で認めた疾患の有病率と内外における医療機関の剖検で認めたそれとの比較においては，この偏りを考慮すべきである．

4． 先の第1報と第2報に述べた剖検所見は，教育，経験および背景において相当異なる数多くの病理専門医の解釈を反映するものである．したがって，同じ疾患を有する各剖検例に対しても，主要剖検死因の確定には相当な相違があった．このような相違は，ある特定な疾患（例えば，心臓血管病や脳卒中）において，他の疾患（例えば癌）よりもよく認められた．このことおよび他の理由により，特定な臓器系を調査するにあたっては，病理学者は剖検記録を再評価したり，ホルマリンで固定した組織を再検査したり，また，新たに別の組織標本を作ったりする必要があった．この入念な作業の結果，解釈の一貫性や時には新しい診断をもたらし，併せて行った小病変に対する強力な探求によって驚くような新しい観察所見が得られた．このような調査の結果，先に発表した病理学的調査の報告とは異なる結果をしばしば導いたのである．

目　的

ABCC一予研病理学的調査について定期的に結果報告することによって資料の精度を高め，その訂正を行ったり，傾向における変化を探知したり，また疾患の異常発生を認める機会を提供するものである．先の報告[1,2]と同様に，本報の目的は下記のとおりである．

1． 剖検入手プログラムのその後の経緯，併せて剖検例に偏りをもたらす各種の要因について記述すること．

2． 死亡診断書記載の原死因と剖検死因との一致性，ならびに年齢，性，都市，調査群，死亡場所および放射線被曝による影響を再検討すること．

3. To review the pathologic findings (especially ischemic heart disease, stroke, and cancer) as such and in relation to radiation exposure.

FACTORS INFLUENCING AUTOPSY PROCUREMENT [6]

Autopsy Procurement Procedures. The LSS autopsies are of two types depending on whether they are performed in hospitals or at ABCC. The autopsies performed in hospitals outside of ABCC by collaborating pathologists are generally performed shortly after death as part of the routine hospital autopsy program frequently without knowledge on the part of the hospital staff that the patient had been a member of the LSS sample. Although autopsy contactors learn very quickly that an autopsy has been performed and the fact is entered on statistical department and other records, the protocols and tissue blocks are not received by the ABCC Department of Pathology until several months later at the best and often not until years after the autopsy. The autopsy rate for these non-ABCC LSS cases is a reflection of the hospital's autopsy rate modified by interest in the particular disease and perhaps knowledge of the radiation exposure. Permission for the second type, the ABCC autopsy, is obtained by ABCC autopsy contactors who attempt to procure such permission on all persons in the sample who die including persons who died at home or were removed to their homes after death in a hospital or clinic, and on hospital and clinic deaths when autopsy facilities were not available there. In 1970, 90% of autopsies were ABCC autopsies and 10% non-ABCC autopsies.

In perhaps 80% of the deaths, the family's first indication of ABCC interest in the deceased is the approach of autopsy contactors with a request for autopsy permission, the remaining 20% being aware of ABCC interest because they are members of the AHS sample. Under these conditions the procurement of permission for autopsy is a delicate process requiring great tact, patience and understanding, the active collaboration of the family physician, and of the people of the two cities.

Autopsy Rates. Until the establishment of the present intensive LSS autopsy procurement program in 1961, relatively few autopsies were performed on members of the LSS sample who died in Hiroshima and Nagasaki (Table 1). In 1961, there was a dramatic increase in the number of autopsies as well as in the autopsy rate. The rate reached the peak of 45.0% in 1962 in Hiroshima and 45.8% in Nagasaki a year later.

3. 病理学的所見(特に虚血性心臓病，脳卒中および癌)およびこれら所見と放射線被曝との関係を検討すること．

剖検入手を左右する諸要因 [6]

剖検例の入手方法． 寿命調査集団における剖検例は，剖検が病院あるいはABCCで実施されるかによって二つに大別できる．ABCC以外の病院において協力病理専門医が実施する剖検では，通常その病院の剖検プログラムの一環として死亡後早い時期に行われ，多くの場合，病院側においてはその患者が寿命調査の対象者であるか否かという事前の情報はない．剖検連絡員は対象者の剖検が病院で行われた事実を早急に知り，その旨が統計部などの記録に記入されるが，ABCC病理部がその例の剖検記録や組織ブロックを入手するのは，早い場合で数か月後，多くの場合，何か年後のことである．このような寿命調査対象者の非ABCC剖検率は，病院における剖検率を反映するもので，特定な疾患に対する関心と恐らく被爆歴によって影響を受けるのである．一方，ABCCで実施される剖検例は，調査集団中に死亡があった場合，これには家庭における死亡者，病医院で死亡後家庭に移された者あるいは剖検施設がない病医院における死亡者が含まれるが，その全例について剖検承諾を得るように努力しているABCC剖検連絡員によって得られる．1970年における剖検例のうち，90%はABCC剖検例で，10%は非ABCC剖検例である．

死亡者の約80%では，ABCCが死亡者に関心を持っている事実が，剖検承諾を求めるための連絡員の来訪で遺族に初めて判明するもので，残り20%のものでは，ABCCの成人健康調査の対象者であるのでABCCが関心のあることは事前に判明している．このような情況下にあるので，剖検承諾手続は微妙なものであって，連絡員の技術，忍耐と理解ならびに主治医と両市の市民の積極的な協力を必要とするのである．

剖検率． 現行の強力な剖検例入手プログラムが1961年に発足する前は，寿命調査集団に属し，広島または長崎で死亡する者の剖検は比較的少なかった(表1)．1961年に剖検数とその率に急激な上昇があって，広島では1962年に45.0%，また長崎ではその一年後の1963年に45.8%という最高値に達した．

The autopsy rate declined about 2% per year in Hiroshima in the period between 1963 and 1970, followed by a very sharp drop in 1970. In Nagasaki the autopsy rates were more variable but the general picture was similar to that for Hiroshima especially if the exceptionally high rate in 1966 and the low rate in 1967 are averaged out. If anything, the rate of decline in the autopsy rate was somewhat greater for Nagasaki than that for Hiroshima. As in Hiroshima, the LSS sample autopsy rate for 1970 was the lowest recorded in the past 10 years.

In the Second Report of the JNIH-ABCC Pathology Studies,[2] procurement data were examined to see if (1) possible changes in the migration pattern might have influenced the autopsy procurement rate, and (2) whether the place of autopsy might have been a source of variation in the procurement rate. The findings were negative. The updated information (Table 2) confirms the past findings that the decline in the procurement rate was not the result of a fall in the proportion of deaths occurring within the local communities to which procurement efforts were directed. On the other hand, the proportion of non-autopsied cases among deaths occurring outside of the respective cities to all deaths was inching upwards in Hiroshima. In Nagasaki, the increase was greater but the rate was still less than 20%.

With respect to the second possibility, place of autopsy, it seems clear from Table 3 that there has been a steady decline in the procurement rate for autopsies performed at ABCC whereas there has not been a great change in the rate for non-ABCC autopsies except for the last year, 1970. In Nagasaki, the proportion of non-ABCC autopsies actually increased between 1961 and 1968. However, in 1969 and 1970, the procurement rate for non-ABCC autopsies decreased.

The low overall procurement rate of 25.1% for both cities can be explained in part by the apparent decline in the number of non-ABCC autopsies in 1970. In the period 1965 to 1969, an average of 65 cases had been contributed by outside institutions. In 1970, this number had decreased to 30. If the average of the previous 5 years had been contributed by outside institutions in 1970, the overall procurement rate would have been 28.2%. Although this is more than the 25.1% actually recorded, it would still be an all time low since the special autopsy procurement program was instituted.

EPIDEMIOLOGIC CHARACTERISTICS OF AUTOPSY DATA

In the previous reports of this series of ABCC-JNIH

広島では剖検率は，1963年から1970年まで毎年約２％程度減少し，1970年にその率に急激な下降が見られた．長崎の剖検率には，より大きな変動があったが，1966年に見られた例外的な高率と1967年における低率を平均化すれば，剖検率の傾向は広島のそれと近似している．どちらかといえば，長崎の剖検率の下降は，広島のそれよりわずかながら強いようであった．広島の場合と同様に，1970年の剖検率は過去10年間の実績に比べて最低であった．

病理学的調査の第２報[2]において，剖検例を検討して，(1) 人口の移動パターンの変化が剖検入手率に影響を及ぼしているか否か，および(2) 剖検場所が剖検入手率に差を生じさせる原因であるか否かについて調べた．両者とも陰性的な結果が得られた．最新の資料（表２）によれば，剖検入手の努力が行われている両市において死亡する者の割合が減少したために剖検率が下降したのではないという過去の実績が裏付けられた．一方，全死亡者中の広島・長崎両市以外における死亡者の未剖検例の割合は，広島ではわずかながら上昇している．長崎ではその増加は広島よりも高いが，率はなお20％以下である．

第２の可能性である剖検場所の影響については，表３で明白のように，ABCCにおける剖検の率は一貫して減少しているが，非ABCC剖検の実施率は1970年を除き著しい変動はなかった．長崎では，非ABCC剖検の割合は1961年から1968年までの間に上昇を示した．しかし，1969年と1970年においては，非ABCC剖検の入手率は減少した．

1970年に見られた両市における25.1％という低い総剖検率は，非ABCC剖検数の明白な減少によって部分的に説明できる．1965年から1969年までの間，平均して約65の剖検例が外部の病院から提供されていたが，1970年に至りこの数は30例まで減少した．外部の病院が行った過去５か年の平均剖検数を1970年に提供していれば，総剖検率は28.2％になっていたはずである．この率は，実績である25.1％よりも高いが，その値は新剖検入手プログラムが発足して以来の最低値であることに変わりはない．

剖検資料の疫学的特徴

ABCC－予研病理学的調査の剖検例に関する以前の報告

Pathology Studies, autopsy rates in relation to various factors of epidemiologic interest were presented. These included factors such as (1) exposure to radiation, (2) participation in the AHS, (3) place of death, (4) cause of death, (5) interaction between cause of death and radiation, (6) sex, and (7) age. In this report, the same factors will be reexamined on the basis of accumulated experience to provide background information for future studies of necropsy data.

Exposure to A-bomb Radiation. In the period between 1951 and 1960 when the LSS autopsy procurement rates were low, they were virtually level for all exposure groups except for the 200+rad group in both Hiroshima and Nagasaki (Figure 1, & Table 4). In this heavily exposed group, the autopsy procurement rate was conspicuously high.

In the subsequent 10-year period, there was considerable equalization in the autopsy rates for Nagasaki. Although the rate for the 200+rad group continued to be high in the years between 1961-65, in the period 1966-70, the autopsy rate for the low dose groups caught up to the level of the 200+rad group. The rates for the groups exposed to 50-199 rad were slightly higher than the average, but not excessively so. Over the whole period between 1951-70, the autopsy rates for Nagasaki were relatively level with some excess in the rates for the 50-99 rad and 200+rad groups.

For Hiroshima, the autopsy rates appear to be directly associated with radiation dose. Consequently, even if there were no actual radiation effect, the distribution by radiation dose would clearly suggest a radiation effect because of the higher autopsy rate for high dose survivors. Thus, great caution needs to be exercised in the analysis of autopsy data by radiation dose for Hiroshima.

Participation in the Adult Health Study. The AHS sample[7] consists of two groups (1) a small group who for various reasons including non-cooperation, were never examined (AHS-NE), and (2) a large group who were examined one or more times. The autopsy procurement rates for those participating in the biennial examinations of the AHS appear to be uniformly high (Figure 2 & Table 6). However, when the χ^2 tests are applied, only the differences at the lower doses are statistically significant. Comparison of the rates for the group examined in the AHS sample with those in the AHS-NE group shows statistically significant differences only for the under 1 rad and for the 1-49 rad classes. Similar comparison between the AHS sample examined and those not in the AHS show statistically significant differences in the same dose groups.

では，剖検率と各種疫学的要因との関係を述べた．要因としては(1) 放射線被曝，(2) 成人健康調査への参加状態，(3) 死亡場所，(4) 死因，(5) 死因と線量との相互作用，(6) 性別，(7) 年齢などが取り上げられた．今回の報告では，その後に収集された資料を用いて同一要因の再検討を行い，剖検資料の今後の調査のために必要な背景資料を提供する．

原爆放射線被曝． 寿命調査集団における剖検率が低率を示した1951年から1960年までの期間は，広島・長崎ともに200 rad以上の群を除けば，各被爆群における剖検率はほとんど等しかった(図1および表4)．高線量群では剖検率が著しく高率であった．

長崎では，その後の10年間に剖検率はかなり均一となった．200 rad以上の群は，1961－65年に引き続き高率を示したが，1966－70年の期間に至って低線量群の剖検率は200 rad以上の群の水準に達した．50－199 rad被曝群は平均値よりもやや高率を呈したが，過大であるというほどではない．1951年から1970年までの全期間を通じてみると，長崎における剖検率は50－99 rad群と200 rad以上の群がやや高率であることを除けば，比較的均一であった．

広島では，剖検率と放射線量との間に直接関係がみられるようである．したがって，高線量被曝群の剖検率が高いために放射線影響が実際存在しない場合でも症例の線量別分布から放射線影響が明らかに示唆されるであろう．したがって，広島における剖検資料の線量別解析は非常な注意を必要とする．

成人健康調査への参加状態． 成人健康調査集団[7]は，(1) 協力拒否を含めて何らかの理由で全く受診したことのない少数の者，ならびに(2) 1回以上受診した多数の者，から成る二つの群に大別できる．成人健康調査における2年ごとの検診で受診したことのある者の剖検率は，一貫して高いようである(図2および表6)．しかし，χ^2 検定では，低線量群における差だけが統計的に有意であった．すなわち，成人健康調査における受診者と非受診者との比較で統計的に有意な差が認められたのは1 rad未満ならびに1－49 radの者だけである．成人健康調査受診者と成人健康調査対象として選ばれていない者との比較検討でも，同線量群に統計的に有意な差があった．

It has long been thought that the biennial contacts with the AHS sample create a certain rapport favorable from the standpoint of obtaining permission for an autopsy. If this hypothesis is correct, the AHS examined group should have the highest procurement rates and the never examined group the lowest rates. The latter might be considered the least cooperative because of refusal to participate in the medical examinations. Those not in the AHS (but in the LSS) should be in the intermediate positions.

The observed values (Table 6) clearly appear to support the above hypothesis. However, when the sample size is taken into consideration, it is only in the low dose groups that this hypothesis is upheld. In the intermediate and high dose groups, the differences between the autopsy procurement rates for the various samples are not statistically significant. It appears that in this context, autopsy procurement rate is determined by two factors; radiation exposure ATB and rapport through AHS biennial physical examination. When patients were exposed to high doses of radiation, autopsy procurement rates were high in all groups whether examined or not. When radiation exposure dose was low (below 50 rad) the autopsy rate was significantly higher for the AHS sample who participated in the biennial examinations than in the not AHS sample. However, it should be noted that it is in the exposed population where greater interest in the cause of death may be expected.

Place of Death. There is little question that autopsy procurement is simpler and more likely to be successful when death occurs in a hospital. As may be seen from Table 12, 45.4% of hospital deaths were autopsied in the period 1961-70. The corresponding proportion was 34.6% for clinic deaths and 30.6% for deaths occurring in other places mostly at home. In Nagasaki, the difference in the proportion of autopsies in the clinic and other places was not as great as in Hiroshima.

Cause of Death. The autopsy procurement rates are high for leukemia, other malignant neoplasms, and possibly certain forms of cerebrovascular and cardiovascular disease (Table 7). However, it is not clear why the autopsy rate for tuberculosis and cirrhosis of the liver should be high. For several other diseases there appears to be an association between diagnosis and autopsy rate but the frequency of deaths involved is too small for any meaningful statistical inference.

Interaction of Cause of Death and Radiation Dose. For the purposes of epidemiologic studies, it is important that the autopsy rates not be biased in the comparison of radiation exposure groups. As may be

成人健康調査対象者との2年ごとの接触は，剖検の承諾を求める見地から有利な関係をもたらすものと長い間考えられていた．この仮説が正しければ，成人健康調査受診者の剖検率が最高で，非受診者が最低になるはずである．すなわち，後者は，医学的検診を拒否しているので最も非協力的な者と考えられよう．成人健康調査に含まれていない者（ただし，寿命調査の対象である者）は，その中間位を占めるはずであろう．

表6に示した観察数は，上記の仮説を明らかに支持していると思われる．しかし，その例数を考慮すればこの仮説が裏付けられたのは低線量群だけであり，中線量群や高線量群における各群間の剖検率の差は統計的に有意ではない．この関係からすれば，剖検率は二つの要因で決定されると思われる．すなわち，放射線被曝および成人健康調査の2年ごとの検診を通じての協力関係である．高線量被曝者の場合，受診者であるか否かにかかわらず，すべての群において剖検率が高かった．低線量被曝の場合（50 rad 未満）では，成人健康調査の2年ごとの検診を受けた対象者の剖検率が，対象者でない者のそれよりも有意に高かった．しかし，死因についてより大きな関心が持たれるのは，被爆者集団においてであることを述べておく必要があろう．

死亡場所．病院で死亡した場合に剖検の承諾を求めることがより容易であり，成功率が高いことはいうまでもない．表12に示したごとく1961－70年の期間では病院死亡者の45.4％が剖検を受けた．これに対して医院における死亡者は34.6％，その他の場所，主として自宅における死亡者は30.6％が剖検を受けた．長崎では，医院とその他の場所との間の剖検率の差は広島ほど著しくはない．

死因．白血病，その他の悪性新生物ならびに恐らくある種の脳血管性および心臓血管性疾患の剖検率が高い（表7）．しかし，結核や肝硬変の剖検率も高率である理由は不明である．そのほかの数種の疾患においても診断と剖検率との間に関連があるようであったが，死亡者数が少ないために意味のある統計的推計ができない．

死因と線量との相互作用．疫学的調査を目的とする線量群間の比較検討では，剖検率に偏りのないことが重要である．表9の資料にみられるごとく，一般に各疾患の剖

seen from the data in Table 9, the autopsy procurement rates for various diseases appear to be generally unbiased by dose. No association is evident between autopsy procurement rate and the various other causes of death with the possible exception of malignant neoplasms, excluding leukemia and cardiovascular diseases. The χ^2 tests show association between radiation dose and autopsies at the 0.05 level for deaths from malignant neoplasms, excluding leukemia. For cardiovascular deaths, the P value for χ^2 was close to 0.05 but between 0.05 and 0.10. These comparisons indicate that some caution is needed in the interpretation of results from radiation effects studies of cancer (but not leukemia) and of cardiovascular diseases when autopsy data are used as measures of incidence or prevalence.

Sex. The autopsy procurement rate was slightly higher for males than for females (Table 10) but the difference was slight (22.5% vs 21.7%).

Age. Except for the low autopsy procurement rate for persons younger than age 30 at death, there is no evidence in Table 10 that age at death significantly influenced the procurement rates. Above age 30 the rates varied from 19% to 24%.

CLINICAL AND AUTOPSY DIAGNOSES

The Death Certificate Underlying Cause of Death. The LSS is based on analysis of death certificates and the diagnostic data contained therein. The statistics used are those on the underlying cause of death which is defined as the disease or condition that started the sequence of events leading to death as certified by the attending physician. The concept of underlying cause of death is that used as the basis for official mortality statistics for which there is an internationally accepted procedure.[8]

The concept of the underlying cause of death has been a subject of much criticism.[9-11] Basically, the issue is the difficulty and impracticability of selecting a single disease or condition as the cause of death when more than one disease is involved. With the increasing prevalence of chronic diseases where a multiplicity of pathologic processes is involved, the selection of a single disease to depict the entire process becomes increasingly difficult. In addition, questions have been raised about the accuracy of diagnoses reported on death certificates.[12-14] The problem of accuracy and reliability of clinical diagnoses is an exceedingly difficult one to determine. Short of a full fledged clinicopathological conference, it is not possible to assess the accuracy of diagnosis in the difficult cases and

検率には線量のための偏りはないようである．白血病を除く悪性新生物と心臓血管疾患以外は，死因と剖検率との間に明白な関連は認められない．χ^2 検定では，白血病を除く悪性新生物は0.05の水準で線量と剖検との間に関連がある．心臓血管疾患では，χ^2 のP値が0.05に近いとはいえ，0.05から0.10の間にある．この比較からは，癌（白血病以外）および心臓血管疾患に対する放射線影響の調査に剖検資料を発病率または有病率の指標とする場合に，結果の解釈に若干の注意が必要であることがわかる．

性別．女よりも男の剖検率がやや高いが（表10），その差は軽度である（22.5%対21.7%）．

年齢．表10では，死亡時年齢30歳未満の者の剖検率が低いことを除けば，死亡時年齢が剖検率に有意な影響を及ぼすとは認められない．年齢30歳以上では，剖検率は19%から24%の範囲にあった．

臨床診断および剖検診断

死亡診断書記載の原死因．寿命調査における解析は，死亡診断書とそれに記載されている診断名を基礎資料としている．死亡を引き起こした一連の病的事象の起因となった疾病もしくは損傷として主治医の記載した状態が原死因であり，これを統計量として用いている．この原死因の概念は，公式死亡統計の基礎でもあり，そのための国際的に採択された選定規則がある．[8]

原死因の概念に対して多くの批判がある．[9-11] 根本的には二つ以上の疾患が関係している場合に単一の疾病もしくは損傷を死因として選定することは，困難で実行不可能であるという問題がある．多種の病的機転が関係している慢性疾患の頻度の増加に伴い，病状全体を表わす単一の疾病の選定がますます困難になっている．その上，死亡診断書に記載される診断の正確性に疑問が表明されている．[12-14] 臨床診断の正確性もしくは信頼性の問題は，究明がきわめて困難である．診断決定の困難な症例では，詳細な臨床病理検討会を行わない限り診断の正確性は評価で

it is obviously not practical to determine the accuracy of diagnoses by this method. However, the autopsy series at ABCC does provide a means for checking the death certificate information which is based on clinical observations made prior to death against the findings from pathological observations made after death.

The Principal Autopsy Diagnosis. The pathologist, when completing the autopsy protocol, designates a principal disease which in theory is equivalent to the underlying cause of death assigned by the attending physician on the medical certification of death. In practice the problems of the antecedent cause and of multiple chronic diseases produce difficulties for the pathologist as perplexing as they were for the clinician. In addition to the conflicts inherent in the approach of different disciplines, a further constraint is placed on the comparison of the clinician's diagnosis on the death certificate with the pathologist's autopsy protocol diagnosis in that the classification of disease does not always suit the pathologist's needs. The pathologist cannot find autopsy evidence for symptomatic disease, psychoses, acute and ill defined conditions, etc., and cannot find diagnostic codes for some of his specific diagnoses including those which are not likely to be recognized by clinicians.

Rules for Determining Principal Autopsy Diagnosis. In the study of the quality of diagnostic data reported on death certificates in this and previous ABCC studies, the assumption is made that the principal autopsy diagnosis is correct. In reality, the autopsy diagnosis is also subject to error. There are no specific criteria for designation of the principal autopsy diagnosis. On occasion, in autopsy conferences, the pathologists do not agree on the principal diagnosis, and the same pathologist might select another diagnosis with passage of time. In an attempt to eliminate the difference between pathologists, selection rules were adopted and the entire ABCC series of autopsy cases was reviewed by a single pathologist (A.S.). Because this review took place over a period of 2 years, it is probable that there was some drift in the application of the rules. However, the concepts were not knowingly changed over this period. In this review, the rules for the principal diagnosis (equivalent to the underlying cause of death on death certificates) were based in large part but not entirely on the international coding rules. Antecedent cause was accepted as principal disease for most conditions (e.g., old fracture of the femur was the principal diagnosis when death occurred after subsequent inanition, bed sores, sepsis, and pneumonia). However, in the study of stroke, cerebral infarct was selected as the principal diagnosis rather than generalized arteriosclerosis,

きないが，この方法を用いて診断の正確性を決定することは，明らかに実行不可能である．しかし，ABCCにおける剖検調査は，生前の臨床観察に基づく死亡診断書資料と死後の病理学的観察に基づく所見との照合が可能である．

主要剖検診断．病理専門医は，剖検記録作成時に主要疾患を選定しており，これは理論的には主治医によって死亡診断書に記載される原死因に相当するものである．その選定にあたり，病理専門医も先行死因や多種の慢性疾患併発の問題のために，臨床医が経験すると同様の困難に直面する．学問分野の違いによって考えかたが異なるばかりでなく，疾病分類が必ずしも病理専門医の必要に合致しないことも死亡診断書における臨床医の診断と剖検記録における病理専門医の診断との比較に制約を加える．病理専門医は，剖検で症候的疾病，精神症，急性もしくは診断名不明確な状態などの形跡を検出できないとともに臨床医によって発見される可能性の少ない疾病を含むある種の特殊的な診断のためのコードを見出し得ないことがある．

主要剖検診断決定規則．死亡診断書に記載される診断資料の質に関する今回および以前のABCC調査では，主要剖検診断が正しいと仮定した．現実には剖検診断にも誤りが起こりうる．主要剖検診断の選定に特定の基準はない．時には剖検検討会で病理専門医の間に主要診断について意見の不一致があるばかりでなく，同一病理専門医でも時が経過すれば別の診断を選定することがある．病理専門医間の差を除去するため，選定基準を設けてABCCにおける全剖検例を病理専門医1名（A.S.）が再検討した．この再検討が2年間にわたって行われたので，その基準の適応に若干の変動があったかもしれない．しかし，この間に故意に概念の変更が行われたことはなかった．この再検討に用いた主要診断（死亡診断書における原死因に相当する診断）の選定基準は，国際的なコード規則のみに基づくものではないとはいえ，それを主体にして作成したものである．先行死因を主要診断として選定したことが多い．たとえば，大腿骨骨折に続いて飢餓衰弱，褥瘡，敗血症および肺炎を発病して死亡した場合は，その古い骨折を主要診断とした．しかし，脳卒中の研究に

cerebral atherosclerosis, etc. When more than one significant process was present, the principal diagnosis selected was the one related to the immediate cause of death (e.g., when both an old myocardial infarct and an old cerebral infarct were present the cerebral infarct was regarded as the principal diagnosis if the immediate cause of death was pneumonia, and myocardial infarct if the immediate cause of death was cardiac failure).

Cancer was designated as the principal diagnosis if it was the logical cause of death, if it was related to the immediate cause of death, or if the treatment for the cancer led to death, as in postoperative hemorrhage following surgical removal of the neoplasm. At autopsy the pathologist has the advantage over the clinician in that he can observe the size and location of the cancer and make some judgment as to the invasiveness and significance of the neoplasm as a cause of death.

The following special definitions were employed in assigning the principal autopsy diagnosis of heart disease, stroke, or cancer:

Heart Disease. Atherosclerosis of coronary arteries was not graded unless narrowing or constriction of the lumen was specifically described in the autopsy protocol. Myocardial infarcts were limited to lesions 0.5 cm or greater in any dimension. Smaller lesions were listed as areas of focal fibrosis. Infarcts were coded as recent if cellular reaction, pigment, hemorrhage, etc., were present and as old if fibrotic and no cellular reaction was seen. Cardiac hypertrophy was coded if the heart weighed more than 350 grams, 300 grams or more in persons weighing less than 45 kg (99 lbs.), or 280 grams or more in persons weighing less than 35 kg (77 lbs.). Hypertension was listed if the available clinical resume recorded a blood pressure reading of 150 mmHg systolic or more or if myocardial hypertrophy was present without adequate explanation other than hypertension.

Stroke. The diagnosis of hemorrhage was made when an area of hemorrhage 3 cm or more in diameter was present in the cerebrum and it was not due to a ruptured berry aneurysm. Smaller hemorrhagic lesions in the brain stem were also accepted. Hemorrhagic lesions in the cerebrum less than 3 cm in diameter were listed as hemorrhagic infarcts. However, if both old infarcts and recent cerebral hemorrhage were present, the cerebral hemorrhage was considered a new expression of the original process and was listed as the immediate but not principal cause of death, the cerebral infarct being named as the

おいて全身性動脈硬化症，脳動脈アテローム性動脈硬化症などがあっても，脳梗塞を主要診断とした．有意な病的過程が二つ以上ある場合は，直接死因と関係あるものを主要診断として選んだ．たとえば，古い心筋梗塞と古い脳梗塞の併発が認められた場合，肺炎が直接死因であったならば脳梗塞を主要診断とし，心不全が直接死因であったならば心筋梗塞を選んだ．

癌が死因として合理的である場合や直接死因と関係がある場合，また，新生物の外科的切除術後の出血など，癌の治療が死亡をひき起こした場合は，癌を主要診断として選定した．病理専門医は，剖検で癌の大きさおよび部位を観察して，その新生物の侵襲性や死因としての意義について何らかの判定ができるということにおいて臨床医より有利である．

心臓疾患，脳卒中および癌を主要剖検診断として選定するにあたって次の特別な定義を用いた：

心臓疾患．冠状動脈のアテローム性動脈硬化症は，剖検記録に内腔狭窄の具体的な記述がなければ評価しなかった．心筋梗塞は，いずれかの方向の直径が0.5cm以上の病変に限定した．それ以下の病変は巣状線維症として記録した．細胞性反応，色素，出血等があれば新鮮梗塞とし，線維性で細胞性反応がなければ陳旧性梗塞としてコードした．心肥大は，心臓重量350 g以上のもの，体重45kg（99lb）以下の者で心臓重量300 g以上，また，体重35kg（77lb）以下の者で心臓重量280 g以上のものとした．入手された臨床所見の総括記録に150 mm Hg以上の収縮期血圧がある場合，また，心筋肥厚があって高血圧以外に適当な説明がない場合は，高血圧を記載した．

脳卒中．直径3 cm以上の出血が大脳内にあって，嚢状動脈瘤破裂のためでなければ脳出血として診断した．脳幹内の出血は，もっと小さいものをも採択した．直径3 cm未満の大脳内の出血性病変は出血性梗塞として記載した．しかし，陳旧性梗塞および新鮮脳出血がともにみられる場合には，脳出血をその初めの病的過程の新たな発症であると考えて直接死因として記載し，主要死因としなかった．その脳梗塞

principal autopsy diagnosis. Cerebral infarct was diagnosed as principal autopsy diagnosis when an adequate lesion was found which was consistent with the immediate cause of death (e.g., old cerebral infarct with aspiration pneumonia). In addition, cerebral infarct was accepted as principal disease even though small if no other adequate diagnosis could be made and there was historical or anatomical evidence of functional effect (hemiplegia, contractures, decubiti, etc.).

Cancer. All tumors were listed but were coded as principal autopsy diagnosis only if they were an adequate cause of death. In the special case where both cirrhosis and hepatoma were present, the cirrhosis was not considered the antecedent cause of the cancer. Inadequately documented cases of "cured" cancer were not accepted. Tumors not recognized at the time of autopsy but discovered during the course of special intensive and directed investigations were not listed.

Equivalent Death Certificate and Autopsy Diagnoses for Heart Disease, Stroke, and Cancer. In the analyses which follow, certain diseases were grouped together (e.g., ICD 410-414 Ischemic Heart Disease). These groups are well defined for clinicians and include nonanatomic forms such as ICD 414 Asymptomatic Heart Disease. As mentioned previously, this imposes a constraint on the pathologists' diagnoses which becomes evident when their diagnoses are listed without regard to ICD code designations. Then, as in Table 31, discrepancies appear between tables developed from ICD coded autopsy diagnoses and those prepared on the basis of pathoanatomic terms. The latter were used only in the second half of this report. In all correlations of death certificate and autopsy diagnoses, the ICD coded diagnoses for both were used. A list of ICD code numbers used for death certificate diagnoses and the equivalent autopsy diagnoses for heart disease, stroke, and cancer follows follows (Page 13).

ACCURACY OF UNDERLYING CAUSE OF DEATH AS DETERMINED FROM DEATH CERTIFICATE DATA

In assessing the quality of the medical certification on death certificates, the underlying causes of death as reported on death certificates are compared with the principal autopsy diagnoses. The agreements and disagreements from these comparisons may be used as measures of the difference between the pathologist's concept of the underlying cause of death and the underlying cause of death determined by the international selection rules based upon observations as recorded by clinicians. The

を主要剖検診断とした．脳梗塞の十分な病変があって，直接死因と矛盾しない場合（例えば，嚥下性肺炎を伴う陳旧性脳梗塞）は脳梗塞を主要剖検診断とした．そのほか，脳梗塞が小さい場合でも，別の適当な診断がなければ，また，機能的効果（片麻痺，れん縮，座創等）の病歴上または解剖学的証拠があれば，脳梗塞を主要疾患とした．

癌．すべての腫瘍を記載したが，死因として適当である場合にかぎり主要剖検診断としてコードした．肝硬変と肝腫の併発が認められた特別の例では，その肝硬変を癌の先行原因とは考えなかった．「治癒した」癌例では，記録が不十分であれば，採択しなかった．腫瘍が，剖検で発見されたものではなく，強力な注意深い特別研究で検出された場合は，記載しなかった．

心臓疾患，脳卒中および癌についての死亡診断書と剖検診断との対応性．後述の解析では，ある疾患はまとめて扱った．たとえば，ICD 410－414 虚血性心疾患などである．この種の分類は，臨床医に明瞭であり，ICD 414 無症候性虚血性心疾患などのような非解剖学的診断名も含まれている．前述のごとく，これによって病理専門医の診断に制約が加えられたが，ICD コード分類を無視して病理専門医の診断を列挙してみればこのことは明瞭である．したがって，表31にみられるように，ICD に基づいてコードした剖検診断の集計と病理解剖学的診断名に基づく製表との間に差異が現われる．後者は本報告書の後半においてのみ利用した．死亡診断書診断と剖検診断とのすべての比較において両診断を ICD に基づいてコードして使用した．13ページの表には心臓疾患，脳卒中および癌についての死亡診断書診断名およびそれに対応する剖検診断名に対する ICD コード番号を示した（P. 13）．

死亡診断書に基づく原死因の正確性

死亡診断書に記載された医学的診断名の質を評価するため，死亡診断書の原死因と主要剖検診断との比較を行った．この種の比較で認められる一致や不一致は，原死因に対する病理専門医の概念と国際選択規則に基づいて臨床医の観察記録から決定された原死因との違いの指標と

DEATH CERTIFICATE AND AUTOPSY EQUIVALENT DIAGNOSES BY ICD CODE

死亡診断書診断名とそれに対応する剖検診断名の ICD コード

ICD (8th Rev)	Death Certificate Underlying Cause of Death	Principal Autopsy Diagnosis
400-404	Hypertensive disease	Hypertensive heart diseases as indicated by cardiac hypertrophy without other adequate principal diagnosis
410-414	Ischemic heart disease	Coronary atherosclerosis, coronary thrombosis, myocardial infarct
420-429	Other forms of heart disease	
428	Other myocardial insufficiency	Coronary atherosclerosis
429	Ill-defined heart disease	Cardiac hypertrophy
430-438	Cerebrovascular disease	Cerebral hemorrhage & infarction
430	Subarachnoid hemorrhage	Subarachnoid hemorrhage
431	Cerebral hemorrhage	Cerebral hemorrhage
433	Cerebral thrombosis	Cerebral infarction
434	Cerebral embolism	
433, 434, 437	Cerebral thromboembolic & ischemic disease	Cerebral infarction
432, 435, 436, 438	Other cerebrovascular disease	Not specifically defined
204-207	Leukemia, regardless of type	Leukemia, regardless of type
140-203, 208-209	Other cancers	Other cancers by site of origin regardless of cell type

following table shows the possible agreements and disagreements between the underlying cause of death based on death certificate diagnoses and the principal autopsy diagnoses:

なろう．次表には，死亡診断書診断名に基づく原死因と主要剖検診断との間に起こりうる一致および不一致を示した．

Principal Autopsy Diagnosis 主要剖検診断	Underlying Cause of Death 原死因		Total 計
	Disease X 疾病X	Other than Disease X 疾病X以外	
Disease X 疾病X	a Confirmed 確認	b False negative 見落とし	a + b
Other than Disease X 疾病X以外	c False positive 誤診	d Absence of disease X confirmed 疾病Xの欠如を確認	c + d
Total 計	a + c	b + d	a + b + c + d

In this table, four possible outcomes are specified, two agreements (a and d) and two disagreements (b and c). The percentage of cases in which the underlying cause is confirmed by autopsy is 100 a/(a+c). This may be termed the confirmation rate. The complement of the confirmation rate, that is, 100 c/(a+c) is the false positive rate. Similarly, the rate of correspondence between the underlying cause of death and the principal autopsy diagnoses is 100 a/(a+b). This may be termed the detection rate, and its complement, 100 b/(a+b) the false negative rate.

The confirmation rate and the detection rate are not independent for a is common to both. In the detection rate, a is related to (a+b), the "true" total for

この表では，起こりうる四つの結果，すなわち，2種類の一致（a および d）と2種類の不一致（c および b）を示した．原死因が剖検で確認された百分率は 100 a／（a＋c）である．これを確認率と呼称する．この確認率の補数，すなわち，100 c／（a＋c）が誤診率である．同様にして，原死因が主要剖検診断と対応する割合は 100 a／（a＋b）である．これを発見率と呼称し，その補数 100 b／（a＋b）が見落とし率である．

この確認率と発見率は，a が共通しているので，互いに独立でない．発見率では，a と疾病Xの「真の」総数

disease X. In the confirmation rate, a is related to (a+c), the asserted total for disease X. Depending on the size of b and c, these rates may differ greatly. To combine the two measures, it will be necessary to know the error components of b and c. For example, a large value of c will dilute the number of deaths attributed to X so as to make the statistics based on death certificates insensitive to factors truly associated with the incidence of X. The size of b, on the other hand, which also reduces the power of analysis based on a to detect factors associated with its incidence, could be quite large without depriving a of all value (i.e., if a is sufficiently large in the absolute sense, it will be the relative admixture of c that will count). In other words, a relatively low detection rate can be tolerated if the confirmation rate is high. In this limited sense, and in the absence of any interaction with the factors to be investigated (e.g., the exposure status), the confirmation rate is more important.

Using the principal autopsy diagnoses as the base, it may be seen in Table 26 that generally high confirmation rates are obtained for malignant neoplasms as the underlying cause of death derived from death certificates. The highest confirmation rate of 97% was recorded for breast cancer. The death certificate diagnoses of leukemia, cancers of the stomach, and of the bronchus, trachea, and lung with confirmation rates of over 80% rank high (Table 26). On the other hand, the confirmation rate for malignant neoplasms of sites not specified is low (28%). Other diagnoses with low confirmation rates (Table 29) are syphilis (11.8%), diabetes (35.8%), hypertensive diseases (28.9%), cerebral hemorrhage (21.3%), intestinal obstruction and hernia (20.0%), and nephritis and nephrosis (21.1%).

Of special interest is the low confirmation rate for cerebral hemorrhage, said to be the leading cause of death in Japan. From Table 29, it is seen that of the 451 deaths attributed to cerebral hemorrhage on the basis of death certificates, in only 96 (21%) was cerebral hemorrhage determined to be the principal disease at autopsy. Most of the deaths attributed to cerebral hemorrhage on death certificate were found at autopsy to be due to cerebral infarcts. There were 188 cases where the principal autopsy diagnosis was cerebral infarction instead of cerebral hemorrhage. In addition, there were 34 deaths where the autopsy diagnosis was subarachnoid hemorrhage rather than cerebral hemorrhage. Because death certificate data overstate the cerebral hemorrhage problem with the corresponding understatement of cerebral infarction, it is suggested that total cerebrovascular diseases be used for study rather than the components part of this group of diseases.

(a＋b)との関係を求めている．確認率では，aと疾病Xと報告された総数(a＋c)との関係を求める．この二つの率には，bおよびcの大きさによって大差がありうる．この二つの値を一つにまとめるためには，bおよびcによる誤差成分を知る必要がある．例えば，cが高値であれば，疾病Xによるとして報告される死亡者数が希釈され，死亡診断書に基づく統計は，疾病Xの発生率と真に関連を有する要因についての感度が低下するであろう．他方，bも，発生率と関連を有する各種要因の検出のためのaに基づく解析の検定力を低下させるが，bが非常に高値であっても，aの価値が完全に失なわれない場合がある．例えば，aの絶対数が十分に多いならば，c混入の相対的な割合が重要である．換言すれば，確認率が高いならば，発見率がかなり低くても許容できる．この限定された見地からみれば，また，調査の対象となる要因，例えば，被爆状態などと何らの相互作用がないならば，確認率の方が重要である．

主要剖検診断を基盤とした場合，表26にみられるごとく，死亡診断書に基づく原死因としての悪性新生物の確認率は，全般的に高率である．確認率が最も高いのは乳癌であり，97%であった．白血病ならびに胃，気管支，気管および肺の癌についても，死亡診断書診断名の確認率は高く，80%以上であった(表26)．他方，部位不明の悪性新生物の確認率は低率であった(28%)．そのほかに確認率の低い診断名(表29)は梅毒(11.8%)，糖尿病(35.8%)，高血圧性疾患(28.9%)，脳出血(21.3%)，腸閉塞とヘルニア(20.0%)ならびに腎炎およびネフローゼ(21.1%)であった．

日本で死因の首位を占めるといわれる脳出血の確認率が低いことが特に注目される．表29にみられるごとく，死亡診断書に脳出血と記載された死亡者451名のうちわずかに96名，すなわち，21%は剖検で脳出血が主要疾患とされていた．死亡診断書に脳出血に起因するとされていた死亡の多くは，剖検の結果，脳梗塞のためであることが認められた．主要剖検診断が脳出血でなく，脳梗塞であったものが188例あった．そのほか，剖検診断が脳出血でなく，くも膜下出血であったものが34例あった．死亡診断書資料では，脳出血の問題が過大評価され，また脳梗塞が過小評価されるので，調査にあたってこの一群の疾病を細分類別にみるよりは，むしろ脳血管疾患全体としてみるべきであることが示唆される．

The confirmation rate for "other forms of heart disease" was only 7.6%, but this category includes symptomatic as well as ill-defined heart diseases which are not likely to be designated as the principal diagnosis at autopsy. In general, diagnoses on death certificates which are essentially clinical are likely to have low confirmation rates.

As for the detection rates (Table 29) leukemia with a rate of 89.2% ranks highest. The death certificates are also apparently good sources for detecting diseases of blood and blood forming organs (82.4%) and breast cancer (81.4%). On the other hand, low detection rates are obtained for syphilis (11.8%), cancer of liver and bile ducts (12.9%), cancer of cervix (16.1%), hypertensive diseases (19.8%), other forms of heart disease (20.9%), subarachnoid hemorrhage (18.7%), cerebral embolism and thrombosis (16.1%), diseases of arteries (6.0%), and pneumonia (15.9%).

The low detection rate for cerebral embolism and thrombosis (cerebral infarction) for example, suggests why these pathologic conditions are infrequently entered on death certificates. In many cases cerebral embolism or thrombosis are incorrectly diagnosed as cerebral hemorrhage.

Of interest is the low detection rate for cancer of the cervix which is an accessible site for diagnostic purpose. It would seem that cervical cancers should be readily detected and entered on death certificates. When detected, the confirmation rate is high. However, it is believed that cancer of the cervix is often not detected in older women who comprise a large proportion of the autopsy population because vaginal examinations are often not made by clinicians in older women.

In comparing the results given in Table 26 of this study for the period 1951-70 with the corresponding Table 25 in Report 2 for the years 1950-65,[2] it may be seen that the confirmation rate did not change very much for diseases such as cancer of the stomach, lung, and cervix, tuberculosis, rheumatic heart disease, gastric and duodenal ulcer, nephritis and nephrosis, and deaths from violence. The confirmation rate increased significantly only for one disease, leukemia. On the other hand, the confirmation rate was substantially lower for lymphoma, diabetes, hypertensive disease, and cirrhosis of liver. These changes are probably due to difficulties in diagnosis (biopsy for lymphoma, clinical evaluation for diabetes and hypertension, and confusion when both cirrhosis and hepatoma are present) as well as differences in interpretation of antecedent cause and significance in causing death when more than one disease is present.

「その他の心疾患」の確認率は7.6％にすぎなかったが，この分類は，剖検で主要診断にされる可能性の少ない症状や診断名不明確の心疾患などを含むものである．死亡診断書に記載される診断名のうちで本質的に臨床診断であるものは，一般に確認率が低いことが多い．

発見率についてみれば(表29)，白血病は89.2％で最高であった．血液および造血器の疾患(82.4％)ならびに乳癌(81.4％)の発見のためにも死亡診断書は良好な出所となるようである．他方，発見率が低いと認められたのは，梅毒(11.8％)，肝と胆管の癌(12.9％)，子宮頚の癌(16.1％)，高血圧性疾患(19.8％)，その他の心疾患(20.9％)，くも膜下出血(18.7％)，脳栓塞症と血栓症(16.1％)，動脈の疾患(6.0％)ならびに肺炎(15.9％)であった．

例えば，脳栓塞症と血栓症(脳梗塞)の発見率が低いことは，これらの病的状態の死亡診断書における記載が低頻度である理由を示唆している．脳栓塞症または血栓症が脳出血と誤診されていることが多い．

診断検査が容易に実施できる部位である子宮頚については，癌の発見率の低いことが注目される．子宮頚の癌は発見が容易で，死亡診断書への記入が行われるはずであると考えられよう．発見例での確認率は高いことが認められた．しかし，臨床医は高年齢群の女について内診を行わないことが多いので，剖検調査の対象集団の大きな割合を占めている高年齢女性に子宮頚の癌の発見されることが少ないのであろうと考えられている．

1951－70年に関する今回の調査について表26に示した結果と第2報の表25における1950－65年の期間に関する結果[2]とを比較してみれば，胃，肺および子宮頚の癌，結核，リウマチ性心疾患，胃および十二指腸潰瘍，腎炎およびネフローゼ，暴力による死亡などの確認率に著しい変化は認められなかった．確認率の有意な増加があったのはわずかに一つの疾患，すなわち，白血病である．他方，確認率のかなりの下降が認められたのは，リンパ腫，糖尿病，高血圧性疾患および肝硬変であった．この変化は，疾患が二つ以上併発している場合の先行死因や死因としての意義に関する解釈の違いのためであるだけでなく，恐らく診断の困難性(リンパ腫の生検，糖尿病と高血圧の臨床的評価，肝硬変と肝腫が併発している時の混乱など)のためでもあろう．

AUTOPSY DIAGNOSES FOR STUDY OF RADIATION EFFECTS

Death certificate information on causes of death is available for the LSS sample. Because such data are, or will become available for the entire sample, the LSS sample constitutes a valuable source of statistics for investigation of radiation effects on the survivors. On the other hand, the deficiency of cause of death information is made clear by the confirmation and detection rates. For many purposes, clinical data do not adequately picture the pattern of underlying causes of death among survivors.

Although an autopsy series is not free from the biases of selection, the authoritative diagnoses based on pathological observations were thought to provide another important data source for the study of the delayed effects of A-bomb radiation. In the previous report, preliminary T65D data were used because the final dose estimates had not been made for the entire mortality sample. Omitting cases without dose estimates, data on exposure dose and autopsy rates were shown for the first time. Although these data were presented without comment, there was more than a suggestion of a relationship between radiation dose and the success of the autopsy procurement program.

The data in Table 6 show clearly the biased nature of the autopsy information as related to radiation dose. The efforts of the contactors in seeking permission for autopsies are related to knowledge of the exposure distance, and therefore exposure dose of the decedent. It is virtually impossible for the autopsy contactors to persuade the family to give consent for an autopsy without exposure information surfacing during the course of the interview.

The percent of autopsies increases in a linear fashion with radiation dose. Examination of Table 4 shows that the linearity of this relationship is more marked in the period 1961-65 as compared with the later years, 1966-70. However, even in the years 1966-70, the proportion of autopsies obtained in the high exposure dose group (100+rad) is significantly greater than that in the low dose group. This situation is obtained even though the percent of autopsies in the 200+rad group in Nagasaki was disproportionately low.

The autopsy procurement is definitely biased by radiation dose. The important question is how much of the data on underlying cause of death or principal diagnosis are similarly affected. This may be seen from the data in Table 9, but meaningful comparisons cannot be readily made primarily because of the small numbers involved when the autopsy data are sub-

放射線影響調査における剖検診断

寿命調査では，死亡診断書から死因の資料が求められている．この種の資料がいずれ全対象者について入手されるので，寿命調査集団は，被爆者における放射線影響を調査するための統計の重要な資料源である．一方，確認率および発見率から明らかであるように，死因に関するこの資料は不完全である．臨床資料も被爆者における原死因の状況を十分に示さないため，目的にかなわないことが多い．

剖検調査においても症例選択のための偏りは避けられないが，病理学的観察に基づく権威ある診断は，原爆放射線の遅発性影響の調査のための今一つの重要な資料源であると考えられている．前回の報告では，死亡調査集団全員の最終的な推定線量の計算が未完了であったので，予備的なT65D資料が用いられた．推定線量未決定の例を除外して，被曝線量と剖検率に関する資料が初めて報告された．資料は，別に説明を加えないで記載されていたが，線量と剖検入手の成功との間には，示唆的というよりはもっと著しい関係があった．

剖検資料に放射線量のための偏りがあることは，表6の資料から明らかである．剖検の承諾を求める際の連絡員の努力は，死亡者の被爆距離，すなわち，被曝線量と関係がある．剖検承諾を求めるための遺族との面接の際に被爆の有無が連絡員に判明することは，ほとんど避けられない．

剖検の百分率は，線量とともに直線的に増加する．表4に示した資料によれば，1961－65年における線型関係は，その後の1966－70年の期間に比べて著しいことが認められる．しかし，1966－70年の期間においても，高線量群(100 rad以上)は，低線量群に比べて剖検入手の割合が有意に高い．長崎における200 rad以上の群の剖検百分率が著しく低いにもかかわらず，このような結果が得られている．

剖検の入手には，放射線量によって明らかな偏りがある．原死因や主要診断の資料に同様な影響がどの程度あるかが重要な問題となる．これは表9の資料から判定できる，しかし，剖検資料を線量別および死因別に細分すれば例

divided by radiation dose and the cause of death. The following observations may be made with respect to the radiation effects biases in the underlying cause data:

There is no evidence that the leukemia mortality data are biased, but there appears to be a linear increase by dose in the statistics for total cancer mortality excluding leukemia.

The autopsy procurement on cerebrovascular disease deaths is higher in the high dose group. There is a marked linear association between dose estimates and autopsy procurement for the cardiovascular disease deaths. For the other causes of death, there appears to be some or no correlation at all between autopsy procurement and dose, but the number of cases is generally small.

The implications of these data for the studies of radiation effects using ABCC-JNIH autopsy material are clear. Extreme caution needs to be taken in the interpretation of data so that unwarranted inferences are not made.

AUTOPSY STUDIES

The principal disease as determined by autopsy is given in broad categories in Table 30 and in greater detail in Table 31. These diagnoses are based on anatomical nomenclature and not according to the International Classification of Diseases (ICD). In some areas this provides greater detail such as cancer by cell type. However, clinical diagnoses and ill-defined conditions are generally not listed. Instead, the best possible anatomical diagnosis is substituted. In many instances, clinical history was not available and for many of the elderly who were chronically ill and who died at home, a thorough medical investigation was not perfomed. Interpretation of autopsy findings in these cases was difficult and in 158 autopsies the principal disease was listed as undetermined.

Certain data were either obvious or easily verified such as sex, age at death, city of death, place of death, radiation exposure and estimated dose received, membership in the LSS sample, interval between death and autopsy, and completeness of autopsy. Various restrictions were placed on other data. Body weight and various indices related to body weight were computed only for autopsies performed at ABCC in Nagasaki from 1963 and in Hiroshima from April 1964 when body scales were obtained and the same scales were used continuously thereafter.

数が少なくなるので，意味のある比較が容易にできない．原死因の資料における線量のための偏りについて次のことがいえる：

白血病による死亡者の資料に偏りの形跡は認められないが，白血病以外のすべての癌による死亡者に関する統計には線量とともに直線的な増加がみられるようである．

脳血管疾患死亡者の剖検入手は，高線量群において高率である．心臓血管疾患死亡者では，剖検入手と推定線量との間に著しい線型関係がある．その他の死因では，剖検入手と線量との間に相関が若干あるか，全くないようであるが，例数は一般に少ない．

ABCC－予研剖検材料に基づく放射線影響調査に対してこれらの資料がいかなる含蓄を有するかは明瞭である．資料の解釈にあたって不当な推論を避けるために細心の注意が必要である．

剖検調査

剖検で決定した主要疾患を表30では大まかな分類別に，表31ではもっと細かな分類別に示した．これらの診断は解剖学的命名法に基づくものであり，国際疾病分類（ICD）に基づくものではない．この方法では，癌の細胞型など，ある面については一層詳細な記述ができる．しかし，臨床診断や診断名不明確な状態は，一般に記入されない．その代りに，できるだけ適当な解剖学的診断を用いるようにする．臨床病歴はしばしば入手不能であり，また，慢性疾患があって自宅で死亡した高年齢者では，完全な医学的検診が実施されていないことが多い．そのような例では，剖検所見の解釈が困難であり，剖検158例の主要疾患は不明として記載した．

ある種の資料は明白であるか，容易に確認できた．例えば，性別，死亡時年齢，死亡都市名，死亡場所，被爆状態と推定被曝線量，寿命調査該当の有無，死亡から剖検までの時間，剖検の完全性などである．その他の資料には種々の制約が加わる．ABCCで実施した剖検についてのみ体重や体重に関係した指標の計算が行われており，この資料は，長崎で1963年，広島で1964年4月に体重計が求められた時から入手されている．なお，その後，同じ体重計を引き続き使用している．

Most analyses of autopsy findings were based on the 3777 autopsies performed in the interval 1961-70 rather than on the 4353 autopsies collected in the entire period 1951-70. There was known biased selection of cases for autopsy during the earlier period. For study of heart disease and stroke, the number of 1961-70 autopsies examined was further reduced to the 3418 autopsies in which both heart and brain were examined. If anything this would increase the proportion of cerebral lesions found at autopsy because it is not likely that permission for examination of the brain would be withheld in patients with cerebral disease.

Estimates of radiation dose ATB[15] could not be made for a small number of cases because of unusual shielding configurations and when used they are listed as dose unknown. Preliminary analysis and previous studies indicated that the group of survivors exposed to a dose range of 0-9 rad were an adequate and satisfactory control group with no observable radiation effect. This was further tested by comparison with the group who were not in either city ATB.

剖検所見の解析では，1951－70年の全期間に収集された剖検4353例よりは，むしろ1961－70年の期間に実施された剖検3777例を用いたことが多い．すなわち，初期の剖検に症例選択のための偏りがあることが判明している．1961－70年における剖検のうちで心疾患および脳卒中の検討に使用できた例は一層少なく，心臓および脳ともに検査されていたものは3418例にすぎない．このことが何らかの影響をもたらすとすれば，それは，剖検で発見される脳病変の割合の増大であろう．すなわち，脳疾患を有する患者では，脳の検査の承諾が得られないことは少ないと思われる．

少数例では，特異的な遮蔽状況下にあったために原爆放射線被曝線量の推定[15]が不可能であり，これらの例を使用する場合は，線量不明として示した．予備的解析および以前の調査によれば，0－9 rad の範囲の線量を受けた被爆群は，放射線影響が認められないので，対照群として十分で満足すべきものであることが示されている．この点は，原爆時にいずれの原爆市にもいなかった群との比較によってさらに検討されている．

General Characteristics of the Autopsy Sample

剖検調査例の一般的特徴

Sex and Age at Death. During 1961-70, autopsies were performed on 36.6% of men and 35.8% of women in the LSS sample who died. Except for Nagasaki males aged 80 or more, there was little variation in the autopsy rate by age at death (Table 12).

性別および死亡時年齢：1961－70年の期間には，寿命調査集団の中で死亡した男の36.6%，女の35.8%の剖検が行われた．長崎の80歳以上の男を除けば，死亡時年齢別剖検率にほとんど差がなかった（表12）．

Body Weight and Height at Autopsy Tables 32, 33, and 34 give the weight, height, and weight to height ratio found in 2027 LSS autopsies by age and sex for ischemic heart disease, stroke, cancer, and remaining causes of death. For both sexes, height and weight decrease in parallel fashion with advancing age. Men were both heavier and taller than women age for age. The average body weight for patients dying of stroke or heart disease was almost 20 kg greater for those less than 40 years of age than for those 80 years or more. For cancer, the difference was about 5 kg. Similarly those younger than age 60 were taller by almost 10 cm than those 80 or more. However, there was little variation in height by disease category.

剖検時の身長および体重：寿命調査に属している剖検2027例における身長，体重および体重・身長比を年齢別，性別に，また，虚血性心疾患，脳卒中，癌およびその他の死因別に表32，33，34に示した．男女ともに，年齢の増加につれて身長および体重は平行的に減少する．男は，同年齢の女に比べて体重が重く，身長も高い．脳卒中あるいは心疾患死亡者の平均体重は，40歳未満の者が80歳以上の者よりほとんど20kgも重いことが認められた．癌では，その差が約5kgであった．同様にして，年齢60歳未満の者は，80歳以上の者に比べて身長がほとんど10cmも高い．しかし，疾病分類別にみた場合，身長の差はほとんどない．

The ratio, body weight to height, in cancer deaths varied little by age but for ages below 80 the ratio was much lower in cancer deaths than in heart disease or stroke. These differences reflect differences in body weight by disease since there was little difference in body height by disease.

癌死亡者における体重・身長比は年齢別にほとんど差はないが，80歳未満の群では，癌死亡者は，心疾患あるいは脳卒中死亡者に比べて，はるかに低い比を呈している．疾病別には身長に差がほとんどないので，この差異は，疾病間の体重における差を反映するものである．

Place of Death and Death Certificate Diagnosis. Most patients in the LSS sample (60%) died at home

死亡場所と死亡診断書診断名：寿命調査対象者の過半数

(Table 35) but this varied with the cause of death. Autopsy rates varied with both the place and the cause of death but the place of death appeared to be a more important determinant. For example, 33% of patients with diagnosis of cancer died at home and 38% were autopsied while 94% of patients with death certificate diagnosis of various symptoms and ill-defined conditions died at home and 32% were autopsied. For cancer, 67% of patients died in hospitals and 49% were autopsied while 30% of heart disease patients died in hospitals and 45% were autopsied.

(60%)は自宅で死亡しているが(表35)，死因によって差がある．剖検率は，死亡場所によっても死因によっても異なるが，死亡場所がはるかに重要な決定因子であるように思われる．例えば，癌の診断を有する患者の33%は自宅で死亡し，その38%が剖検を受けたのに対し，死亡診断書診断名が症状および診断名不明確の状態とされていた患者の94%は自宅で死亡し，その32%が剖検を受けた．癌患者の67%が病院で死亡し，その49%が剖検を受けたのに対し，心疾患患者の30%が病院で死亡し，その45%が剖検を受けた．

STROKE, HEART DISEASE, AND CANCER

脳卒中，心疾患および癌

Cerebral Hemorrhage and Infarction. It is part of the conventional wisdom that cerebral hemorrhage is a frequent cause of death in Japanese.[16] However, in recent years clinicians have tended to give less support to this belief. A number of autopsy studies have shown that the role of cerebral hemorrhage is exaggereted. This is not to deny that cerebrovascular disease is of frequent occurrence in Japanese but autopsy studies show that it is manifested more often by small repeated infarcts, which are the antecedent principal autopsy cause of death. In these cases, the interval between infarction and death may be quite long and in some instances is terminated by a large fatal cerebral hemorrhage.

脳出血および脳梗塞症． 日本人には，死因として脳出血の多いことが常識になっている．[16] しかし，近年は，この説に対する臨床医の支持が低下している傾向がある．いくつかの剖検調査では，脳出血の役割が誇張されていたことを示している．このことは日本人に脳血管疾患が高頻度であることを否定するものではないが，剖検調査によれば，小さな梗塞の頻発の形で発症する場合の多いことが認められており，剖検ではこれが主要先行死因として記載される．そのような例では，梗塞発生から死亡までの期間がかなり長いことがあり，ある場合には致死的な大量脳出血で終結する．

In this study, particular attention was given to cerebrovascular disease. In order to determine the frequency of cerebral hemorrhage and infarction, the occurrence of each was recorded and listed as principal disease or significant lesion (definitions previously listed) and for cerebral hemorrhage whether or not it was the immediate cause of death.

今回の検討では，脳血管疾患に特に注意を向けた．脳出血および脳梗塞症の頻度を決定するために，両者の発生について記録を作成し，それが主要疾患または有意な病変であるか否かの記入を行い(定義は先に示した)，さらに，脳出血については，直接死因であったか否かを記載した．

By implication, cerebral hemorrhage is an acute process. In patients who survive a cerebral hemorrhagic episode, body mechanisms remove the blood products and erase the evidence of the hemorrhage leaving behind an area of destruction with some residual pigment to mark the site of the hemorrhage. For survival, such hemorrhages must be localized and not massive, and vital centers cannot be involved. Most are hemorrhagic infarcts (by definition, less than 3 cm in diameter) which in time cannot be distinguished from anemic infarcts and are therefore classified with them.

脳出血は，急性の疾病過程であると考えられる．脳出血発作の生存者では，生体内機転によって血液産物が除去されて出血の証拠は消滅し，出血のあった部分に組織の破壊と若干の色素沈着が残るだけである．患者が生存するためには，出血は限局性でなければならないとともに，大量出血や重要な中枢への侵襲のないことが必要である．その多くは出血性梗塞(定義により直径3 cm未満のもの)であり，時の経過とともに貧血性梗塞との区別が不可能となるので，それらと同一の分類に入れられることになる．

The rules for listing cerebral infarcts as principal autopsy diagnosis or as significant lesions were quite arbitrary and intentionally emphasized the frequency and role of cerebral infarction in this autopsy sample. In retracing antecedent causes, the trail was stopped if it reached cerebral infarction.

脳梗塞を主要剖検診断あるいは有意な病変として記載するために設けた規則は，非常に任意であり，この剖検調査例中における脳梗塞症の頻度および役割を故意に強調するものである．先行死因の追跡にあたり，脳梗塞症が発見された時に追求を中止した．したがって，病床に伏していたことに伴う大きな褥瘡形成および飢餓衰弱の後

Thus, a patient who died of aspiration pneumonia following a period of inanition associated with being bed fast and with large bed sores, preceded by hemiplegia following a stroke after a long period of hypertension with myocardial hypertrophy and fibrosis, a rather frequent course in the elderly, was assigned the principal diagnosis of cerebral infarction even though generalized arteriosclerosis and arteriolar nephrosclerosis were also present. Consequently, although cerebral infarction as the principal autopsy diagnosis may have been exaggerated, the total of principal and significant cerebral infarcts is an accurate statement of the occurrence of this lesion in the autopsy sample.

The analysis of cerebral lesions was approached in two ways; the occurrence based on death certificate diagnoses and the findings in the autopsies. In the first group there are problems in relating the ICD diagnoses of death certificates to the anatomical diagnoses of the pathologists. For example, embolism, thrombosis or occlusion of basilar, carotid, or vertebral artery (ICD 432) was mentioned 222 times on death certificate but found only 3 times at autopsy while cerebral thrombosis and infarction was given 191 times on death certificates and found 578 times at autopsy.

Cerebral Hemorrhage. For the 1951-70 period, cerebral hemorrhage was the assigned cause of death in 14.3% of death certificates. Autopsies were performed on 16% of these deaths. The confirmation rate was 21% and the detection rate was 61% (Table 36).

During 1961-70, 80% of patients with cerebral hemorrhage given as underlying cause of death died at home. The autopsy rate was 28% for those dying at home and 43% for those dying in a hospital or clinic (Table 37).

In the 1961-70 autopsy sample, cerebral hemorrhage was the principal autopsy diagnosis in 145 cases (4.2%) and was found as a significant process in 50 other cases (1.5%). It was the immediate cause of death in 122 (3.6%) of these autopsies. Cerebral hemorrhage was present in 6.0% of the autopsies on men and 5.4% on women and tended to be found in younger men than women (Table 38).

Cerebral hemorrhage generally was not associated with cerebral infarction. The two were found together in 26 autopsies but in none of these was the cerebral hemorrhage or infarct the principal autopsy diagnosis. However, it is possible and even probable that a massive cerebral hemorrhage would make it impossible to detect the presence of an antecedent infarct in the involved area.

に嚥下性肺炎で死亡した患者において，心筋の肥大と線維症が認められ，全身性動脈硬化症および細動脈性腎硬化症も存在している場合でも，既往に長期の高血圧があり，脳卒中発作を起こして片麻痺が生じていたならば，脳梗塞症を主要診断とした．上記のような経過は，高年齢者にかなりしばしば認められるものである．このために主要剖検診断としての脳梗塞症は誇張されたかもしれないが，主要および有意な脳梗塞の総数は，この剖検調査例中におけるその病変の発生を正確に示している．

脳病変についての解析は，次の二つの方法で取りあげた；死亡診断書に基づく頻度ならびに剖検所見に基づく頻度である．前者では，死亡診断書における ICD 分類に基づく診断と病理専門医の解剖学的診断との関係を求める上に問題がある．例えば，死亡診断書には脳底動脈，頚動脈または椎骨動脈の塞栓症，血栓症あるいは閉塞症（ICD 432）の記載が 222 例認められたのに対して，剖検では3例認められたにすぎない．また，死亡診断書には 191 例の脳血栓症および脳梗塞症の記載があったが，剖検では578例認められている．

脳出血：1951－70年の期間には，死亡診断書の14.3%に脳出血が死因として記載してあった．これらの死亡者の16%について剖検が行われた．確認率は21%，発見率は61%であった（表36）．

1961－70年には，脳出血を原死因とする患者の80%が自宅で死亡した．自宅死亡者の剖検率は28%，病院または医院における死亡者では43%であった（表37）．

1961－70年における剖検調査例中に脳出血を主要剖検診断とするものが 145 例（4.2％）あり，それを有意な病変とするものが50例（1.5％）あった．剖検 122 例（3.6％）では，脳出血が直接死因であった．剖検を受けた男の6.0%と女の 5.4％に脳出血が認められ，若年齢群では女よりも男に多い傾向があった（表38）．

一般に脳出血は脳梗塞症を伴わなかった．両者の併発を剖検22例に認めたが，そのいずれの例においても脳出血および脳梗塞症は主要剖検診断でなかった．しかし，大量脳出血があれば，それに先行した同部位の梗塞の存在が検出できないかもしれないばかりでなく，恐らく検出できないことが多いであろう．

Cerebral Infarct. In the 1951-70 period, cerebral thromboembolic disease (ICD 433, 434, 437) was assigned as the death certificate underlying cause of death in 3.3% of the 19,701 deaths and 29.7% of these cases were autopsied. The confirmation rate was 48.7% and the detection rate was 16.1% (Table 36).

During 1961-70 most patients (74.6%) certified as cerebral thromboembolic disease deaths died at home. The autopsy rate was 35% for cerebral thromboembolic disease; 35.1% for those dying at home and 34.8% for those dying in hospitals or clinics.

In the autopsy study, 1961-70, cerebral infarction was the principal autopsy diagnosis in 537 cases (15.7%) and was present but was not the principal diagnosis in 633 (18.5%) other autopsies (Table 39). Cerebral infarction as a principal diagnosis was somewhat more frequent in men (36.3%) than women (32%) and was clearly related to age (13.4% below age 60; 43.9% age 80 or more, Figure 3). Of the cerebral infarcts listed as principal autopsy diagnosis only 5% were of recent origin; 13% were judged to be a combination of recent and old infarcts and 82% were old infarcts.

If all cerebrovascular disease is placed in a single group on the assumption that clinicians do not make the distinctions available to the autopsy pathologist, cerebrovascular disease was certified on 21.8% of death certificates, 20.8% were autopsied, the confirmation rate was 23.4%, and the detection rate was 25.7% (Table 36).

In the autopsy study, 1961-70, cerebral hemorrhage or infarct was found in 1339 (39.2%) of the 3418 autopsies and in 46.5% of those above age 79. This extraordinary occurrence reflects the advanced age of the autopsy population (80% were 60 years old or older) and the large number of "significant" infarcts which are more frequent in older persons (Figure 4).

Heart Disease Ischemic heart disease is reported to be much less frequent in Japanese than in Caucasians and acute fatal myocardial infarction is said to be quite infrequent.[17] These statements are probably true but it is also probably true that ischemic heart disease is under-reported in Japan.[18] In particular the sequelae of chronic ischemic heart disease with and without healed myocardial infarcts are submerged in diagnoses of cardiac asthma, cardiac myopathy, myocardial degeneration and fibrosis, pulmonary heart disease, etc. Severe coronary arteriosclerosis and healed myocardial infarcts are often found at autopsy in patients who have died of other disease.

For the purpose of this report, ischemic heart disease was listed as the principal autopsy diagnosis when

脳梗塞症: 1951—70年の期間における死亡者19,701名のうち3.3％が死亡診断書に脳血栓塞栓症(ICD 433, 434, 437)を原死因として記載され，その29.7％が剖検を受けた．確認率は48.7％，発見率は16.1％であった(表36)．

1961—70年には，死亡診断書で脳血栓塞栓症と記載された例の大多数(74.6％)は自宅で死亡した．脳血栓塞栓症例の剖検率は35％であった；自宅死亡者の場合は35.1％，病院または医院死亡者では34.8％であった．

1961—70年における剖検調査例中に脳梗塞症を主要剖検診断とするものは537例(15.7％)あり，主要診断ではなかったが本症の存在が認められたものがその他に633例(18.5％)あった(表39)．脳梗塞症が主要疾患とされた頻度は，男(36.3％)が女(32％)よりやや高率であり，明らかに年齢と関係があった(60歳未満で13.4％；80歳以上で43.9％)(図3)．主要剖検診断として記載された脳梗塞のわずか5％が最近起こった新鮮なものであった；13％は新鮮および陳旧性梗塞の共存があると考えられ，82％は陳旧性梗塞症であった．

臨床医は剖検を担当した病理専門医ほどの区別を行わないであろうと仮定して，すべての脳血管疾患を一つの群にまとめてみると，死亡診断書の21.8％が脳血管疾患として記載され，その20.8％が剖検を受けており，確認率は23.4％，発見率は25.7％であった(表36)．

1961—70年における剖検3418例中の1339例(39.2％)に脳出血または脳梗塞が認められ，79歳以上の例では，その46.5％に認められた．この異常に高い頻度は，剖検調査集団が高年齢であること(80％が60歳以上)，また，高年齢者に多発する「有意」な梗塞の多いことを反映している(図4)．

心疾患: 虚血性心疾患の頻度は，白人に比べて日本人がはるかに低率であることが報告されており，致死的な急性心筋梗塞は非常に少ないといわれている.[17] この種の記述は恐らく真実であろうが，日本では，虚血性心疾患が過少報告されていることも恐らく真実であろう.[18] 特に，慢性虚血性心疾患の後遺症は，治癒した心筋梗塞を伴うものも，伴わないものも，心臓性喘息，心臓性筋症，心筋変性および線維症，肺心症など各種の診断名で隠蔽されている．その他の疾病で死亡した患者の中には，剖検で強度の冠状動脈硬化症および治癒した心筋梗塞がしばしば認められる．

今回の報告の目的のために，虚血性心疾患が直接死因と関係があって先行発生している場合に虚血性心疾患を主

it was related and antecedent to the immediate cause of death. The diagnosis, significant ischemic heart disease, was assigned when another disease was selected as the principal autopsy diagnosis and coronary sclerosis with more than 25% narrowing of the lumen or myocardial infarction greater than 0.5 cm in any dimension of multiple areas of focal fibrosis none of which was as large as 0.5 cm in diameter were present.

In the 1961-70 portion of the autopsy study, only the 3418 autopsies which included examination of both the heart and the brain were used for analysis. This permitted correlation of ischemic changes in both organs.

In the 1951-70 period, ischemic heart disease was assigned as the underlying cause of death on 4.1% of the death certificates and autopsies were preformed in 23.1% of these deaths. The confirmation rate was 35.8% and the detection rate was 36% (Table 36). Recent myocardial infarction alone or with healed myocardial infarcts was found in 133 of the 4353 autopsies (3.1%). A first episode of myocardial infarction was not a frequent principal autopsy diagnosis (Table 40). Of autopsies with recent myocardial infarcts as the principal autopsy diagnosis, two thirds also had healed infarcts. Of all autopsies with recent myocardial infarcts, 26% died of disease other than ischemic heart disease compared with 11% when both recent and healed myocardial infarcts were found at autopsy.

In the 1961-70 period, 70.6% of the patients with a death certificate diagnosis of ischemic heart disease died at home and 24.8% of them came to autopsy. Of the 29.4% who died in hospitals and clinics, 42.3% were autopsied (Table 37). Ischemic heart disease was the principal diagnosis in 5.3% of the autopsies and was diagnosed as significant in an additional 33.3%. The frequency of this diagnoses, both as a principal and as a significant disease, clearly increased with advancing age so that more than half of the persons 80 years or older showed evidence of ischemic heart disease (Table 39).

Ischemic Heart Disease, Cerebral Infarction, and Cerebral Hemorrhage. In this autopsy sample, cerebral hemorrhage not due to ruptured aneurysm or trauma was an infrequent autopsy finding. In contrast to both cerebral infarction and ischemic heart disease, it was less frequent in older than in younger persons. Proportionately, more women than men had cerebral hemorrhage only in the age group 80 years old or older (Table 38). The reason for this was not apparent. In 58.5% of persons with cerebral hemorrhage, either ischemic heart disease or cerebral

要剖検診断として記載した．別の主要剖検診断があって，25%以上の管腔狭窄を呈する冠状動脈硬化症あるいはいずれかの方向の直径が0.5 cm以上の心筋梗塞または直径0.5cm未満の多発性巣状線維症がある場合は虚血性心疾患を有意な病変と診断した．

1961－70年における剖検調査例のうちで，心臓および脳ともに検査の行われていた3418例を取りあげて解析を行った．これにより，両器官における虚血性変化の相関を求めた．

1951－70年の期間には，死亡診断書の4.1％に虚血性心疾患が原死因として記載されており，その23.1％について剖検が行われた．確認率は35.8%，発見率は36%であった（表36）．新鮮心筋梗塞は，治癒した心筋梗塞を伴うものも，伴わないものも含めて，剖検4353例中に133例（3.1％）認められた．心筋梗塞の初回発作が主要剖検診断とされることは多くない（表40）．新鮮心筋梗塞を主要剖検診断とする剖検例の三分の二には治癒した梗塞も認められた．新鮮心筋梗塞を有する剖検例の中に虚血性心疾患以外の疾患で死亡したものが26%あったが，新鮮および治癒した心筋梗塞がともに認められた例中に11%あった．

1961－70年の期間には，死亡診断書で虚血性心疾患と診断された患者の70.6%は自宅で死亡し，その24.8%が剖検を受けた．病院および医院で死亡した29.4%では，42.3%が剖検を受けた（表37）．剖検例の5.3％は虚血性心疾患が主要診断であり，その他に33.3%では本症が有意な病変として診断された．主要疾患および有意な疾患として診断された頻度は年齢の増加とともに明白な上昇を示し，80歳以上の者の半数以上に虚血性心疾患の所見があった（表39）．

虚血性心疾患，脳梗塞症および脳出血：この剖検調査例中には，動脈瘤破裂または外傷以外の原因による脳出血の剖検所見の頻度は低い．若年齢者よりも高年齢者において少ないことが，脳梗塞症や虚血性心疾患と対照的である．80歳以上の年齢群のみに男よりも女に脳出血が多かった（表38）．この理由は不明である．脳出血の58.5%

infarction or both were also found and most of this association was with ischemic heart disease.

では，虚血性心疾患または脳梗塞症あるいはその両者の併発も認められたが，虚血性心疾患の併発が最も多い．

Either ischemic heart disease or cerebral infarction or both were present as principal autopsy diagnosis or as a significant lesion in 52.4% of the 1961-70 autopsies (Table 41). Ischemic heart disease alone was present in 18.2%, cerebral infarction alone in 13.9%, and the two together in 20.4%. Except in persons less than 60 years of age, both lesions were more likely to be found together than either alone. Of 181 autopsies with ischemic heart disease as principal autopsy diagnosis, 87 (48%) also had cerebral infarcts while of 537 autopsies with cerebral infarction as principal autopsy diagnosis, 333 (62%) also had evidence of ischemic heart disease (Table 41). The general belief is that coronary heart disease and cerebral infarction are end stages of a generalized vascular process and, a priori, one might expect an even greater association of the two together. An intensive investigation of the relation between ischemic cerebral and cardiac disease is presently in progress at ABCC.

1961－70年における剖検例の52.4％では，虚血性心疾患または脳梗塞症あるいはその両者が主要剖検診断または有意な病変であった（表41）．虚血性心疾患のみの例は18.2％，脳梗塞症のみのものは13.9％，両者の併発は20.4％に認められた．60歳未満の者を除けば，いずれかが単独に存在するよりは両病変の併発が認められることが多いようである．虚血性心疾患を主要剖検診断とする剖検181例中の87例（48％）に脳梗塞も認められ，一方脳梗塞症を主要剖検診断とする537例中の333例（62％）に虚血性心疾患の所見もあった（表41）．冠状動脈性心疾患および脳梗塞症は全身性血管性病的過程の終段階であると一般に考えられており，先験的には，両者の併発がさらに多いことが想像されるであろう．虚血性脳疾患と虚血性心疾患との関係についてはABCCで強力な調査が進行中である．

Cancer. Table 31 lists the cancers found at autopsy by site and cell type. The previously described problems which complicate and distort the study of prevalence of disease based on autopsy experience are even more troublesome in the study of cancer. Cancer is not a single disease. Its components vary greatly in their response to the carcinogenic effect of radiation. Some, such as leukemia, are sensitive and relatively rapid reactants. Others, like lung cancer, show a lower and greatly delayed association. Children exposed to ionizing radiation develop a variety of cancers after a long interval.[19]

癌：剖検で発見された癌を部位別および細胞型別に表31に示した．剖検所見に基づく有病率調査を複雑にし，かつ，ゆがめている前述の各種の問題は，癌調査の場合に一層困難をもたらす．癌は単一の疾病ではない．癌の種類によって放射線の発癌効果に対する反応が著しく異なる．癌の中には，白血病などのように敏感でかなり急速な反応を示すものがある．そのほか，肺癌のように関連がより少なく，はるかに遅く現われるものもある．電離放射線に被曝した子供には，長い潜伏期の後で各種の癌が発生すると認められている．[19]

The component histologic types of cancer can be identified and verified only by histologic or cytologic examination. This may be accomplished by examination of surgically removed tissues or at autopsy. However, cancers are not uniformly fatal and without review of surgical specimens, "cured" cancers are lost to study. Some neoplasms like breast cancer and leukemia are easily recognized and identified during life. Others like thoracic and abdominal malignancies often require major surgery for accurate diagnosis and differentiation from confusing serious diseases like pulmonary tuberculosis and cirrhosis.

癌の組織型は，組織学的または細胞学的検査によって初めて識別され，確認される．これは，外科標本や剖検材料の検査に基づいて行われる．しかし，癌が一貫して致死的であるとは限らないので，外科標本の再検討を経なければ，「治癒」例は調査から除外される．乳癌や白血病など，ある種の新生物は生前に容易に発見され，確認できる．そのほか，胸部や腹部の悪性疾患のように，正確な診断のためにまた，肺結核あるいは肝硬変症などの重要な疾患との鑑別診断のために，多くの場合大手術が必要なものもある．

Cancer may be more completely represented in the autopsy sample than other diseases and this may be especially true for irradiated persons dying of cancer. It is certainly true for leukemia, in part because of the thorough surveillance program, in part because of the invariably fatal outcome of this disease and in part because of the popular recognition of leukemia as "the A-bomb disease." But it also

剖検調査例では，癌はその他の疾病に比べて代表性が高いかも知れない．このことは，癌で死亡した被爆者において特に著しいかもしれない．白血病の場合は確かにそうであり，このことは，一部は綿密な白血病調査に起因し，一部は本症が例外なく死亡を転機とするためでもあり，また，一部には白血病が「原爆症」として広く考えら

holds for other fatal cancers because in the comparison of various diseases, a higher percentage of cancer patients die in hospitals where the autopsy rate is high. In addition, there may be some carry over in popular belief that like leukemia, all cancers are "A-bomb diseases" thus increasing the likelihood of obtaining permission for autopsy. Interpretation of cancer autopsy findings is further complicated by small numbers when tumors are subclassified by cell type and radiation dose or when multiple factors are considered such as smoking and occupation in lung cancer.

It should be noted that many of these factors must also be considered in the study of cancer based on death certificate diagnoses. However, the autopsy program does permit histologic verification by cell type and determination of confirmation and detection rates which may be used to evaluate the quality of death certificate information. Evidently, a combined epidemiologic and pathologic investigation offers many advantages.

Separate intensive investigations of cancers of different organs have been undertaken to detect evidence for a delayed carcinogenic effect of ionizing radiation. In summary of these studies, a definite radiation carcinogenic effect has been demonstrated for leukemia,[20] lung,[21] breast,[22] and thyroid[23] cancer and for a variety of cancers if children are exposed to ionizing radiation.[19] There is a probable effect for lymphomas[24] and salivary gland tumors[25] but no evidence of radiation carcinogenic effect for gastrointestinal,[26,27] other abdominal,[28] prostate,[29] genital, central nervous system, bone, or skin cancers. Tumors which are rare in Japanese such as chronic lymphocytic leukemia and malignant melanoma were not increased by exposure to ionizing radiation ATB.

During the 20-year period, 1951-70, cancer was the principal autopsy diagnosis in 1440 (33.1%) of the 4353 autopsies. In addition 401 "incidental" cancers were found (Table 43). The "incidental" tumors were classified as (1) "Significant" if it was judged that they would probably have caused death had the patient not died sooner of another cause (including another cancer as in instances of double primary cancers of lung and stomach), and (2) "Not Significant" if the probability was low or uncertain that the tumor would ultimately cause death if untreated. The "Not Significant" tumors included *in situ* carcinomas of the gastrointestinal tract, lung, and cervix; border line renal adenomas; latent carcinoma of the prostate; and a large number of occult sclerosing thyroid carcinomas. In the 1440 cases with cancer as the cause of death, there were 127 additional tumors of which 53 were classified as

れていることに起因する．その他の致死的な癌の場合にも，これと同様なことが成り立つ．すなわち，各種疾病の比較では，癌患者は病院死亡の百分率の高いことが認められ，病院での剖検率が高い．そのほか，白血病と同様に，すべての癌も「原爆症」であると一般大衆はある程度考えているかもしれないので，これも剖検承諾が得られる可能性を高めるであろう．腫瘍を細胞型別および線量別に細分類した場合，また，肺癌における喫煙および職業など，多種類の要因を考慮する場合は，例数が少なくなり，癌に関する剖検所見の解釈は一層複雑になる．

この種の要因の多くは，死亡診断書診断に基づく癌調査においても考慮しなければならないことを指摘したい．しかし，この剖検調査では，細胞型の組織学的確認ならびに死亡診断書資料の質を評価するために使用できる確認率および発見率の決定が可能である．疫学的調査および病理学的調査を組み合わせることには多くの利点があることは明らかである．

電離放射線の遅発性発癌効果の証拠を検出する目的で，各器官の癌についてそれぞれ別個に調査が強力に行われてきている．これらの調査をまとめてみると，白血病,[20] 肺,[21] 乳房[22] および甲状腺[23] の癌ならびに電離放射線被曝を受けた子供の各種の癌[19] に対して明らかに遅発性放射線発癌効果が立証されている．リンパ腫[24] および唾液腺腫瘍[25] に対する影響の可能性もある．しかし，胃腸,[26,27] その他の腹部臓器,[28] 前立腺,[29] 性器，中枢神経系，骨および皮膚の癌には放射線発癌効果の証拠は得られていない．慢性リンパ球性白血病や悪性黒色腫などのように日本人にまれな腫瘍は，原爆時の電離放射線被曝のために増加していない．

1951—70年の20年間における剖検4353例中の1440例(33.1%)に癌が主要剖検診断とされていた．そのほか，癌を「付随的」疾患とするものが401例認められた(表43)．これらの「付随的」な腫瘍は次のように分類した：a）その患者が別の死因(肺と胃の原発性二重癌があった場合の他の一方の癌など)のために早く死亡しなかったならば，恐らく死因になったであろうと判断されるものを「有意な」疾患とし，b）その腫瘍が放置されたならば，結局は死因となる可能性が少ないか不明であるものを「有意でない」疾患とした．「有意でない」腫瘍は胃腸系，肺および子宮頚の上皮内型癌，境界域腎臓腺腫，前立腺の潜在性癌および多くの潜在性硬化性甲状腺癌を含んでいた．癌が死因とされていた1440例中にその他の腫瘍が認められたものが127例あり，そのうちの53例は「有意」，74例

"significant" and 74 as "not significant." In 266 autopsies with death not due to cancer, there were 273 cancers of which 142 were classified as "significant" and 131 as "not significant." Table 43 lists these incidental cancers by site and cell type.

は「有意でない」として分類された．癌が死因とされなかった剖検のうちの266例に癌が273件認められ，142は「有意」，131は「有意でない」として分類された．付随的な癌を部位別細胞型別に表43に示した．

Approximately 67% of patients with fatal cancer die in hospitals or clinics and the autopsy rate was higher than for deaths at home (Table 35). As shown previously the confirmation and detection rates for cancer are generally high and much higher than for heart disease or stroke. However, there is considerable variation depending on site (Table 17).

致死的な癌を有する患者の約67%は，病院または医院で死亡し，自宅死亡者に比べて剖検率が高い（表35）．前述のごとく，癌の確認率と発見率は一般に高く，心疾患や脳卒中の場合に比べてはるかに高率である．しかし，部位によってかなりの差がある（表17）．

The average age at death for patients with cancer is younger than for other causes of death. In ischemic heart disease and stroke approximately 7% were below age 60 and 28% were 80 years old or older. For cancer 27% were below age 60 and 10% 80 or older.

癌患者の平均死亡時年齢は，その他の死因の患者より若い．虚血性心疾患および脳卒中患者では約7%が60歳未満，28%が80歳以上であり，これに対して癌患者においてはそれぞれ27%および10%であった．

Radiation ATB. There is no evidence which indicates that the occurrence of ischemic heart disease or stroke was related to exposure to ionizing radiation ATB. If anything, the rates for these diseases are higher in those who received an estimated dose of less than 10 rad than in those who received 100 rad or more (Table 44).

原爆時の放射線被曝: 虚血性心疾患または脳卒中の発生が原爆時の電離放射線被曝と関係を有することを示す証拠は認められない．何らかの関係があるとすれば，この種の疾病の率は，推定被曝線量が100 rad以上の者よりも10 rad未満の者において高いことが認められることである（表44）．

As stated previously, there is a definite but not a consistent relation between ionizing radiation exposure ATB and the subsequent development of cancer. For each type of cancer this has required separate and intensive analysis and study of histologic material, clinical records, death certificate, and other epidemiologic data related to the LSS sample. In each investigation additional histologically verified cases have been found. For both the thyroid and prostate, reexamination and semiserial section of the entire organ exposed a much greater number of cancers than recognized during routine autopsy examination. For leukemias, lymphomas, breast cancers, etc., examination of surgical biopsies and blood and bone marrow smears revealed additional cases not in the autopsy series.

前述のごとく，原爆時の電離放射線被曝とその後の癌発生との間の関係は明白であるが，一貫していない．そのために，癌の種類別に，寿命調査集団に関する組織材料，臨床記録，死亡診断書およびその他の疫学的資料について強力に解析および検討を別々に行う必要があった．これらの各調査では，組織学的に確認された新たな例が発見されている．甲状腺および前立腺については，再検討および器官全体から採った多くの半連続切片の検査により，通常の剖検におけるよりもはるかに多数の癌が認められた．白血病，リンパ腫，乳癌などでは，生検や血液および骨髄塗抹標本の検査によって，剖検調査に含まれない新たな例が発見されている．

Radiation exposure data are given in Table 45 for cancer found at autopsy and considered the principal autopsy diagnosis. These are arranged by site of origin without regard to cell type except that all lymphomas are grouped together. Table 47 shows the age ATB for the same tumor group. These are raw data and not tested for statistical significance. However, one can see trends of interest. Leukemia, lymphoma, lung and breast cancers are increased at high radiation dose. Genitourinary tumors may be increased and gastrointestinal, hepatobiliary, pancreatic, and "other" malignancies apparently are not increased with radiation exposure.

剖検で検出され，主要剖検診断として見なされた癌についての放射線被曝の資料を表45に示す．ここでは，細胞型を無視して原発部位別に示した．ただし，すべてのリンパ腫は一つの群にまとめた．この同じ腫瘍群の原爆時年齢を表47に示した．これは粗資料であり，統計的有意性検定はまだ行われていない．しかし，興味ある傾向がみられる．高線量では，白血病，リンパ腫，肺癌および乳癌が増加している．性尿器の腫瘍も増加しているかもしれない．しかし，胃腸，肝臓・胆管，膵臓および「その他」の悪性新生物は，放射線被曝によって増加しないようである．

TABLE 1 DEATHS AND AUTOPSY RATE IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY YEAR OF DEATH AND CITY 1951-70

表1　予研－ABCC寿命調査対象群における死亡数および剖検率：
死亡年度および都市別，1951－70年

Year of Death	Hiroshima			Nagasaki			Total		
	Deaths	Autopsies	%	Deaths	Autopsies	%	Deaths	Autopsies	%
1951-55	3135	148	4.7	1061	42	4.0	4196	190	4.5
1956-60	3953	270	6.8	1111	116	10.4	5064	386	7.6
1961	793	282	35.6	219	62	28.3	1012	344	34.0
1962	787	354	45.0	201	73	36.3	988	427	43.2
1963	782	349	44.6	212	97	45.8	994	446	44.9
1964	766	300	39.2	226	95	42.0	992	395	39.8
1965	820	307	37.4	289	113	39.1	1109	420	37.9
1966	842	313	37.2	224	96	42.9	1066	409	38.4
1967	765	278	36.3	239	74	31.0	1004	352	35.1
1968	781	252	32.3	247	78	31.6	1028	330	32.1
1969	898	299	33.3	215	70	32.6	1113	369	33.2
1970	884	229	25.9	251	56	22.3	1135	285	25.1
Total	15206	3381	22.2	4495	972	21.6	19701	4353	22.1

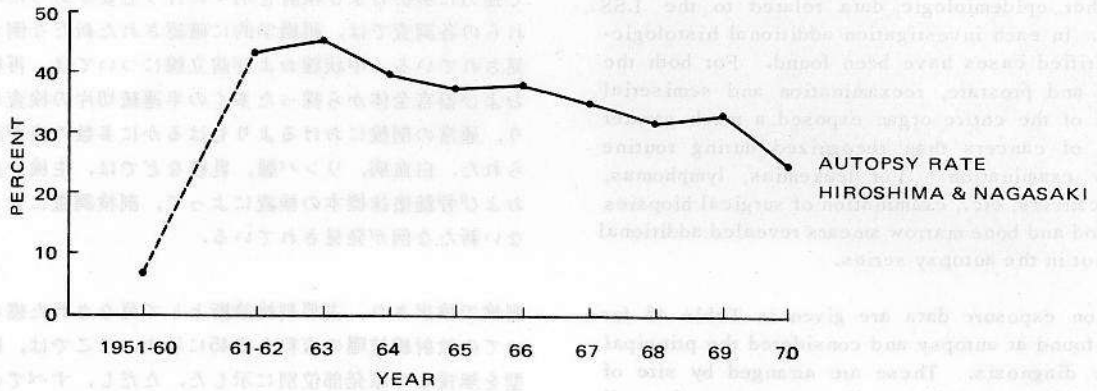

TABLE 2 DEATHS AND AUTOPSY RATE IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY YEAR OF DEATH AND PLACE OF DEATH 1951-70

表 2　予研－ABCC 寿命調査対象群における死亡数および剖検率：
死亡年度および死亡場所別，1951－70年

Year of Death	Deaths in City			Deaths Outside City			
	Deaths	Autopsies	%	Deaths	% of Total Deaths	Autopsies	%
			Hiroshima				
1951-60	6476	413	6.4	612	8.6	5	0.8
1961	704	270	38.4	89	11.2	12	13.5
1962	695	350	50.4	92	11.7	4	4.3
1963	675	333	49.3	107	13.7	16	15.0
1964	655	282	43.1	111	14.5	18	16.2
1965	710	299	42.1	110	13.4	8	7.3
1966	715	296	41.4	127	15.1	17	13.4
1967	657	265	40.3	108	14.1	13	12.0
1968	662	242	36.6	119	15.2	10	8.4
1969	772	292	37.8	126	14.0	7	5.6
1970	750	223	29.7	134	15.2	6	4.5
Total	13471	3265	24.2	1735	11.4	116	6.7
			Nagasaki				
1951-60	1969	156	7.9	203	9.3	2	1.0
1961	195	58	29.7	24	11.0	4	16.7
1962	179	71	39.7	22	11.1	2	9.1
1963	194	97	50.0	18	8.5	0	0
1964	197	93	47.2	29	12.8	2	6.9
1965	250	105	42.0	39	13.5	8	20.5
1966	185	87	47.0	39	17.4	9	23.1
1967	197	71	36.0	42	17.6	3	7.1
1968	203	72	35.5	44	17.8	6	13.6
1969	179	65	36.3	36	16.7	5	13.9
1970	203	51	25.1	48	19.1	5	10.4
Total	3951	926	23.4	544	12.1	46	8.5

TABLE 3 AUTOPSY RATE IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY YEAR OF DEATH, PLACE OF AUTOPSY AND CITY 1951-70

表3　予研－ABCC寿命調査対象群における剖検率：死亡年度，剖検場所，および都市別，1951－70年

Year of Death	Hiroshima				Nagasaki			
	ABCC		Other		ABCC		Other	
	Autopsies	%	Autopsies	%	Autopsies	%	Autopsies	%
1951-60	394	5.6	24	0.3	119	5.5	39	1.8
1961-62	587	37.2	49	3.1	106	25.2	29	6.9
1963	308	39.4	41	5.2	79	37.3	18	8.5
1964	266	34.7	34	4.4	73	32.3	22	9.7
1965	270	32.9	37	4.5	83	28.7	30	10.4
1966	273	32.4	40	4.8	71	31.7	25	11.2
1967	237	31.0	41	5.4	50	20.9	24	10.0
1968	216	27.7	36	4.6	48	19.4	30	12.1
1969	253	28.2	46	5.1	54	25.1	16	7.4
1970	208	23.5	21	2.4	47	18.7	09	3.6
Total	3012	19.8	369	2.4	730	16.2	242	5.4

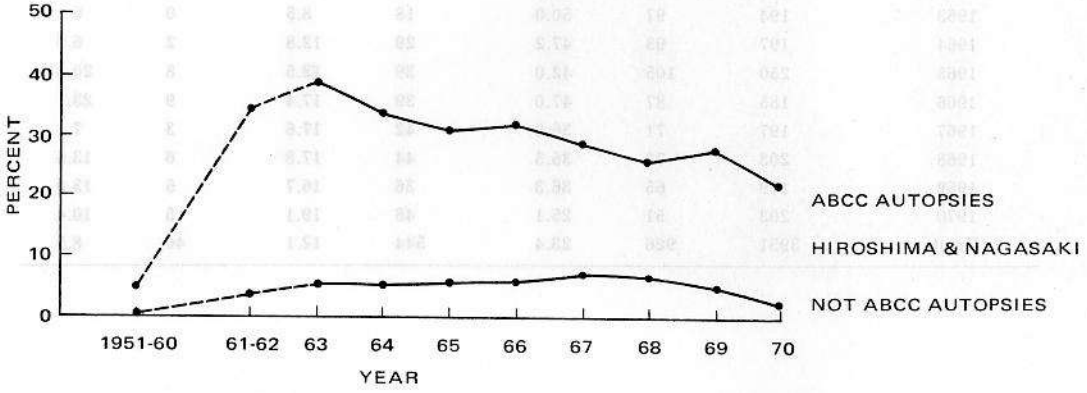

TABLE 4 DEATHS AND AUTOPSIES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY YEAR OF DEATH, RADIATION DOSE AND CITY 1951-70

表4　予研－ABCC寿命調査対象群における死亡数および剖検数：死亡年度，放射線量，および都市別，1951－70年

T65 D* (rad)	Hiroshima			Nagasaki		
	Deaths	Autopsies	%	Deaths	Autopsies	%
		1951-60				
NIC	1512	47	3.1	504	37	7.3
<1	2910	140	4.8	407	27	6.6
1-49	2028	163	8.0	896	61	6.8
50-99	226	18	8.0	82	05	6.1
100-199	156	13	8.3	86	04	4.7
200+	121	24	19.8	102	17	16.7
		1961-65				
NIC	962	336	34.9	284	102	35.9
<1	1472	548	37.2	201	73	36.3
1-49	1145	524	45.8	468	182	38.9
50-99	183	85	46.4	60	26	43.3
100-199	82	46	56.1	53	19	35.8
200+	72	41	56.9	48	24	50.0
		1966-70				
NIC	1106	314	28.4	294	72	24.5
<1	1574	501	31.8	200	73	36.5
1-49	1145	413	36.1	475	152	32.0
50-99	127	45	35.4	64	27	42.2
100-199	92	37	40.2	45	20	44.4
200+	86	41	47.7	63	21	33.3

* "Dose Undetermined" not included

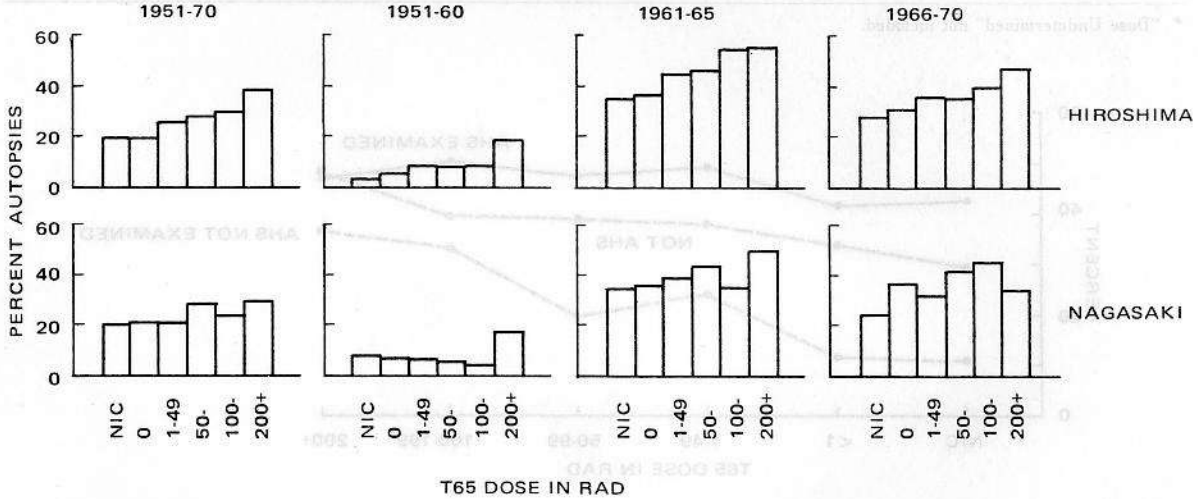

TABLE 5 DEATHS AND PERCENT AUTOPSIES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY DATE OF DEATH AND PARTICIPATION IN THE ABCC-JNIH ADULT HEALTH STUDY

表5　予研－ABCC寿命調査対象群における死亡数および剖検率：
死亡年度およびABCC－予研成人健康調査への参加状態別

Classification	1951-60		1961-65		1966-70	
	Deaths	Autopsies	Deaths	Autopsies	Deaths	Autopsies
Not in AHS sample	7684	5.6%	4178	38.0%	4247	31.1%
AHS examined	154	12.3	811	51.9	1027	41.0
AHS not examined	1422	8.9	106	23.6	72	6.9
Total	9260	6.2	5095	39.9	5346	32.6

TABLE 6 DEATHS AND AUTOPSIES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY ADULT HEALTH STUDY PARTICIPATION AND RADIATION DOSE 1961-70

表6　予研－ABCC寿命調査対象群における死亡数および剖検数：
成人健康調査への参加状態および放射線量別，1961－70年

T65D* (rad)	Not AHS Sample			AHS Examined			AHS Not Examined			Total		
	Deaths	Autopsies	%	Deaths	Autopsies	%	Deaths	Autopsies	%	Deaths	Autopsies	%
NIC	2158	637	29.5	424	180	42.5	64	7	10.9	2646	824	31.1
<1	2979	1013	34.0	424	177	41.7	44	5	11.4	3447	1195	34.7
1-49	2782	1056	38.0	426	209	49.1	25	6	24.0	3233	1271	39.3
50-99	261	102	39.1	168	80	47.6	5	1	20.0	434	183	42.2
100-199	109	43	39.4	145	73	50.3	18	6	33.3	272	122	44.9
200+	48	23	47.9	210	100	47.6	11	4	36.4	269	127	47.2
Total	8337	2874	34.5	1797	819	45.6	167	29	17.4	10301	3722	36.1

* "Dose Undetermined" not included.

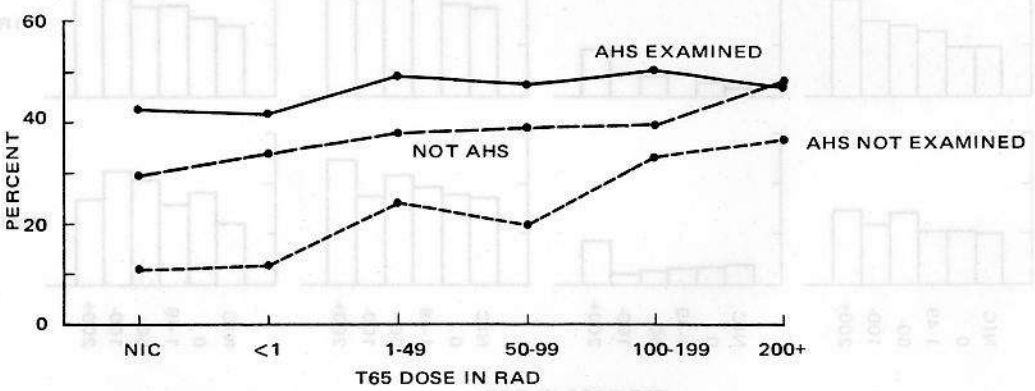

TABLE 7 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY YEAR OF DEATH AND UNDERLYING CAUSE OF DEATH 1951-70

表7　予研－ABCC寿命調査対象群における剖検数および剖検率：
死亡年度および原死因別，1951－70年

Death Certificate Underlying Disease		1951-60		1961-65		1966-70	
ICD	Diagnostic Class	Autopsies*	%	Autopsies	%	Autopsies	%
010-	Tuberculosis	66	8.4	85	40.9	74	46.3
204-	Leukemia	37	50.0	17	73.9	16	61.5
140-	Other malignant neoplasms	142	9.7	509	51.3	447	39.9
250	Diabetes mellitus	7	10.6	27	48.2	19	24.1
430-	Cerebrovascular disease	63	3.5	447	37.2	384	30.0
390-	Cardiovascular disease	51	5.5	233	34.6	273	30.9
480-	Pneumonia	8	3.3	71	35.9	59	28.4
490-	Bronchitis, emphysema, asthma	9	3.9	37	32.7	35	31.5
531-	Esophageal, gastric, & duodenal disease	11	5.6	22	33.8	21	34.4
550-	Intestinal obstruction & hernia	2	3.6	11	47.8	7	25.0
571	Cirrhosis of liver	17	11.2	54	51.4	55	36.9
580-	Nephritis & nephrosis	12	4.6	23	29.1	22	31.0
780-	Ill-defined	29	2.8	168	36.5	79	24.7
800-	Accidents, etc.	15	2.3	79	25.6	47	16.4
	Other	105	8.3	249	42.3	207	36.7
	Total	576	6.2	2032	39.9	1745	32.6

* Number autopsied with that death certificate diagnosis.　%= Percent of deaths autopsied in that diagnostic class

TABLE 8 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY YEAR OF DEATH AND CEREBRO AND CARDIOVASCULAR DISEASES AS UNDERLYING CAUSE OF DEATH 1951-70

表8　予研－ABCC寿命調査対象群における剖検数および剖検率：
死亡年度別および原死因としての脳血管疾患および心臓血管疾患別，1951－70年

Death Certificate Underlying Disease		1951-60		1961-65		1966-70	
ICD	Diagnostic Class	Autopsies*	%	Autopsies	%	Autopsies	%
431	Cerebral hemorrhage	48	3.1	252	34.4	151	27.0
433-	Cerebral thromboembolic	5	4.4	101	41.7	85	29.4
430-	Other cerebrovascular	4	10.0	14	40.0	50	33.1
438	Ill-defined cerebrovascular	6	4.8	80	41.5	98	35.1
400-	Hypertensive disease	7	4.1	79	43.9	66	34.7
410-	Ischemic heart disease	9	4.4	60	30.0	118	29.9
420-	Other heart disease	32	6.5	80	30.8	73	27.8
	Total	111	4.1	666	36.1	641	30.1

* Number autopsied with that death certificate diagnosis.　%= Percent of deaths autopsied in that diagnostic class.

TABLE 9 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY UNDERLYING CAUSE OF DEATH AND RADIATION DOSE 1961-70

表 9　予研－ABCC 寿命調査対象群における剖検数および剖検率：
原死因および放射線量別，1961－70年

Death Certificate Underlying Disease			T65D (rad)*						
ICD	Diagnostic Class		Total	NIC	<1	1-49	50-99	100-199	200+
010-	Tuberculosis	No.	154	37	49	44	8	6	10
		%	42.9	36.6	45.4	37.6	80.0	50.0	90.9
204-	Leukemia	No.	30	5	7	11	0	2	5
		%	65.2	62.5	70.0	73.3	0.0	66.7	55.6
140-	Other malignant neoplasms	No.	946	227	290	317	45	31	36
		%	45.4	41.9	42.9	48.3	51.1	59.6	51.4
250	Diabetes mellitus	No.	45	8	17	10	4	3	3
		%	34.1	24.2	32.1	34.5	50.0	100.0	50.0
430-	Cerebrovascular disease	No.	821	167	264	302	39	25	24
		%	33.5	27.0	32.8	38.0	35.5	36.8	44.4
390-	Cardiovascular disease	No.	501	94	168	178	28	16	17
		%	32.6	26.9	31.2	34.9	39.4	45.7	48.6
480-	Pneumonia	No.	126	25	44	43	9	3	2
		%	31.5	23.4	30.6	37.7	69.2	27.3	18.2
490-	Bronchitis, emphysema, asthma	No.	70	21	23	20	0	4	2
		%	31.8	35.6	29.1	29.9	0.0	50.0	66.7
531-	Esophageal, gastric, & duodenal disease	No.	41	9	11	15	2	3	1
		%	33.1	29.0	28.2	34.9	50.0	75.0	33.3
550-	Intestinal obstruction & hernia	No.	18	8	5	4	0	0	1
		%	35.3	53.3	27.8	26.7	0.0	0.0	100.0
571	Cirrhosis of liver	No.	109	28	35	32	6	6	2
		%	43.1	45.2	36.8	47.1	60.0	54.5	28.6
580-	Nephritis & nephrosis	No.	45	14	18	10	3	0	0
		%	30.6	33.3	31.0	25.6	50.0	0.0	0.0
780-	Ill-defined	No.	244	65	76	82	8	8	5
		%	31.8	26.9	30.3	37.6	27.6	50.0	41.7
800-	Accidents, etc.	No.	124	28	42	42	8	3	1
		%	21.1	16.9	23.1	23.1	32.0	15.8	7.7
	Other	No.	448	88	146	161	23	12	18
		%	39.3	32.6	37.4	44.0	42.6	41.4	56.3
	Total	No.	3722	824	1195	1271	183	122	127
		%	36.1	31.1	34.7	39.3	42.2	44.9	47.2

* "Dose Undetermined" not included.　　%=Percent of deaths autopsied in that diagnostic class.

TABLE 10 AUTOPSIES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY SEX AND AGE AT DEATH HIROSHIMA AND NAGASAKI 1951-70

表10 予研－ABCC寿命調査対象群における剖検数：
性および死亡時年齢別，広島・長崎，1951－70年

Age at Death	Total			Male			Female		
	Deaths*	Autopsies	%	Deaths	Autopsies	%	Deaths	Autopsies	%
0-19	216	28	12.97	131	19	14.5	85	9	10.6
20-29	702	82	11.68	424	56	13.2	278	26	9.4
30-39	821	173	21.07	386	94	24.4	435	79	18.2
40-49	1165	236	20.26	540	112	20.7	625	124	19.8
50-59	2671	505	18.91	1447	271	18.7	1224	234	19.1
60-69	4895	1178	24.07	2918	716	24.5	1977	462	23.4
70-79	5882	1371	23.31	3095	708	22.9	2787	663	23.8
80+	3336	780	23.38	1236	310	25.1	2100	470	22.4
Total	19688	4353		10177	2286	22.5	9511	2067	21.7

* Thirteen cases, age unknown, not included.

TABLE 11 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY CEREBRO AND CARDIOVASCULAR DISEASES AS UNDERLYING CAUSE OF DEATH AND RADIATION DOSE 1961-70

表11 予研－ABCC寿命調査対象群における剖検数および剖検率：
原死因としての脳血管疾患および心臓血管疾患別および放射線量別，1961－70年

Death Certificate Underlying Disease			T65D (rad)*						
ICD	Diagnostic Class		Total	NIC	<1	1-49	50-99	100-199	200+
431	Cerebral hemorrhage	No.	397	85	129	138	25	12	8
		%	31.1	25.0	29.3	36.7	41.7	33.3	34.8
433-	Cerebral thromboembolic	No.	185	32	54	79	7	8	5
		%	35.2	27.8	34.0	41.4	23.3	47.1	38.5
430-	Other cerebrovascular	No.	62	15	24	16	2	0	5
		%	34.1	32.6	35.8	30.2	40.0	0.0	62.5
438	Ill-defined cerebrovascular	No.	177	35	57	69	5	5	6
		%	37.9	29.9	41.0	39.7	33.3	41.7	60.0
400-	Hypertensive disease	No.	144	23	41	61	5	8	6
		%	39.2	35.9	33.9	42.7	38.5	50.0	60.0
410-	Ischemic heart disease	No.	175	32	61	60	12	3	7
		%	29.9	21.3	28.9	33.9	42.9	37.5	58.3
420-	Other heart disease	No.	152	35	55	46	11	3	2
		%	29.3	28.0	30.2	27.9	37.9	37.5	22.2
	Total	No.	1292	257	421	469	67	39	39
		%	33.0	26.9	31.9	36.7	37.2	39.0	45.9

* "Dose Undetermined" not included. %=Percent of deaths autopsied in that diagnostic class.

TABLE 12 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY YEAR OF DEATH, AGE AT DEATH, AND CITY 1961-70

表12 予研－ABCC寿命調査対象群における剖検数および剖検率：
死亡年度，死亡時年齢，および都市別，1961－70年

Age at Death	Hiroshima				Nagasaki			
	1961-65		1966-70		1961-65		1966-70	
	Autopsies	%	Autopsies	%	Autopsies	%	Autopsies	%
< 50	137	34.1	98	30.9	80	43.0	50	29.1
50-59	190	43.5	100	28.4	57	36.5	37	31.6
60-69	426	43.1	350	34.0	139	45.0	97	31.4
70-79	502	38.6	499	35.2	126	36.7	133	34.0
80+	337	41.1	324	30.7	38	24.8	57	30.5
Total	1592	40.3	1371	32.9	440	38.4	374	31.8

%=Percent of deaths autopsied.

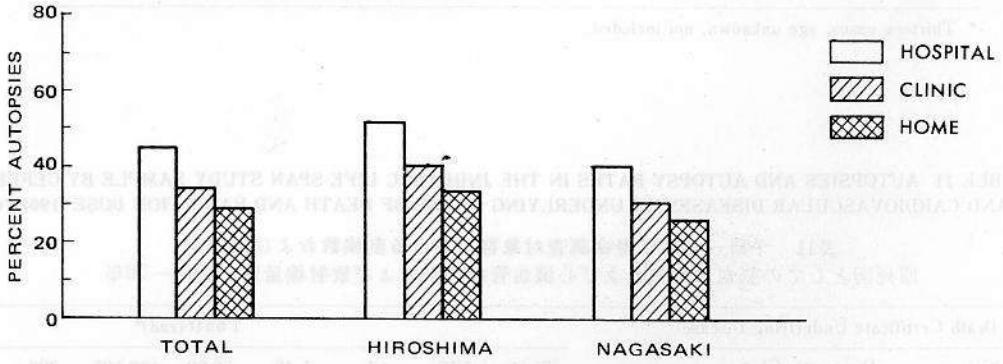

TABLE 13 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY PLACE OF DEATH, YEAR OF DEATH, AND CITY 1961-70

表13 予研－ABCC寿命調査対象群における剖検数および剖検率：
死亡場所，死亡年度，および都市別，1961－70年

Year	Place of Death	Hiroshima		Nagasaki		Total	
		Autopsies	%	Autopsies	%	Autopsies	%
1961-65	Hospital	616	50.1	218	57.7	834	51.9
	Clinic	36	49.3	15	29.4	51	41.1
	Home*	940	35.5	207	28.8	1147	34.1
	Total	1592	40.3	440	38.4	2032	39.9
1966-70	Hospital	671	39.7	241	44.1	911	40.7
	Clinic	57	33.5	15	24.2	72	31.0
	Home*	643	27.8	118	20.8	761	26.4
	Total	1371	32.9	374	31.8	1744	32.6

* Home includes other non-hospital and non-clinic deaths

TABLE 14 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY UNDERLYING CAUSE OF DEATH, AND PLACE OF DEATH 1961-70

表14 予研－ABCC 寿命調査対象群における剖検数および剖検率：
原死因および死亡場所別，1961－70年

Death Certificate Underlying Cause		Place of Death					
ICD	Diagnostic Class	Hospital or Clinic		Home		Other	
		Autopsies*	%	Autopsies	%	Autopsies	%
010-	Tuberculosis	112	48.3	44	33.8	3	50.0
204-	Leukemia	31	70.5	1	25.0	1	100.0
140-	Other malignant neoplasms	689	48.8	258	38.1	9	36.0
250	Diabetes mellitus	25	45.5	20	26.3	1	25.0
430-	Cerebrovascular disease	252	42.6	553	31.1	26	23.2
390-	Cardiovascular disease	204	44.7	277	27.3	25	29.4
480-	Pneumonia	51	39.2	74	28.0	5	41.7
490-	Bronchitis, emphysema, asthma	24	49.0	46	27.7	2	22.2
531-	Esophageal, gastric, & duodenal disease	24	39.3	17	30.4	2	22.2
550-	Intestinal obstruction & hernia	13	35.1	5	35.7	-	-
571	Cirrhosis of liver	74	44.8	34	39.1	1	50.0
580-	Nephritis & nephrosis	20	33.3	25	29.4	-	-
780-	Ill-defined	10	22.7	219	32.4	18	30.0
800-	Accidents, etc.	74	24.7	31	23.7	21	12.9
	Other	266	47.1	181	33.3	9	20.5
	Total	1869	44.5	1785	31.3	123	22.9

* Number autopsied with that death certificate diagnosis. %=Percent of deaths autopsied in that diagnostic class.

TABLE 15 AUTOPSIES AND AUTOPSY RATES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY CEREBRO AND CARDIOVASCULAR DISEASES AS UNDERLYING CAUSE OF DEATH AND PLACE OF DEATH 1961-70

表15 予研－ABCC 寿命調査対象群における剖検数および剖検率：原死因としての脳血管疾患
および心臓血管疾患別および死亡場所別，1961－70年

Death Certificate Underlying Cause		Place of Death					
ICD	Diagnostic Class	Hospital or Clinic		Home		Other	
		Autopsies*	%	Autopsies	%	Autopsies	%
431	Cerebral Hemorrhage	111	43.4	276	28.7	16	21.3
433-	Cerebral thromboembolic	47	34.8	134	35.4	5	27.8
430-	Other cerebrovascular	22	31.4	41	36.6	1	25.0
438	Ill-defined cerebrovascular	72	55.0	102	31.3	4	26.7
400-	Hypertensive disease	53	48.6	88	35.6	4	28.6
410-	Ischemic heart disease	74	42.3	92	24.3	12	28.6
420-	Other heart disease	56	41.8	89	24.5	8	32.0
	Total	435	43.1	822	29.7	50	25.9

* Number autopsied with that death certificate diagnosis. %=Percent of deaths autopsied in that diagnostic class.

TABLE 16 AUTOPSIES AND AUTOPSY RATES FOR MALES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY OCCUPATION AT DEATH 1961-70

表16　予研－ABCC 寿命調査対象群における男の剖検数および剖検率：死亡時の職業別，1961－70年

Occupation	Autopsies	%
Professional and Technical	37	36.6
Administrative	51	30.5
Clerical	63	39.1
Sales	110	39.3
Farmers, lumbermen, & fishermen	45	25.9
Mine & quarry workers	0	0
Transport & communication	7	18.9
Craftsmen & factory workers	193	48.4
Service workers	17	25.8
Not in labor force, unknown	926	40.2
Other	498	30.4
Total	1947	36.6

%=Percent of deaths autopsied.

TABLE 17 DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE CLASSIFIED BY UNDERLYING CAUSE OF DEATH AND PRINCIPAL AUTOPSY DIAGNOSIS WITH CONFIRMATION AND DETECTION RATES BY CITY AND SEX 1951-70

表17　予研－ABCC 寿命調査対象群における死亡の原死因および主要剖検診断別分類ならびに確認率および発見率：都市および性別，1951－70年

ICD	Diagnostic Class	Underlying Cause *				Autopsy**				Confirmation				Detection			
		H		N		H		N		H		N		H		N	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
010-	Tuberculosis	94	48	55	30	105	68	53	37	61.7	54.2	67.3	66.7	55.2	38.2	69.8	54.1
090-	Syphilis	5	3	3	6	6	3	5	3	20.0	33.3	0.0	0.0	16.7	33.3	0.0	0.0
000-	Other infective & parasitic disease	25	24	7	9	13	11	2	4	8.0	8.3	0.0	22.2	15.4	18.2	0.0	50.0
150	Cancer of esophagus	27	7	7	3	31	6	5	2	81.5	57.1	57.1	33.3	71.0	66.7	80.0	50.0
151	stomach	182	121	51	25	211	151	54	29	83.0	85.1	86.3	80.0	71.6	68.2	81.5	69.0
153	large bowel	14	13	3	1	16	21	3	1	57.1	61.5	66.7	0.0	50.0	38.1	66.7	0.0
154	rectum	13	18	4	7	14	12	5	7	76.9	44.4	100.0	85.7	71.4	66.7	80.0	85.7
155-	liver & bile ducts	7	10	7	3	53	44	27	16	42.9	90.0	71.4	33.3	5.7	20.5	18.5	6.3
157	pancreas	19	15	2	1	29	21	9	2	57.9	60.0	100.0	100.0	37.9	42.9	22.2	50.0

→

TABLE 17 CONTINUED 表17続き

ICD	Diagnostic Class	Underlying Cause*				Autopsy**				Confirmation				Detection			
		H		N		H		N		H		N		H		N	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
162	Cancer of bronchus, trachea, & lung	66	45	26	8	101	62	43	12	81.8	77.9	92.3	87.5	53.5	56.5	55.8	58.3
174	breast	1	26	0	9	0	32	0	11	0.0	100.0	0.0	100.0	0.0	81.3	0.0	81.8
180	cervix uteri	0	7	0	4	0	54	0	8	0.0	100.0	0.0	75.0	0.0	13.0	0.0	37.5
181-	Chorionepithelioma & other neoplasms of uterus	0	48	0	5	0	8	0	6	0.0	12.5	0.0	80.0	0.0	75.0	0.0	66.7
200-	Malignant lymphoma	13	10	5	7	17	15	12	8	61.5	90.0	80.0	100.0	47.1	60.0	33.3	87.5
204-	Leukemia	28	22	12	8	22	23	11	9	71.4	90.9	91.7	87.5	90.9	87.0	100.0	77.8
140-	All other malignant neoplasms	93	93	44	28	89	80	28	22	46.2	40.9	36.4	35.7	48.3	47.5	57.1	45.5
210-	Benign & unspecific neoplasms	26	26	9	11	0	2	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
250	Diabetes mellitus	19	25	5	4	11	11	1	2	36.8	36.0	20.0	50.0	63.6	81.8	100.0	100.0
280-	Dis. of blood & blood forming organ	8	16	7	4	4	7	4	2	25.0	43.8	57.1	25.0	50.0	100.0	100.0	50.0
390-	Rheumatic fever & chronic rheumatic heart disease	6	21	4	2	17	31	7	7	50.0	57.1	75.0	50.0	17.6	38.7	42.9	14.3
400-	Hypertensive disease	52	56	24	20	69	90	26	37	28.8	17.9	41.7	45.0	21.7	11.1	38.5	24.3
410-	Ischemic heart disease	74	77	24	12	86	68	21	11	40.5	33.8	37.5	16.7	34.9	38.2	42.9	18.2
420-	Other forms of heart disease	64	85	18	18	27	28	7	5	9.4	5.9	16.7	0.0	22.2	17.9	42.9	0.0
430	Subarachnoid hemorrhage	10	15	3	2	19	42	5	9	20.0	60.0	33.3	100.0	10.5	21.4	20.0	22.2
431	Cerebral hemorrhage	196	162	56	37	76	47	20	15	27.0	14.2	16.1	29.7	69.7	48.9	45.0	73.3
433	Thromboembolic disease	78	77	20	16	225	234	80	39	55.1	42.9	50.0	43.8	19.1	14.1	12.5	17.9
432	Other cerebrovascular disease	84	96	27	15	2	1	0	0	0.0	1.0	0.0	0.0	0.0	100.0	0.0	0.0
440-	Disease of arteries	7	12	1	2	19	26	1	1	14.3	16.7	0.0	0.0	5.3	7.7	0.0	0.0
480-	Pneumonia	40	69	16	13	46	54	18	14	7.5	14.5	31.3	23.1	6.5	18.5	27.8	21.4
490-	Bronchitis, emphysema, & asthma	43	22	11	5	29	32	4	6	30.2	36.4	18.2	40.0	44.8	25.0	50.0	33.3
531-	Gastric, duodenal, & peptic ulcers	31	13	8	2	31	14	7	2	58.1	23.1	62.5	0.0	58.1	21.4	71.4	0.0
550-	Intestinal obstruction & hernia	7	11	1	1	5	5	1	0	28.6	9.1	100.0	0.0	40.0	20.0	100.0	0.0
571	Cirrhosis of liver	66	33	18	9	47	33	17	6	43.9	54.5	50.0	33.3	61.7	54.5	52.9	50.0
580-	Nephritis & nephrosis	22	25	4	6	9	6	4	2	13.6	20.0	75.0	16.7	33.3	83.3	75.0	50.0
780-	Symptoms referable to system or organs	26	19	7	7	1	2	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
794	Senility	68	108	11	21	2	9	1	0	1.5	3.7	0.0	0.0	50.0	44.4	0.0	0.0
790-	Ill-defined diseases	3	4	2	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
800-	Accidents, & etc.	70	42	18	11	70	58	22	15	85.7	66.7	83.3	81.8	85.7	48.3	68.2	60.0
	All other	137	133	42	38	222	246	58	58	44.5	42.1	52.4	31.6	27.5	22.8	37.9	20.7

* Number who died with this death certificate diagnosis and were autopsied.

** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 18 DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE CLASSIFIED BY DEATH CERTIFICATE UNDERLYING CAUSE, PRINCIPAL AUTOPSY DIAGNOSIS AND YEAR OF DEATH WITH CONFIRMATION AND DETECTION RATES

表18 予研－ABCC寿命調査対象群における死亡の死亡診断書記載の原死因，主要剖検診断および死亡年度別分類ならびに確認率および発見率

ICD	Diagnostic Class	Year of Death					
		Death Certificate*			Autopsy**		
		1951-60	1961-65	1966-70	1951-60	1961-65	1966-70
010-	Tuberculosis	68	85	74	82	104	77
204-	Leukemia	37	17	16	35	16	14
140-	Other malignant neoplasms	142	509	447	185	624	570
250	Diabetes mellitus	7	27	19	2	17	6
430-	Cerebrovascular disease	63	447	384	59	416	339
390-	Cardiovascular disease	51	233	273	55	243	239
480-	Pneumonia	8	71	59	13	64	55
490-	Bronchitis, emphysema, asthma	9	37	35	2	36	33
531-	Esophageal, gastric & duodenal disease	11	22	21	13	23	18
550-	Intestinal obstruction & hernia	2	11	7	0	7	4
571	Cirrhosis of liver	17	54	55	17	46	40
580-	Nephritis & nephrosis	12	23	22	4	10	7
780-	Ill-defined	29	168	79	0	13	3
800-	Accidents, etc.	15	79	47	21	88	56
	Other	105	249	207	88	325	284
	Total	576	2032	1745	576	2032	1745
		Confirmation Rate			Detection Rate		
010-	Tuberculosis	69.1	58.8	59.5	57.3	48.1	57.1
204-	Leukemia	81.1	88.2	81.3	85.7	93.8	92.9
140-	Other malignant neoplasms	92.3	93.9	93.7	70.8	76.6	73.5
250	Diabetes mellitus	28.6	48.1	21.1	100.0	76.5	66.7
430-	Cerebrovascular disease	66.7	66.7	60.7	71.2	71.6	68.7
390-	Cardiovascular disease	56.9	45.1	47.6	52.7	43.2	54.4
480-	Pneumonia	0.0	21.1	10.2	0.0	23.4	10.9
490-	Bronchitis, emphysema, asthma	11.1	37.8	28.6	50.0	38.9	30.3
531-	Esophageal, gastric & duodenal disease	63.6	54.5	33.3	53.8	52:2	38.9
550-	Intestinal obstruction & hernia	0.0	18.2	28.6	0.0	28.6	50.0
571	Cirrhosis of liver	64.7	48.1	40.0	64.7	56.5	55.0
580-	Nephritis & nephrosis	25.0	13.0	27.3	75.0	30.0	85.7
780-	Ill-defined	0.0	3.0	0.0	0.0	38.5	0.0
800-	Accidents, etc.	86.7	87.3	63.8	61.9	78.4	53.6
	Other	43.8	42.6	44.9	52.3	32.6	32.7
	Total	62.8	59.6	58.4	62.8	59.6	58.4

* Number who died with this death certificate diagnosis and were autopsied.
** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 19 DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE WITH CEREBRO AND CARDIOVASCULAR DISEASE AS DEATH CERTIFICATE UNDERLYING CAUSE AND PRINCIPAL AUTOPSY DIAGNOSIS BY CITY AND TIME PERIOD, WITH CONFIRMATION AND DETECTION RATES 1951-70

表19 予研－ABCC寿命調査対象者で死亡診断書記載の原死因および主要剖検診断が脳血管疾患および心臓血管疾患であった死亡の都市別・期間別分布ならびに確認率および発見率，1951－70年

ICD	Diagnostic Class	Death Certificate*						Autopsy**					
		Hiroshima			Nagasaki			Hiroshima			Nagasaki		
		-1960	1961-65	1966-70	-1960	1961-65	1966-70	-1960	1961-65	1966-70	-1960	1961-65	1966-70
431	Cerebral hemorrhage	37	196	125	11	56	26	12	63	48	4	19	12
433-	Cerebral thromboembolic	5	87	63	-	14	22	29	225	205	9	69	41
430-	Other cerebrovascular	10	69	126	-	25	22	3	33	28	2	7	5
400-	Hypertensive disease	2	55	51	5	24	15	9	85	65	8	34	21
410-	Ischemic heart disease	7	49	95	2	11	23	12	58	84	5	13	14
420-	Other heart disease	24	64	61	8	16	12	2	29	24	3	4	5
800-	Accidents, etc.	12	64	36	3	15	11	15	71	42	6	17	14
	Other	321	1008	814	129	279	243	336	1028	875	121	277	262
		Confirmation Rate						Detection Rate					
431	Cerebral hemorrhage	16.2	22.4	20.8	27.3	16.1	30.8	50.0	69.8	54.2	75.0	47.4	66.7
433-	Cerebral thromboembolic	60.0	56.3	38.1	-	64.3	36.4	10.3	21.8	11.7	-	13.0	19.5
430-	Other cerebrovascular	-	10.1	7.1	-	12.0	4.5	-	21.2	32.1	-	42.9	20.0
400-	Hypertensive disease	50.0	23.6	21.6	40.0	50.0	33.3	11.1	15.3	16.9	25.0	35.3	23.8
410-	Ischemic heart disease	71.4	42.9	31.6	50.0	27.3	30.4	41.7	36.2	35.7	20.0	23.1	50.0
420-	Other heart disease	8.3	7.8	6.6	-	6.3	16.7	100.0	17.2	16.7	-	25.0	40.0
800-	Accidents, etc.	83.3	85.9	63.9	100.0	93.3	63.6	66.7	77.5	54.8	50.0	82.4	50.0
	Other	93.5	84.4	87.1	87.6	87.1	88.5	89.3	82.8	81.0	93.4	87.7	82.1

* Number who died with this death certificate diagnosis and were autopsied.

** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 20 DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE AND RATES OF CONFIRMATION AND DETECTION BY RADIATION DOSE, DEATH CERTIFICATE UNDERLYING CAUSE, AND PRINCIPAL AUTOPSY DIAGNOSIS 1961-70

表20 予研－ABCC 寿命調査対象群における死亡数および確認率と発見率：放射線量，死亡診断書原死因，および主要剖検診断別，1961－70年

ICD	Diagnostic Class	T65D (rad)*											
		Death Certificate**						Principal Autopsy Diagnosis***					
		NIC	<1	1-49	50-99	100-199	200+	NIC	<1	1-49	50-99	100-199	200+
		Deaths											
010-	Tuberculosis	37	49	44	8	6	10	45	58	51	10	6	6
204-	Leukemia	5	7	11	0	2	5	5	7	7	0	3	6
140-	Other malignant neoplasms	227	290	317	45	31	36	279	381	373	59	40	48
250	Diabetes mellitus	8	17	10	4	3	3	5	5	6	2	3	1
430-	Cerebrovascular disease	167	264	302	39	25	24	170	227	267	31	20	26
390-	Cardiovascular disease	94	168	178	28	16	17	97	155	177	17	17	12
480-	Pneumonia	25	44	43	9	3	2	26	44	33	6	5	2
490-	Bronchitis, emphysema, asthma	21	23	20	0	4	2	20	27	17	1	3	1
531-	Esophageal, gastric, & duodenal disease	9	11	15	2	3	1	11	9	15	3	2	1
550-	Intestinal obstruction & hernia	8	5	4	0	0	1	4	2	5	0	0	0
571	Cirrhosis of liver	28	35	32	6	6	2	22	20	29	10	3	2
580-	Nephritis & nephrosis	14	18	10	3	0	0	4	8	3	2	0	0
780-	Ill-defined	65	76	82	8	8	5	3	6	5	2	0	0
800-	Accidents, etc.	28	42	42	8	3	1	32	38	54	11	4	4
	Other	88	146	161	23	12	18	101	208	229	29	16	18
	Total	824	1195	1271	183	122	127	824	1195	1271	183	122	127
		Confirmation Rate						Detection Rate					
010-	Tuberculosis	56.8	63.3	54.5	62.5	66.7	50.0	46.7	53.4	47.1	50.0	66.7	83.3
204-	Leukemia	100.0	100.0	63.6	0.0	100.0	100.0	100.0	100.0	100.0	0.0	66.7	83.3
140-	Other malignant neoplasms	92.5	95.5	93.4	93.3	100.0	91.7	75.3	72.7	79.4	71.2	77.5	68.8
250	Diabetes mellitus	62.5	17.6	30.0	25.0	100.0	33.3	100.0	60.0	50.0	50.0	100.0	100.0
430-	Cerebrovascular disease	65.9	62.5	62.6	64.1	64.0	66.7	64.7	72.7	70.8	80.6	80.0	61.5
390-	Cardiovascular disease	44.7	44.0	48.3	42.9	68.8	35.3	43.3	47.7	48.6	70.6	64.7	50.0
480-	Pneumonia	28.0	11.4	14.0	11.1	33.3	0.0	26.9	11.4	18.2	16.7	20.0	0.0
490-	Bronchitis, emphysema, asthma	38.1	26.1	40.0	0.0	50.0	0.0	40.0	22.2	47.1	0.0	66.7	0.0
531-	Esophageal, gastric, & duodenal disease	44.4	9.1	66.7	100.0	33.3	100.0	36.4	11.1	66.7	66.7	50.0	100.0
550-	Intestinal obstruction & hernia	12.5	20.0	50.0	0.0	0.0	0.0	25.0	50.0	40.0	0.0	0.0	0.0
571	Cirrhosis of liver	50.0	34.3	46.9	66.7	33.3	50.0	63.6	60.0	51.7	40.0	66.7	50.0
580-	Nephritis & nephrosis	14.3	33.3	0.0	33.3	0.0	0.0	50.0	75.0	0.0	50.0	0.0	0.0
780-	Ill-defined	1.5	1.3	3.7	0.0	0.0	0.0	33.3	16.7	60.0	0.0	0.0	0.0
800-	Accidents, etc.	75.0	73.8	85.7	75.0	100.0	100.0	65.6	81.6	66.7	54.5	75.0	25.0
	Other	45.5	43.2	46.0	47.8	25.0	33.3	39.6	30.3	32.3	37.9	18.8	33.3
	Total	59.6	57.2	59.7	60.1	64.8	59.1	59.6	57.2	59.7	60.1	64.8	59.1

* "Dose Undetermined" not included.

** Number who died with this death certificate diagnosis and were autopsied.

*** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 21 DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE AND RATES OF CONFIRMATION AND DETECTION BY AGE AT DEATH, DEATH CERTIFICATE UNDERLYING CAUSE, AND PRINCIPAL AUTOPSY DIAGNOSIS 1961-70

表21 予研－ABCC寿命調査対象群における死亡数および確認率と発見率：死亡時年齢，死亡診断書原死因，および主要剖検診断別，1961－70年

ICD	Diagnostic Class	Age at Death							
		Death Certificate*				Principal Autopsy Diagnosis**			
		<50	50-59	60-69	70+	<50	50-59	60-69	70+
		Deaths							
010-	Tuberculosis	34	24	47	54	36	25	55	65
204-	Leukemia	18	3	8	4	16	3	7	4
140-	Other malignant neoplasms	91	135	351	379	107	156	395	536
250	Diabetes mellitus	4	5	14	23	4	2	7	10
430-	Cerebrovascular disease	26	60	232	513	24	60	202	469
390-	Cardiovascular disease	35	43	94	334	24	43	87	328
480-	Pneumonia	9	3	30	88	4	1	24	90
490-	Bronchitis, emphysema, asthma	5	4	15	48	4	4	17	44
531-	Esophageal, gastric, & duodenal disease	1	2	17	23	2	3	17	19
550-	Intestinal obstruction & hernia	1	3	5	9	0	0	2	9
571	Cirrhosis of liver	15	20	39	35	18	20	24	24
580-	Nephritis & nephrosis	6	5	12	22	6	4	6	1
780-	Ill-defined	10	8	23	206	2	0	1	13
800-	Accidents, etc.	36	19	30	41	34	18	35	57
	Other	74	50	95	237	84	45	133	347
	Total	365	384	1012	2016	365	384	1012	2016
		Confirmation Rate				Detection Rate			
010-	Tuberculosis	85.3	62.5	66.0	35.2	80.6	60.0	56.4	29.2
204-	Leukemia	83.3	100.0	87.5	75.0	93.8	100.0	100.0	75.0
140-	Other malignant neoplasms	94.5	97.0	93.4	92.9	80.4	84.0	83.0	65.7
250	Diabetes mellitus	75.0	0.0	42.9	34.8	75.0	0.0	85.7	80.0
430-	Cerebrovascular disease	80.8	73.3	65.9	61.0	87.5	73.3	75.7	66.7
390-	Cardiovascular disease	51.4	58.1	42.6	45.5	75.0	58.1	46.0	46.3
480-	Pneumonia	22.2	0.0	26.7	12.5	50.0	0.0	33.3	12.2
490-	Bronchitis, emphysema, asthma	60.0	75.0	33.3	27.1	75.0	75.0	29.4	29.5
531-	Esophageal, gastric, & duodenal disease	100.0	50.0	58.8	30.4	50.0	33.3	58.8	36.8
550-	Intestinal obstruction & hernia	0.0	0.0	20.0	33.3	0.0	0.0	50.0	33.3
571	Cirrhosis of liver	60.0	50.0	43.6	34.3	50.0	50.0	70.8	50.0
580-	Nephritis & nephrosis	83.3	40.0	16.7	0.0	83.3	50.0	33.3	0.0
780-	Ill-defined	0.0	0.0	0.0	2.4	0.0	0.0	0.0	38.5
800-	Accidents, etc.	86.1	73.7	90.0	65.9	91.2	77.8	77.1	47.4
	Other	54.1	38.0	44.2	41.4	47.6	42.2	31.6	28.2
	Total	72.1	69.5	66.9	50.7	72.1	69.5	66.9	50.7

* Number who died with this death certificate diagnosis and were autopsied

** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 22 AUTOPSIED DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE AND RATES OF CONFIRMATION AND DETECTION BY PLACE OF DEATH, DEATH CERTIFICATE UNDERLYING CAUSE, AND PRINCIPAL AUTOPSY DIAGNOSIS 1961-70

表 22 予研－ABCC 寿命調査対象群における剖検数および確認率と発見率：死亡場所，死亡診断書原死因，および主要剖検診断別，1961－70年

ICD	Diagnostic Class	Hospital Status at Death					
		Death Certificate*			Principal Autopsy Diagnosis**		
		Hospital	Clinic	Home	Hospital	Clinic	Home
		Deaths					
010-	Tuberculosis	109	3	44	98	2	80
204-	Leukemia	27	4	1	24	4	1
140-	Other malignant neoplasms	654	35	258	775	33	368
250	Diabetes mellitus	25	0	20	14	0	9
430-	Cerebrovascular disease	223	29	553	195	28	504
390-	Cardiovascular disease	192	12	277	138	13	307
480-	Pneumonia	43	8	74	23	3	91
490-	Bronchitis, emphysema, asthma	23	1	46	31	1	35
531-	Esophageal, gastric, & duodenal disease	24	0	17	26	1	13
550-	Intestinal obstruction & hernia	13	0	5	4	0	6
571	Cirrhosis of liver	71	3	34	57	5	21
580-	Nephritis & nephrosis	20	0	25	13	1	2
780-	Ill-defined	10	0	219	3	1	11
800-	Accidents, etc.	67	7	31	70	7	48
	Other	245	21	181	275	24	289
	Total	1746	123	1785	1746	123	1785
		Confirmation Rate			Detection Rate		
010-	Tuberculosis	62.4	33.3	56.8	69.4	50.0	31.3
204-	Leukemia	81.5	100.0	100.0	91.7	100.0	100.0
140-	Other malignant neoplasms	93.9	85.7	95.0	79.2	90.9	66.6
250	Diabetes mellitus	44.0	0.0	30.0	78.6	0.0	66.7
430-	Cerebrovascular disease	59.2	75.9	65.3	67.7	78.6	71.6
390-	Cardiovascular disease	44.3	50.0	48.4	61.6	46.2	43.6
480-	Pneumonia	7.0	25.0	21.6	13.0	66.7	17.6
490-	Bronchitis, emphysema, asthma	47.8	100.0	23.9	35.5	100.0	31.4
531-	Esophageal, gastric, & duodenal disease	50.0	0.0	41.2	46.2	0.0	53.8
550-	Intestinal obstruction & hernia	23.1	0.0	20.0	75.0	0.0	16.7
571	Cirrhosis of liver	49.3	100.0	26.5	61.4	60.0	42.9
580-	Nephritis & nephrosis	45.0	0.0	0.0	69.2	0.0	0.0
780-	Ill-defined	0.0	0.0	2.3	0.0	0.0	45.5
800-	Accidents, etc.	76.1	71.4	80.6	72.9	71.4	52.1
	Other	45.3	57.1	41.4	40.4	50.0	26.0
	Total	66.8	69.9	51.6	66.8	69.9	51.6

* Number who died with this death certificate diagnosis and were autopsied.

** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 23 AUTOPSIED DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE AND RATES OF CONFIRMATION AND DETECTION IN RELATION TO PARTICIPATION IN THE ABCC-JNIH ADULT HEALTH STUDY BY DEATH CERTIFICATE UNDERLYING CAUSE AND PRINCIPAL AUTOPSY DIAGNOSIS 1961-70

表23 ABCC－予研成人健康調査への参加状態別にみた予研－ABCC寿命調査対象群における剖検数および確認率と発見率：死亡診断書原死因および主要剖検診断別，1961－70年

ICD	Diagnostic Class	Adult Health Study Participation					
		Death Certificate*			Principal Autopsy Diagnosis**		
		Not AHS	AHS		Not AHS	AHS	
			Exam.	Not Exam.		Exam.	Not Exam.
		Deaths					
010-	Tuberculosis	112	45	2	140	39	2
204-	Leukemia	23	9	1	20	10	0
140-	Other malignant neoplasms	699	247	10	894	287	13
250	Diabetes mellitus	29	17	0	14	9	0
430-	Cerebrovascular disease	650	172	9	604	145	6
390-	Cardiovascular disease	408	94	4	382	96	4
480-	Pneumonia	115	14	1	98	21	0
490-	Bronchitis, emphysema, asthma	55	17	0	49	20	0
531-	Esophageal, gastric, & duodenal disease	37	6	0	31	10	0
550-	Intestinal obstruction & hernia	14	4	0	10	1	0
571	Cirrhosis of liver	89	20	0	66	20	0
580-	Nephritis & nephrosis	30	15	0	10	7	0
780-	Ill-defined	203	44	0	14	2	0
800-	Accidents, etc.	89	37	0	100	44	0
	Other	352	101	3	473	131	5
	Total	2905	842	30	2905	842	30
		Confirmation Rate			Detection Rate		
010-	Tuberculosis	58.9	62.2	0.0	47.1	71.8	0.0
204-	Leukemia	87.0	88.9	0.0	100.0	80.0	0.0
140-	Other malignant neoplasms	94.1	92.7	100.0	73.6	79.8	76.9
250	Diabetes mellitus	31.0	47.1	0.0	64.3	88.9	0.0
430-	Cerebrovascular disease	64.5	61.6	66.7	69.4	73.1	100.0
390-	Cardiovascular disease	46.6	45.7	50.0	49.7	44.8	50.0
480-	Pneumonia	15.7	21.4	0.0	18.4	14.3	0.0
490-	Bronchitis, emphysema, asthma	29.1	47.1	0.0	32.7	40.0	0.0
531-	Esophageal, gastric, & duodenal disease	40.5	66.7	0.0	48.4	40.0	0.0
550-	Intestinal obstruction & hernia	28.6	0.0	0.0	40.0	0.0	0.0
571	Cirrhosis of liver	44.9	40.0	0.0	60.6	40.0	0.0
580-	Nephritis & nephrosis	20.0	20.0	0.0	60.0	42.9	0.0
780-	Ill-defined	2.0	2.3	0.0	28.6	50.0	0.0
800-	Accidents, etc.	77.5	81.1	0.0	69.0	68.2	0.0
	Other	43.2	44.6	66.7	32.1	34.4	40.0
	Total	58.0	62.2	66.7	58.0	62.2	66.7

* Number who died with this death certificate diagnosis and were autopsied.
** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 24 AUTOPSIED DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY DEATH CERTIFICATE UNDERLYING CAUSE, PRINCIPAL AUTOPSY DIAGNOSIS, CONFIRMATION AND DETECTION RATES IN RELATION TO PLACE OF AUTOPSY (ABCC – NOT ABCC) 1961-70

表24 剖検場所(ABCC－非ABCC)別にみた予研－ABCC寿命調査対象群における剖検数：死亡診断書原死因，主要剖検診断，確認率および発見率別，1961－70年

ICD	Diagnostic Class	Death Certificate*		Principal Autopsy Diagnosis**	
		ABCC	Not ABCC	ABCC	Not ABCC
		Deaths			
010-	Tuberculosis	154	5	171	10
204-	Leukemia	10	23	9	21
140-	Other malignant neoplasms	694	262	880	314
250	Diabetes mellitus	35	11	15	8
430-	Cerebrovascolar disease	802	29	735	20
390-	Cardiovascular disease	452	54	440	42
480-	Pneumonia	125	5	114	5
490-	Bronchitis, emphysema, asthma	64	8	59	10
531-	Esophageal, gastric, & duodenal disease	42	1	38	3
550-	Intestinal obstruction & hernia	14	4	9	2
571	Cirrhosis of liver	80	29	62	24
580-	Nephritis & nephrosis	38	7	12	5
780-	Ill-defined	243	4	16	0
800-	Accidents, etc.	113	13	132	12
	Other	363	93	537	72
	Total	3229	548	3229	548
		Confirmation Rate		Detection Rate	
010-	Tuberculosis	58.4	80.0	52.6	40.0
204-	Leukemia	90.0	82.6	100.0	90.5
140-	Other malignant neoplasms	93.4	95.0	73.6	79.3
250	Diabetes mellitus	31.4	54.5	73.3	75.0
430-	Cerebrovascular disease	64.5	48.3	70.3	70.0
390-	Cardiovascular disease	44.7	61.1	45.9	78.6
480-	Pneumonia	16.8	0.0	18.4	0.0
490-	Bronchitis, emphysema, asthma	29.7	62.5	32.2	50.0
531-	Esophageal, gastric, & duodenal disease	42.9	100.0	47.4	33.3
550-	Intestinal obstruction & hernia	14.3	50.0	22.2	100.0
571	Cirrhosis of liver	43.8	44.8	56.5	54.2
580-	Nephritis & nephrosis	13.2	57.1	41.7	80.0
780-	Ill-defined	2.1	0.0	31.3	0.0
800-	Accidents, etc.	79.6	69.2	68.2	75.0
	Other	44.4	40.9	30.0	52.8
	Total	56.8	72.4	56.8	72.4

* Number who died with this certificate diagnosis and were autopsied.

** Number in the entire autopsy sample with this diagnosis as principal autopsy diagnosis.

TABLE 25 MALIGNANT NEOPLASMS: AUTOPSIED DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY DEATH CERTIFICATE UNDERLYING CAUSE AND PRINCIPAL AUTOPSY DIAGNOSIS, AND RATES OF CONFIRMATION AND DETECTION 1951-70

表25 悪性新生物：予研－ABCC寿命調査対象群における剖検数：死亡診断書原死因および主要剖検診断別ならびにその確認率および発見率，1951－70年

ICD	Diagnostic Class	Diagnosis By		Rate	
		Death Certificate	Autopsy	Confirmation by Autopsy	Detection on Death Certificate
140-	Buccal cavity & pharynx	15	18	86.7	72.2
150	Esophagus	44	44	70.5	70.5
151	Stomach	379	445	83.9	71.5
153	Large intestine	31	41	58.1	43.9
154	Rectum	42	38	66.7	73.7
162-	Bronchus, trachea, & lung	145	218	82.8	55.0
160	Other respiratory organs	24	25	79.2	76.0
174	Breast	36	43	97.2	81.4
180-	Uterus	64	76	82.8	69.7
183-	Other female genital organs	15	29	53.3	27.6
185	Prostate	9	22	44.4	18.2
188-	Urinary organs	26	52	76.9	38.5
170-	Other and unspecified	25	47	28.0	14.9
200-	Malignant lymphomas	35	52	80.0	53.8
204-	Leukemia	70	65	82.9	89.2
152	Other digestive	208	227	56.7	52.0
800-	Accidents, etc.	141	165	79.4	67.9
	Other	3044	2746	87.0	96.4
	Total	4353	4353	83.6	83.6

TABLE 26 CEREBROVASCULAR AND CARDIOVASCULAR DISEASE: DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY DEATH CERTIFICATE UNDERLYING CAUSE AND PRINCIPAL AUTOPSY DIAGNOSIS, AND RATES OF CONFIRMATION AND DETECTION 1951-70

表26 脳血管疾患および心臓血管疾患：予研－ABCC寿命調査対象群における死亡数：死亡診断書原死因および主要剖検診断別ならびにその確認率および発見率，1951－70年

ICD	Diagnostic Class	Diagnosis By		Rate	
		Death Certificate	Autopsy	Confirmation by Autopsy	Detection by Death Certificate
430	Subarachnoid hemorrhage	30	75	46.7	18.7
431	Cerebral hemorrhage	451	158	21.3	60.8
433*	Thromboembolic disease	191	578	48.7	16.1
432**	Other cerebrovascular disease	222	3	0.5	33.3
390-	Rheumatic fever & rheumatic heart disease	33	62	57.6	30.6
400-	Hypertensive disease	152	222	28.9	19.8
410-	Ischemic heart disease	187	186	35.8	36.0
420-	Other forms of heart disease	185	67	7.6	20.9
440	Generalized arteriosclerosis	18	6	0.0	0.0
441-	Other arterial disease	4	41	50.0	4.9
448-	Other circulatory disease	5	4	20.0	25.0
800-	Accidents, etc.	141	165	79.4	67.9
	Other	2734	2786	86.1	84.5
	Total	4353	4353	64.7	64.7

* 433, 434, 437 ** 432, 435, 436, 438

TABLE 27 DEATHS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE CLASSIFIED BY DEATH CERTIFICATE UNDERLYING CAUSE AND PRINCIPAL AUTOPSY DIAGNOSIS WITH CONFIRMATION AND DETECTION RATES 1951-70

表27　予研－ABCC 寿命調査対象群における死亡数：死亡診断書原死因および主要剖検診断別分類，ならびにその確認率および発見率，1951－70年

ICD	Diagnostic Class	Diagnosis by		Agreement	Rate	
		Death Certificate	Autopsy		Con-firmation	Detection
010-	Tuberculosis	227	263	141	62.1	53.6
090	Syphilis	17	17	2	11.8	11.8
000-	Other infective & parasitic	65	30	6	9.2	20.0
140-	Cancer of buccal cavity & pharynx	15	18	13	86.7	72.2
150	esophagus	44	44	31	70.5	70.5
151	stomach	379	445	318	83.9	71.5
153	large bowel	31	41	18	58.1	43.9
154	rectum	42	38	28	66.7	73.7
156	biliary & liver	27	140	18	66.7	12.9
157	pancreas	37	61	23	62.2	37.7
152	other digestive	21	6	1	4.8	16.7
162	bronchus, trachea, lung	145	218	120	82.8	55.0
160-	other respiratory	24	25	19	79.2	76.0
174	breast	36	43	35	97.2	81.4
180	cervix	11	62	10	90.9	16.1
181-	uterus, other	53	14	10	18.9	71.4
183-	other female genital	15	29	8	53.3	27.6
185	prostate	9	22	4	44.4	18.2
186-	other male genital	2	3	2	100.0	66.7
189	kidney	22	26	6	27.3	23.1
188	other urinary	4	26	3	75.0	11.5
170-	other & unspecified	146	64	17	11.6	26.6
204-	leukemia	70	65	58	82.9	89.2
200-	other lymphoma	35	52	28	80.0	53.8
210-	Neoplasm, benign & unspecified	72	4	0	0.0	0.0
250	Diabetes mellitus	53	25	19	35.8	76.0
240-	Other allergic, endocrine, metabolic	16	23	1	6.3	4.3
280-	Blood & blood forming organs	35	17	14	40.0	82.4
290-	Mental & psychiatric	41	60	17	41.5	28.3
430	Subarachnoid hemorrhage	30	75	14	46.7	18.7
431	Cerebral hemorrhage	451	158	96	21.3	60.8
433-	Cerebral embolism & thrombosis	191	578	93	48.7	16.1
432	Other vascular lesions	222	3	1	0.5	33.3
390-	Rheumatic fever & rheumatic heart disease	33	62	19	57.6	30.6
400-	Hypertensive disease	152	222	44	28.9	19.8
410-	Ischemic heart disease	187	186	67	35.8	36.0
420-	Other forms of heart disease	185	67	14	7.6	20.9
440	General arteriosclerosis	18	6	0	0.0	0.0
441-	Other diseases of circulatory system	9	45	3	33.3	6.7
460-	Upper respiratory & influenza	20	3	0	0.0	0.0
480-	Pneumonia	138	132	21	15.2	15.9
490-	Bronchitis, emphysema, & asthma	81	71	25	30.9	35.2
520-	Diseases of oral cavity, salivary glands, & jaws	1	2	0	0.0	0.0
531-	Gastric, duodenal, & peptic ulcers	54	54	26	48.1	48.1
550-	Hernia & intestinal obstruction	20	11	4	20.0	36.4
571	Cirrhosis of liver	126	103	59	46.8	57.3
570	Other liver, gallbladder, pancreas	82	68	31	37.8	45.6

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TABLE 27 CONT. 表27続き

ICD	Diagnostic Class	Diagnosis by		Agreement	Rate	
		Death Certificate	Autopsy		Con-firmation	Detection
540-	Other digestive system	30	23	5	16.7	21.7
580-	Nephritis & nephrosis	57	21	12	21.1	57.1
590	Infection of kidney	8	45	2	25.0	4.4
591-	Other urinary	9	7	2	22.2	28.6
600	Hyperplasia of prostate	10	8	4	40.0	50.0
610-	Breast & female genitalia	2	4	0	0.0	0.0
680-	Skin & cellular tissue	9	7	2	22.2	28.6
710-	Bones & organs of movement	24	20	4	16.7	20.0
740-	Congenital malformations	5	14	2	40.0	14.3
780-	Symptoms, senility ill-defined	59	4	0	0.0	0.0
794	Senility	208	12	5	2.4	41.7
790-	Ill-defined disease	9	0	0	0.0	0.0
800-	Accidents, etc.	141	165	112	79.4	67.9
	All other disease	88	296	32	36.4	10.8
	Total	4353	4353	1669	38.3	38.3

TABLE 28 MALIGNANT NEOPLASMS IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE, DEATH CERTIFICATE UNDERLYING CAUSE vs PRINCIPAL AUTOPSY DIAGNOSES 1951-70

表28 予研－ABCC 寿命調査対象群における悪性新生物例：
死亡診断書原死因と主要剖検診断との対応，1951－70年

	ICD	Diagnostic Class	Total	Death Certificate Underlying Cause																
				140-	150	151	153	154	162	160-	174	180-	183-	185	188-	170-	200-	204-	152	Other
Principal Autopsy Diagnoses	140-	Cancer of buccal cavity & pharynx	18	13												1			2	2
	150	Esophagus	44		31	2				1							1		1	8
	151	Stomach	445		7	318	2	3	2				2				1	2	31	77
	153	Large bowel	41			3	18	5	1				1			1			3	9
	154	Rectum	38			1	1	28											3	5
	162	Bronchus, trachea, lung	218	1	1	3		1	120	3		1		1		1			7	79
	160-	Other respiratory	25						1	19						2			1	2
	174	Breast	43						3		35									5
	180-	Cervix	76			1	1	2	1			53	2		2				4	10
	183-	Other female genital	29			2		1				6	8			1			3	8
	185	Prostate	22			1	1		2					4	1	1				12
	188-	Other urinary	52			1	1		1			1		1	20	1	2		4	20
	170-	Other and unspecified	47						3	1	1	1		1		7			6	27
	200-	Other lymphoma	52			1							1			2	28	5	5	10
	204-	Leukemia	65															58		7
	152	Other digestive	227	1	1	27	2	1	2			1	1			4	1		118	68
		Other	2911		4	19	5	1	9			1		2	3	4	2	5	20	2836
		Total	4353	15	44	379	31	42	145	24	36	64	15	9	26	25	35	70	208	3185

TABLE 29 CEREBROVASCULAR & CARDIOVASCULAR DISEASES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE
DEATH CERTIFICATE UNDERLYING CAUSE vs PRINCIPAL AUTOPSY DIAGNOSIS 1951-70

表29 予研－ABCC寿命調査対象群における脳血管疾患および心臓血管疾患例：
死亡診断書原死因と主要剖検診断との対応，1951－70年

	ICD	Diagnostic Class	Total	Death Certificate Underlying Cause												
				430	431	433*	432**	390-	400-	410-	420-	440	441-	448-	800-	Other
Principal Autopsy Diagnoses	430	Subarachnoid hemorrhage	75	14	34	4	5		2	4					1	11
	431	Cerebral hemorrhage	158	9	96	9	25		2		2				1	14
	433*	Thromboembolic disease	578	3	188	93	92	2	34	9	17	2		1	5	132
	432**	Other cerebrovascular disease	3				1		1							1
	390-	Rheumatic fever & rheumatic heart disease	62		3	1		19	2	1	24					12
	400-	Hypertensive disease	222		25	11	12	3	44	19	16	4		2		86
	410-	Ischemic heart disease	186		17	4	13		13	67	23				2	47
	420-	Other forms of heart disease	67		4	2	3	1	3	15	14					25
	440	Generalized arteriosclerosis	6		1	1	1				1					2
	441-	Other arterial disease	41		9	2		1	2	4	4	1	2			16
	448-	Other circulatory disease	4		1	1								1		1
	800-	Accidents, etc.	165		6	5	2		2	3	3				112	32
		Other	2786	4	67	58	68	7	47	65	81	11	2	1	20	2355
		Total	4353	30	451	191	222	33	152	187	185	18	4	5	141	2734

* 433, 434, 437 ** 432, 435, 436, 438

TABLE 30 SUMMARY OF PRINCIPAL AUTOPSY DIAGNOSES IN THE JNIH-ABCC LIFE SPAN STUDY SAMPLE BY MAJOR CATEGORIES 1951-70*

表30 予研－ABCC寿命調査対象群における主要剖検診断の総括：大分類別，1951－70年*

	Disease	Malignancy
Central nervous system	946	17
Cardiovascular system	522	
Respiratory system	284	242
Digestive system	106	586
Hepatobiliary system	171	140
Genitourinary system	172	181
Hemolymphatic system	29	108
Infection	268	
Trauma & Suicide	166	
Pancreas	9	61
Breast		43
Soft tissue		12
Endocrine		14
Miscellaneous	82	19
Undetermined	158	17
Total	2913	1440

* Anatomico-pathologic diagnoses.

TABLE 31 PRINCIPAL AUTOPSY DIAGNOSIS* IN 4353 JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA AND NAGASAKI 1951-70

表31　予研－ABCC寿命調査対象者4353剖検例の主要剖検診断，*広島・長崎，1951－70年

DISEASE OTHER THAN CANCER — 2913 *AUTOPSIES*	
Gentral Nervous System — 946	
Cerebral infarction	578
Cerebral hemorrhage	158
Berry aneurysm	69
Other subarachnoid hemorrhage	10
Psychosis	53
Senile	34
Other	19
Degenerative disease	56
Cerebral atrophy	28
Senility	13
Parkinson's disease	7
Epilepsy	5
Other	3
Infections	19
Encephalitis	8
Meningitis	7
Abscess	2
Other	2
Miscellaneous	3
Cardiovascular Disease — 522	
Ischemic heart disease	208
Coronary sclerosis	135
Coronary occlusion	47
Myocardial infarction	26
Hypertensive heart disease	222
Valvular and endocardial disease	32
Rheumatic valvular	11
Bacterial endocarditis	9
Luetic	5
Other	7
Myocardial disease	4
Vascular disease	50
Dissecting aneurysm	19
Arteriosclerotic aneurysm	12
Luetic aneurysm	3
Other aneurysm	2
Thromboembolic disease	10
Other	4
Pericarditis	6
Respiratory Disease — 284	
Pneumonia	181
Bronchopneumonia	101
Chronic pneumonitis	37
Suppurative pneumonitis	25
Lobar pneumonia	14
Other	4
Asthma, bronchitis	92
Asthma	13
Emphysema	39
Bronchiectasis	21
Bronchitis	19
Miscellaneous	11
Empyema	3
Pneumoconiosis	3
Other	5
Digestive Disease — 115	
Esophageal	4
Mouth	2
Ulcer	54
Gastric	49
Duodenal	5
Enterocolitis	20
Acute	7
Ulcerative	5
Amebic	1
Typhoid-paratyphoid	2
Appendicitis	2
Other	3
Intestinal obstruction	15
Obstruction	8
Hernia	4
Ileus	3
Other	11
Pancreatitis	9
Liver & Gallbladder — 171	
Hepatitis	17
Cirrhosis	102
Post necrotic	35
Portal	34
Post hepatitic	26
Biliary	2
Other	5
Liver abscess	1
Cholelithiasis	30
Cholecystitis	14
Cholangitis	2
Other	5

* Anatomico — pathologic diagnoses.

TABLE 31 CONT. 表31続き

Urinary Tract — 153		
Arteriolar nephrosclerosis		68
Pyelonephritis		43
Hydronephrosis		19
Nephrolithiasis		5
Malignant nephrosclerosis		2
Necrotizing papillitis		2
Other		14
Genital Tract — 19		
Male	10	
Benign prostatic hypertrophy		88
Prostatitis		2
Female	9	
Infection		3
Pregnancy complication		6
Hematologic — 29		
Aplastic anemia	7	
Other anemias	4	
Myelofibrosis	3	
Thrombocytopenic purpura	2	
Hemochromatosis	6	
Histiocytosis	3	
Other	4	
Infection — 268		
Tuberculosis	252	
Pulmonary		232
Disseminated		13
Miliary		3
Meningitis		2
Other		2
Syphilis	2	
Septicemia	2	
Tetanus	1	
Other	11	
Trauma & Suicide — 166		
Accidents	74	
Vehicle		32
Falls		13
Suffocation		9
Burns		8
Drowning		6
Other		6
Fractures	35	
Subdural hematoma	14	
Other traumas	3	
Suicide	40	
Hanging		21
Poison		13
Drowning		3
Other		3
Miscellaneous — 82		
Diabetes mellitus	23	
Rheumatoid arthritis	10	
Alcoholism	8	
Pemphigus	5	
Amyloidosis	3	
Kyphoscoliosis	3	
Scleroderma lupus erythematosis	3	
Congenital lesions	2	
Other	13	
Fatal benign tumors	12	
Principal Diagnosis Undetermined — 158		
CANCER — 1440		
Digestive Tract — 586		
Lip	1	
Epidermoid		1
Mouth	4	
Epidermoid		4
Tongue	8	
Epidermoid		8
Tonsil	1	
Epidermoid		1
Esophagus	44	
Epidermoid		41
Adenocarcinoma		2
Leiomyosarcoma		1
Stomach	445	
Adenocarcinoma		436
Adenoacanthoma		7
Leiomyosarcoma		1
Hodgkins disease		1
Small intestine	3	
Leiomyosarcoma		2
Lymphocytic lymphosarcoma		1
Colon, rectum	79	
Adenocarcinoma		78
Stem cell lymphoma		1
Anus	1	
Epidermoid		1
Respiratory — 242		
Accessory sinus	9	
Epidermoid		8
Sarcoma		1

TABLE 31 CONT. 表31続き

Nasopharynx	3	
Epidermoid		3
Larynx	12	
Epidermoid		12
Lung	218	
Bronchogenic adenocarcinoma		72
Bronchogenic epidermoid		70
Bronchogenic large cell		8
Bronchogenic mixed type		13
Bronchiolar		14
Small cell		41
Hepatic & Biliary — 140		
Liver	68	
Hepatoma		52
Cholangiocarcinoma		13
Mixed type		3
Gallbladder	42	
Adenocarcinoma		39
Adenoacanthoma		2
Epidermoid		1
Extrahepatic biliary	30	
Adenocarcinoma		29
Adenoacanthoma		1
Pancreas — 61		
Adenocarcinoma		57
Adenoacanthoma		3
Acinar cell		1
Genital, Male — 25		
Penis	2	
Epidermoid		2
Prostate	22	
Adenocarcinoma		21
Rhabdomyosarcoma		1
Testis	1	
Seminoma		1
Genital, Female — 105		
Vulva-vagina	2	
Epidermoid		2
Uterus	15	
Adenocarcinoma		2
Adenosquamous carcinoma		1
Carcinosarcoma		1
Leiomyosarcoma		5
Choriocarcinoma		4
Other		2
Cervix	62	
Epidermoid carcinoma		55
Adenocarcinoma		5
Other		2
Ovary	26	
Adenocarcinoma		15
Cystadenocarcinoma		9
Other		2
Urinary — 51		
Kidney and ureter	23	
Clear cell		18
Other		5
Bladder	28	
Transitional cell		22
Epidermoid		4
Adenocarcinoma		2
Breast — 43		
Infiltrating duct		42
Lymphosarcoma		1
Soft Tissue — 12		
Rhabdomyosarcoma		2
Teratoma		2
Hodgkins disease		1
Other		7
Nervous System — 17		
Brain	12	
Astocytoma		5
Glioma multiforme		5
Other		2
Meninges	5	
Meningioma		3
Other		2
Endocrine — 14		
Thyroid	8	
Papillary		6
Follicular		1
Sarcoma		1
Other endocrine	6	
Pheochromocytoma		1
Other		5
Skin — 9		
Epidermoid		7
Malignant melanoma		1
Adenocarcinoma		1
Basal		
Bone — 8		
Multiple myeloma		7
Osteosarcoma		1
Leukemia — 63		
Acute granulocytic		26
Chronic granulocytic		26
Acute lymphocytic		3
Acute monocytic		3
Chronic lymphocytic		2
Other		3
Lymphoma — 45		
Reticulum cell sarcoma		25
Lymphocytic lymphosarcoma		11

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TABLE 31 CONT. 表31続き

Hodgkins disease	6
Stem cell lymphoma	3
Other — 2	
Mesothelioma	1
Epidermoid	1

Primary Site Undetermined — 17	
Adenocarcinoma	12
Epidermoid	4
Malignant melanoma	1

TABLE 32 BODY WEIGHT BY SEX & AGE AT DEATH IN 2027* JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES IN ISCHEMIC HEART DISEASE, CEREBRAL INFARCTION, CANCER, & "OTHER" CAUSES OF DEATH, HIROSHIMA & NAGASAKI

表32 虚血性心疾患，脳梗塞症，癌およびその他の死因による予研－ABCC寿命調査対象者2027剖検例*の体重：性および死亡時年齢別，広島・長崎

Sex	<39			40-59			60-79			80+		
	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.
Ischemic Heart Disease — 154 Autopsies												
Male	58.7	13.3	3	52.9	7.6	8	46.5	8.2	50	41.2	8.7	16
Female	45.0	-	1	43.2	9.0	9	40.6	7.8	44	35.3	6.4	23
Total	55.3	12.8	4	47.8	9.5	17	43.7	8.6	94	37.7	7.9	39
Cerebral Infarction — 482												
Male	54.6	6.9	5	50.7	11.2	24	40.9	9.9	166	37.8	7.5	41
Female	38.0	-	1	45.3	10.7	18	34.6	9.3	145	30.8	6.8	82
Total	51.8	9.2	6	48.5	11.2	42	38.0	10.1	311	33.2	7.7	123
Cancer — 559												
Male	42.7	7.4	6	39.1	9.4	32	38.6	8.2	218	36.5	6.7	44
Female	38.0	6.2	6	38.8	8.8	44	34.9	8.3	173	33.8	7.3	36
Total	40.3	6.9	12	38.9	9.0	76	36.9	8.5	391	35.3	7.1	80
Other — 832												
Male	51.0	13.5	28	47.4	10.4	60	41.5	9.2	250	40.6	9.2	74
Female	40.3	12.0	18	42.5	12.1	32	35.0	9.3	220	30.7	7.4	150
Total	46.8	13.9	46	45.7	11.2	92	38.4	9.8	470	33.9	9.3	224

* Cases selected by availability & use of the same scales in Hiroshima & in Nagasaki.

TABLE 33 HEIGHT BY SEX & AGE AT DEATH IN 2027* JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES IN ISCHEMIC HEART DISEASE, CEREBRAL INFARCTION, CANCER, & "OTHER" CAUSES OF DEATH, HIROSHIMA & NAGASAKI

表33 虚血性心疾患，脳梗塞症，癌およびその他の死因による予研－ABCC寿命調査対象者2027剖検例*の身長：性および死亡時年齢別，広島・長崎

Sex	<39			40-59			60-79			80+		
	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.
						Ischemic Heart Disease — 154 Autopsies						
Male	162.0	4.00	3	163.9	6.05	8	156.6	6.22	50	157.2	6.24	16
Female	140.0	-	1	149.7	6.98	9	145.8	5.73	44	139.5	9.97	23
Total	156.5	11.47	4	156.4	9.68	17	151.6	8.06	94	146.8	12.26	39
						Cerebral Infarction — 482						
Male	159.4	9.44	5	158.2	4.67	24	155.7	6.81	166	154.5	5.43	41
Female	137.0	-	1	148.4	5.19	18	144.1	6.01	145	141.7	6.45	82
Total	155.7	12.45	6	154.0	6.88	42	150.3	8.66	311	146.0	8.62	123
						Cancer — 559						
Male	164.2	3.86	6	158.8	6.84	32	157.2	6.41	218	154.7	5.31	44
Female	152.5	5.43	6	150.2	6.69	44	146.7	5.61	173	142.0	5.74	36
Total	158.3	7.57	12	153.8	7.95	76	152.5	7.99	391	149.0	8.40	80
						Other — 832						
Male	159.8	8.14	28	158.7	9.25	60	157.2	6.50	250	154.9	6.08	74
Female	150.9	8.96	18	149.5	5.89	32	144.5	5.82	220	141.4	6.26	150
Total	156.3	9.46	46	155.5	9.30	92	151.3	8.84	470	145.8	8.88	224

* Cases selected by availability & use of the same scales in Hiroshima & in Nagasaki.

TABLE 34 RATIO OF BODY WEIGHT TO HEIGHT BY SEX & AGE AT DEATH IN 2027* JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES IN ISCHEMIC HEART DISEASE, CEREBRAL INFARCTION, CANCER, & "OTHER" CAUSES OF DEATH, HIROSHIMA & NAGASAKI

表34 虚血性心疾患，脳梗塞症，癌およびその他の死因別による予研－ABCC寿命調査対象者2027剖検例*の体重・身長比：性および死亡時年齢別，広島・長崎

Sex	< 39			40-59			60-79			80 +		
	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.
Ischemic Heart Disease — 154 Autopsies												
Male	363.3	91.2	3	323.3	47.1	8	296.4	49.7	50	262.4	55.2	16
Female	321.0	-	1	290.8	67.0	9	277.8	50.8	44	254.4	50.0	23
Total	352.8	77.4	4	306.1	59.1	17	287.7	50.8	94	257.7	51.8	39
Cerebral Infarction — 482												
Male	341.4	25.6	5	320.8	70.2	24	262.1	59.0	166	244.5	45.8	41
Female	277.0	-	1	306.6	70.8	18	239.5	61.0	145	217.5	46.0	82
Total	330.7	34.8	6	314.7	70.0	42	251.5	60.8	311	226.5	47.4	123
Cancer — 559												
Male	259.8	44.4	6	245.8	55.4	32	245.0	48.4	218	236.1	42.4	44
Female	249.2	39.7	6	257.1	51.5	44	237.4	55.6	173	237.4	47.6	36
Total	254.5	40.6	12	252.4	53.0	76	241.7	51.8	391	236.7	44.5	80
Other — 832												
Male	316.8	76.6	28	298.0	61.6	60	263.8	56.5	250	261.6	57.0	74
Female	264.2	70.4	18	283.2	76.0	32	241.3	61.5	220	216.6	49.7	150
Total	296.2	77.9	46	292.9	67.0	92	253.3	60.0	470	231.5	56.0	224

* Cases selected by availability & use of the same scales in Hiroshima & in Nagasaki.

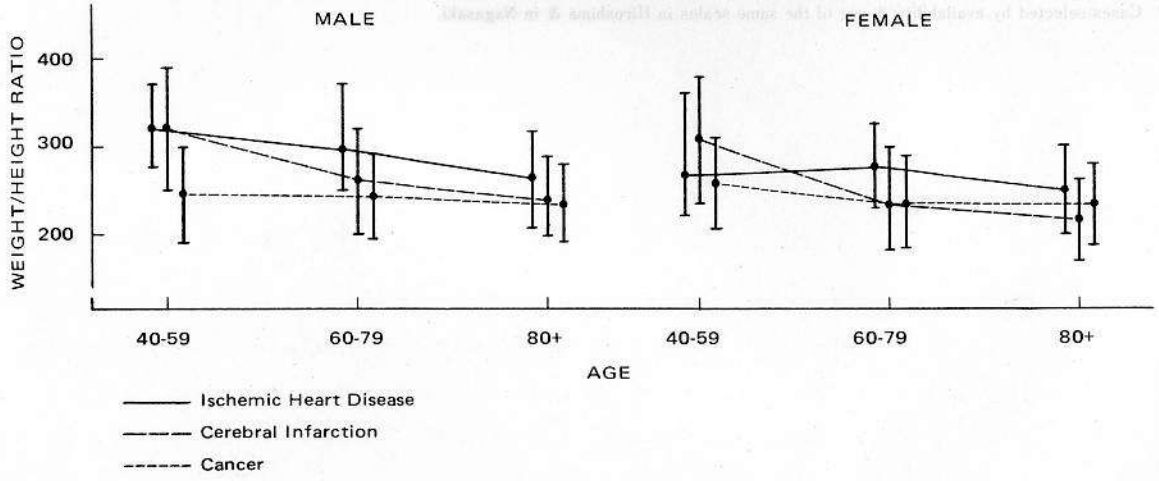

TABLE 35 TOTAL JNIH-ABCC LIFE SPAN STUDY SAMPLE DEATHS & AUTOPSY RATES BY PLACE OF DEATH & DEATH CERTIFICATE DIAGNOSIS, HIROSHIMA & NAGASAKI 1961-70

表35 予研－ABCC 寿命調査対象群における総死亡数および剖検率：
死亡場所および死亡診断書診断名別，広島・長崎，1961－70年

Death Certificate Diagnosis	Total Deaths			Deaths in Hospitals & Clinics			Deaths at Home**		
	Deaths	% of all Deaths	% Autopsied	Deaths	% of Deaths	% Autopsied	Deaths	% of Deaths	% Autopsied
Cerebrovascular	2482	23.8	33.5	592	23.9	42.6	1890	76.1	30.6
Cancer*	2163	20.7	45.7	1456	67.3	49.5	707	32.7	37.9
Cardiovascular	1556	14.9	32.5	456	29.3	44.7	1100	70.7	27.5
Ill-defined	780	7.5	31.7	44	5.6	22.7	736	94.4	32.2
Trauma	594	5.7	21.2	300	50.5	24.7	294	49.5	58.8
Respiratory	406	3.9	32.0	130	32.0	39.2	276	68.0	28.6
Tuberculosis	368	3.5	43.2	232	63.0	48.3	136	37.2	34.6
Remainder	2141	20.5	38.4	1036	48.4	22.3	1105	51.6	31.2
Total	10441		36.2	4202	40.2	44.5	6239	59.8	30.6

* Including leukemia

** Includes other non-hospital and non-clinic deaths

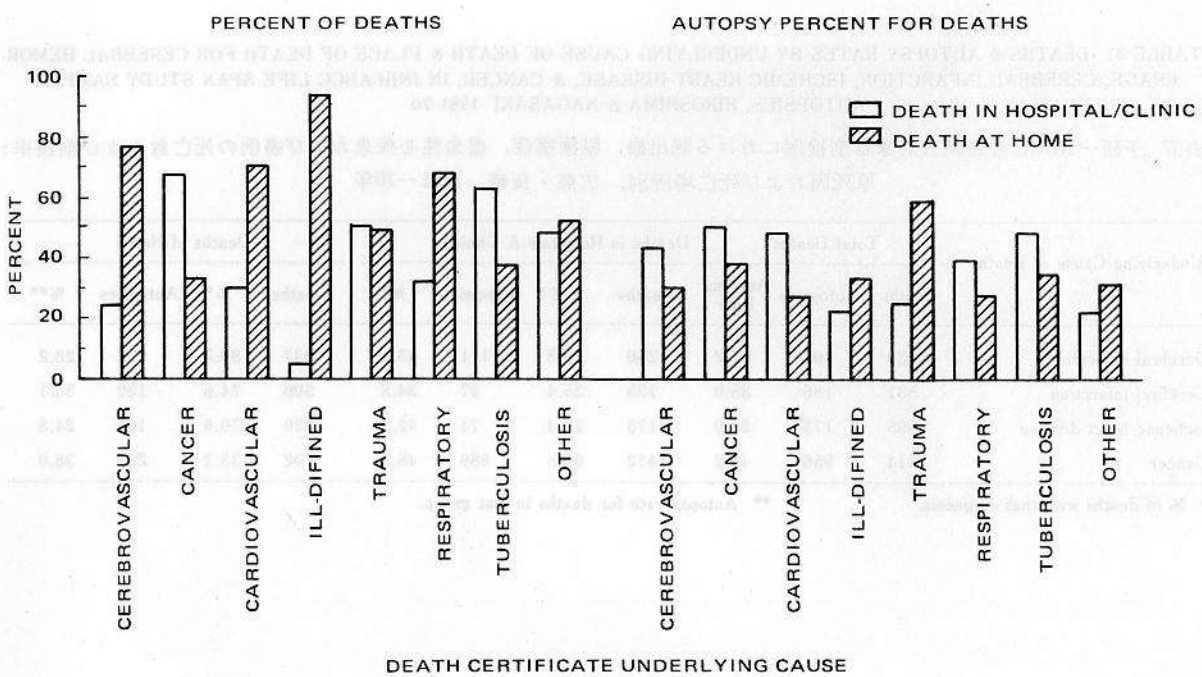

TABLE 36 CONFIRMATION & DETECTION RATES FOR CEREBRAL HEMORRHAGE, CEREBRAL INFARCTION, ALL CEREBROVASCULAR DISEASES, ISCHEMIC HEART DISEASE & CANCER IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1951-70

表36 予研－ABCC 寿命調査対象群剖検例における脳出血，脳梗塞症，全脳血管疾患，虚血性心疾患および癌の確認率および発見率，広島・長崎，1951－70年

Diagnosis	Death Certificate with Diagnosis	Autopsies	Autopsies with Diagnosis	Agree	Confirmation Rate	Detection Rate
Cerebral hemorrhage	2826	451	158	96	21.3	60.8
Cerebral infarction	644	191	578	93	48.7	16.1
Cerebral hemorrhage & infarction	3470	642	736	189	29.4	25.7
All cerebrovascular diseases	4294	894	814	209	23.4	25.7
Ischemic heart disease	808	187	186	67	35.8	36.0
Cancer	3694	1168	1440	878	75.2	61.0

TABLE 37 DEATHS & AUTOPSY RATES BY UNDERLYING CAUSE OF DEATH & PLACE OF DEATH FOR CEREBRAL HEMORRHAGE, CEREBRAL INFARCTION, ISCHEMIC HEART DISEASE, & CANCER, IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1961-70

表37 予研－ABCC 寿命調査対象群剖検例における脳出血，脳梗塞症，虚血性心疾患および癌例の死亡数および剖検率：原死因および死亡場所別，広島・長崎，1961－70年

Underlying Cause of Death	Total Deaths			Deaths in Hospitals & Clinics				Deaths of Home			
	Deaths	Autopsies	Autopsy Rate	Deaths	%*	Autopsies	%**	Deaths	%*	Autopsies	%**
Cerebral hemorrhage	1239	403	31.2	256	19.8	111	43.4	1037	80.2	292	28.2
Cerebral infarction	531	186	35.0	135	25.4	47	34.8	396	74.6	139	35.1
Ischemic heart disease	595	178	29.9	175	29.4	74	42.3	420	70.6	104	24.8
Cancer	2114	956	45.2	1412	66.8	689	48.8	702	33.2	267	38.0

* % of deaths with that diagnosis. ** Autopsy rate for deaths in that group.

TABLE 38 CEREBRAL HEMORRHAGE & INFARCTION BY SEX & AGE AT DEATH IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1961-70

表38　予研－ABCC寿命調査対象群剖検例における脳出血および脳梗塞症例数：性および死亡時年齢別，広島・長崎，1961－70年

Diagnosis		Total		Age at Death					
				<59		60-79		80+	
		Male	Female	Male	Female	Male	Female	Male	Female
All CH	P	86	59	22	8	59	32	5	19
	S	18	32	2	9	14	16	2	7
	Total	104	91	24	17	73	48	7	26
	%*	6.0	5.4	7.2	5.7	6.5	5.1	2.4	5.9
All CI	P	276	261	15	16	197	157	64	88
	S	358	275	25	28	260	154	73	93
	Total	634	536	40	44	457	311	137	181
	%*	36.3	32.0	12.0	14.8	40.6	33.1	47.7	41.4
CH & CI	Total**	727	612	63	66	521	352	143	194
	%	41.7	36.6	19.0	22.2	46.3	37.5	49.8	44.4
Total autopsies***		1745	1673	332	297	1126	939	287	437
% of Autopsies		51.1	48.9	19.0	17.8	64.5	56.1	16.4	26.1

*% = Number of cases/total autopsies in that column (rate by sex)

** = 26 cases with both CH & CI counted once only.

*** = Only those with examination of both heart & brain are included.

CH = Cerebral hemorrhage.

CI = Cerebral infarct.

P = Principal autopsy diagnosis.

S = Significant lesion but not principal autopsy diagnosis.

TABLE 39 AUTOPSY RATES BY AGE AT DEATH FOR CEREBRAL HEMORRHAGE, CEREBRAL INFARCTION, & ISCHEMIC HEART DISEASE IN 3418 JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1961-70

表39 予研－ABCC寿命調査対象群剖検例3418例における脳出血，脳梗塞症および虚血性心疾患例の剖検率：死亡時年齢別，広島・長崎，1961－70年

Autopsy Diagnosis		Total*	%	Age at Death					
				<59		60-79		80+	
				No.	%	No.	%	No.	%
CH	P	145	4.2	30	4.8	91	4.4	24	3.3
	S	50	1.5	11	1.7	30	1.5	9	1.2
	Total	195	5.7	41	6.5	121	5.9	33	4.6
CI	P	537	15.7	31	4.9	354	17.1	152	21.0
	S	633	18.5	53	8.4	414	20.0	166	22.9
	Total	1170	34.2	84	13.4	768	37.2	318	43.9
IHD	P	181	5.3	15	2.4	117	5.7	49	6.8
	S	1137	33.3	74	11.8	723	35.0	340	47.0
	Total	1318	38.6	89	14.1	840	40.7	389	53.7
Total autopsies		3418		629		2065		724	
% of autopsies**			100.0	18.4		60.4		21.2	

* Cases with more than one diagnosis are counted repeatedly

CH = Cerebral hemorrhage.

IHD = Ischemic heart disease.

S = Significant but not principal autopsy diagnosis.

Each diagnosis is counted separately with up to 3 diagnoses per autopsy.

% = % of total autopsies in each age period.

CI = Cerebral infarction.

P = Principal autopsy diagnosis.

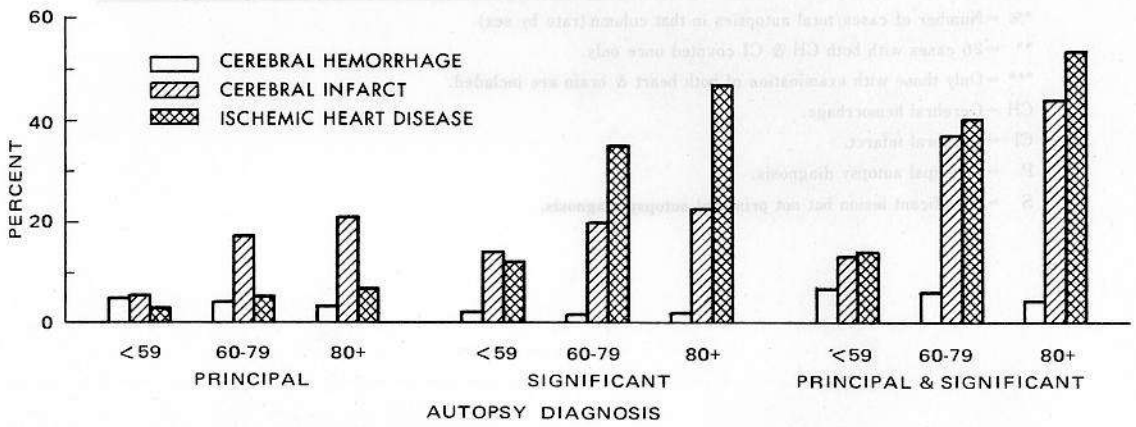

TABLE 40 CARDIAC FINDINGS IN ISCHEMIC HEART DISEASE IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1951-70

表40 予研－ABCC 寿命調査対象群剖検例における虚血性心疾患例の心臓所見，広島・長崎，1951－70年

Autopsy Diagnosis	Principal Diagnosis**	Significant Diagnosis
Myocardiac infarction	180	214
Recent	34	13
Healed	71	190
Recent & healed	75	11
Coronary atherosclerosis	25	833
With infarction*	(165)	(157)
With myocardial fibrosis	17	420
Without myocardial fibrosis	8	411
Focal myocardial fibrosis		212
Total	205	1259

*( ) Cases with atherosclerosis & myocardial infarction counted under infarction.

** Autopsies with principal diagnoses of "probable acute myocardial infarction" are not included.

TABLE 41 CEREBRAL INFARCTION & ISCHEMIC HEART DISEASE ALONE & IN COMBINATION IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, BY AGE AT DEATH, HIROSHIMA & NAGASAKI 1961-70

表41 予研－ABCC 寿命調査対象群剖検例における脳梗塞症例および虚血性心疾患例数ならびにその合併症例数：死亡時年齢別，広島・長崎，1961－70年

Autopsy Diagnosis		Total		Age at Death					
				< 59		60-79		80+	
		No.	%*	No.	%*	No.	%*	No.	%*
CI only	P	204	6.0	14	2.2	135	6.5	55	7.6
	S	270	7.9	40	6.4	175	8.5	55	7.6
IHD only	P	94	2.8	13	2.1	57	2.8	24	3.3
	S	528	15.4	46	7.3	325	15.7	157	21.7
CI and IHD	CI-P	333	9.7	17	2.7	219	10.6	97	13.4
	IHD-P	87	2.5	2	0.3	60	2.9	25	3.5
	Both-S	276	8.1	11	1.7	179	8.7	86	11.9
Total**		1792	52.4	143	22.7	1150	55.7	499	68.9
Total autopsies		3418		629		2065		724	

*% = % of autopsies in that age period.

** = Only autopsies with examination of both heart & brain are included.

CI = Cerebral infarction.

IHD = Ischemic heart disease.

P = Principal autopsy diagnosis.

S = Significant but not principal autopsy diagnosis.

TABLE 42 HEART WEIGHT BY AGE AT DEATH & SEX IN ISCHEMIC HEART DISEASE IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1961-70

表42 予研－ABCC寿命調査対象群剖検例における虚血性心疾患例の心臓の重さ：死亡時年齢別，広島・長崎，1961－70年

Sex	Age at Death											
	< 39			40-59			60-79			80 +		
	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.
Principal Diagnosis — 176 Cases												
Male	397.5	138.7	4	460.7	150.1	7	403.6	94.0	66	366.2	100.8	21
Female				365.0	21.2	2	387.3	70.2	48	348.8	73.9	28
Total	397.5	138.7	4	439.4	136.8	9	396.8	84.9	114	356.2	85.9	49
Significant Diagnosis — 1095 Cases												
Male	327.0	140.3	5	379.5	93.4	33	353.0	94.7	391	330.7	68.2	144
Female	242.5	123.7	2	335.2	108.0	26	318.6	82.0	296	306.8	72.0	198
Total	302.9	131.8	7	360.0	101.7	59	338.2	91.0	687	316.9	71.3	342

TABLE 43 "INCIDENTAL" MALIGNANCIES BY SITE & CELL TYPE IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1951-70

表43 予研－ABCC寿命調査対象群剖検例における「付随的」腫瘍：部位および細胞型別，広島・長崎，1951－70年

Site	Cell Type	Significant†	Not Significant ‡
Esophagus	Epidermoid	3	
Stomach	Adenocarcinoma	66	6
Colon-rectum	Adenocarcinoma	16	6
Lung	Bronchogenic adenocarcinoma	5	3
	Bronchogenic epidermoid	6	1
	Bronchiolar	6	2
	Small cell carcinoma	3	
Liver	Hepatoma	9	
	Cholangiocarcinoma	1	
Gallbladder	Adenocarcinoma	4	1
Extrahepatic biliary	Adenocarcinoma	2	
Pancreas	Adenocarcinoma	2	1
Prostate	Adenocarcinoma	15	38
Vagina	Epidermoid	2	
Uterus	Adenocarcinoma	1	
	Leiomyosarcoma	1	
Cervix	Epidermoid	13	2
	Adenocarcinoma	1	
Ovary	Adenocarcinoma	1	
	Cystadenocarcinoma		1
Kidney & ureter	Clear cell carcinoma	5	8
	Transitional cell	1	
Bladder	Transitional cell	2	3
Breast	Duct carcinoma	4	
	Adenoid cystic	1	
Soft tissue	Sarcoma	3	1
Thyroid	Papillary	5	
	Follicular	3	
	Occult & sclerosing		129
Adrenal	Pheochromocytoma	1	
Endocrine	Other	2	2
Skin	Adenocarcinoma	1	
	Basal cell	1	1
Bone	Multiple myeloma	1	
Leukemia	Acute granulocytic	1	
	Acute lymphocytic	1	
	Monocytic	1	
Undetermined	Epidermoid	1	
	Adenocarcinoma	5	

† Significant — Malignancies which probably would have caused death had the patient not died of another cause

‡ Not significant — Cancers which have low, questionable, or undetermined probability of causing death if untreated. They include carcinoma in situ, latent carcinoma, occult sclerosing carcinoma, etc.

TABLE 44 RELATIVE RISK FOR CEREBRAL HEMORRHAGE, CEREBRAL INFARCT & ISCHEMIC HEART DISEASE AS PRINCIPAL AUTOPSY DIAGNOSIS IN SURVIVORS EXPOSED TO 100+RAD ATB COMPARED TO SURVIVORS EXPOSED TO 0-9RAD ATB, BY AGE AT DEATH & SEX, JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES, HIROSHIMA & NAGASAKI 1961-70

表44　予研－ABCC 寿命調査対象群剖検例の 100 rad 以上の被曝者における主要剖検診断としての脳出血，脳梗塞症および虚血性心疾患の相対的危険率，0－9 rad 被曝者との比較：死亡時年齢および性別，広島・長崎，1961－70年

Diagnosis	Age at Death								
	Total			Male			Female		
	<59	60-79	80+	<59	60-79	80+	<59	60-79	80+
Cerebral hemorrhage	1.1	0.8	-	0.5	0.7	-	4.4	1.1	-
Cerebral infarct	1.5	1.1	0.3	2.6	1.3	-	0.6	0.7	0.5
Ischemic heart disease	0.8	0.5	1.1	0.9	0.2	1.2	-	0.9	1.0

TABLE 45 AUTOPSY RATES OF MAJOR CANCER TYPES IN JNIH-ABCC LIFE SPAN STUDY SAMPLE AUTOPSIES BY RADIATION DOSE (T65D), HIROSHIMA & NAGASAKI 1951-70

表45　予研－ABCC 寿命調査対象群剖検例における各種癌の剖検率：放射線量（T65線量）別，広島・長崎，1951－70年

Cancer	Total		T65D (rad)**					
			<50		50-199		200+	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Breast	42	1.0	33	0.9	5	1.4	4	2.4
Leukemia	63	1.4	32	0.8	8	2.3	19	11.3
Lymphoma	47	1.1	38	1.0	4	1.2	4	2.4
Lung	218	5.0	177	4.7	21	6.1	14	8.3
Liver	68	1.6	62	1.6	4	1.2	2	1.2
Gallbladder	72	1.7	65	1.7	5	1.4	1	0.6
Pancreas	61	1.4	56	1.5	3	0.9	1	0.6
Esophagus	44	1.0	39	1.0	4	1.2	1	0.6
Stomach	443	10.2	391	10.4	28	8.1	19	11.3
Colon-rectum	76	1.7	70	1.9	4	1.1	1	0.6
Bladder & kidney	47	1.1	34	0.9	8	2.3	4	2.4
Gynecologic	76	1.7	65	1.7	6	1.7	4	2.4
Other	182	4.2	156	4.1	15	4.3	7	4.2
Total autopsies	4353		3766		345		168	

* Rate = No. of cancers/Total autopsies for that dose　　** "Dose unknown" cases are omitted

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