Table 2. Completion rates of second examination and lack of data

	Primary-second examination year				Total
	2007–2009	2008–2010	2009–2011	2010–2012	
Completion of second examination (%)	79.5	75.4	73.5	67.0	74.1
Questionnaire (%)	18.8	21.0	21.2	19.5	20.6
Lack of data (%)	1.7	3.7	5.4	13.5	5.3

DISCUSSION

Incidence of breast cancer among Japanese women peaks at late 40 s, and therefore the establishment of an effective method of screening for women of this age is an issue requiring an urgent solution. Mammography is the only method of breast cancer screening that has been scientifically proven effective in reducing the mortality rate, and as such is an effective tool, but as reported by us earlier (4), its detection range for women in their 40 s, many of whom have dense breasts, is only 73.1%, which is considered insufficient. The use of ultrasonography is considered to have potential to improve on this, but there has been a lack of standardization of breast cancer screening using ultrasonography, and there are no data proving its scientific efficacy.

To date, multiple reports have been made of the combined use of mammography and ultrasound in screening (7–9). Each of these notes that it can be expected to increase detection rates, but it has been pointed out that there is a possibility of increasing the recall rate at which detailed examinations are necessary, and while the net-benefit evaluation is important, follow-up of interval breast cancer was insufficient, few subjects were studied, and the evidence level was low, with the result that these studies were insufficient for use as scientific data. Furthermore, the results of ACRIN 6666 (12), which evaluated the efficacy of adding ultrasonography to mammography for high-risk groups, have also been reported. The combined use of ultrasonography has led to increased detection sensitivity, and the fact that around 22% of cancer occurrence was detected using ultrasonography only is worthy of note, but the small number of participants (2809 cases) and the difficulty in defining high risk can be cited as issues in this analysis.

Against this background of information, the J-START was begun as one of the Japanese government's strategic research projects in combating cancer, with the objectives of the standardization of breast screening using ultrasonography and the verification of its efficacy. The first objective of the project was to standardize breast cancer examination using ultrasonography, and this has been almost completely achieved through the implementation of training programs relating to ultrasonography, and the rollout of breast cancer screening using ultrasonography. The fact that ~2000 doctors and technicians have now participated in such a training program relating to ultrasonography examination of the breasts indicates that ultrasonography breast cancer screening is now possible

throughout the country. Furthermore, the creation of a document giving guidance on technical structural issues, and the fact that its contents and methods have been reported by the Ministry of Health, Labour and Welfare as an educational/training achievement are considered to indicate that this standardization has now been achieved.

The most significant issues in ultrasonography breast cancer examination, however, are whether or not it is effective in reducing mortality rates, and data relating to disadvantages, and these things have to date been unclear. Furthermore, there is also a need for verification of whether or not quality control functions correctly in terms of equipment and training.

The second objective of the study was to verify the efficacy of ultrasonography breast cancer screening using an RCT, and to this end 76 196 women were newly registered to the study. This was the first RCT in Japan looking at a large number of people, and is equivalent to the largest studies carried out throughout the world. The sample size was calculated based on the hypothesis that adjunct ultrasonography is expected to improve sensitivity of the intervention group compared with the control group. Our previous data demonstrated lower sensitivity of mammography screening, 71% in women aged 40–49, when compared with those in women aged 50–59 and 60–69, 85 and 86%, respectively (4). Assuming that the sensitivity increases from 71 to 86% by adding ultrasonography to mammography, 42 500 subjects for each arm are needed to make it 5% statistical significance (two-sided) with 80% power. Thus, the number of 100 000 subjects (two arms combined) is set to be a targeted sample size to verify the primary end point, a sensitivity improvement in the intervention group when compared with the control group. We recruited 76 196 subjects, which still have 75% statistical power based on the original calculation. In addition, breast cancer incidence is expected to be higher than that of original calculation, since the incidence in Japan has been continuously increasing, so that this study has sufficient power to test the hypothesis.

96.1% of cases recorded were RCTs, and it is particularly worth noting that 71.1% were individual RCTs, which is considered to have the highest evidence level. At the same time, 74.1% of women expected to have completed their second examination by the end of fiscal 2012 had done so. Since the regular rate of re-examination two years later is almost 50%, this study in fact achieved a high rate of repeated examination, thus indicating the high level of awareness of the study among

participants. Furthermore, 20.6% of all participants were unable to undergo a second examination, but completed a follow-up survey questionnaire, leaving only 5.3% of participants, an extremely low level, for whom no information could be ascertained. The questionnaire asked the subjects to describe the presence or absence of screening, medical institution visits and results. If the subject has visited a medical institution, then the name of that medical institution is requested. Furthermore, in cases where the consent was obtained, we ask the medical institutions that were consulted to provide such information. By matching the information obtained from the questionnaire with the local registration information for cancer, we investigated the presence or absence of interval breast cancer. In this way, we could thus ensure the quality of follow-up when patients did not undergo a second examination. The authors are engaged in further follow-up work to obtain information relating to change of address etc., with the aim of reducing this figure in participants for whom no information was ascertained to $\leq 5\%$.

Interim analysis during the study period has not been performed to date, in order to avoid biasing the results of the study. After all scheduled second examinations have been completed, the Data Monitoring and Statistical Analysis Committees will perform data cleaning, and at that point we plan to publish analysis results for the primary end points of sensitivity/specificity, and the rate of detection of cancer.

Japan does not have a mature system of local registration for cancer, thus making it extremely difficult to ascertain the status of interval cancers. Without an understanding of interval cancers, however, it is impossible to measure sensitivity, which is one of the primary end points. In this study, a structure of implementing a follow-up survey two years after the initial examination was used to ascertain the status of interval cancer, and could be said to be a factor that maintains the quality of the research. Furthermore, following up participants in the study for whom information was not ascertained is one of the most important outstanding issues, and we are still engaged in confirming changes of address or removals from family registers by a process of telephone calls made by the central data center and postal communications, as well as confirming survival or death using demographic statistics. We are already engaged in confirming changes of address or removals from family registers with a number of local authorities, which has resulted in an almost 100% success rate in finding responses, thereby making it clear that this is an effective method of follow-up. The results of this research are thought to likely have a significant impact on the future direction of breast cancer screening not only in Japan but also worldwide, thus making it an extremely significant study.

The Great Eastern Japan Earthquake Disaster, which occurred on 11th March 2011, caused destruction to a large area of the coast between the Tohoku and north Kanto areas. Several organizations participating in this study are in the affected regions, and it was anticipated that it would be difficult for local authorities to implement cancer screening in some areas during fiscal 2011. Despite this, a total of 70.1%

women scheduled for second examinations underwent them, roughly the same percentage as those scheduled for second examinations in areas not affected by the disaster. Relatively large numbers of women registered to the project in the disaster area are expected to have moved home, and in the future, while being sensitive to the psychological issues surrounding involvement in the disaster, it will be necessary to implement detailed follow-up surveys.

In terms of future planning, scheduled second examinations were completed by the end of fiscal 2012, but ascertaining examination results and the results of detailed examinations, verification of cases of cancer confirmed only after the end of the fiscal year, registration of cancer detections and surveys of prognosis, and follow-up surveys of all women registered to the study will be required on an ongoing basis beyond fiscal 2013. In future, it will be very important to establish a research structure that facilitates ongoing, long-term, detailed monitoring, in order to obtain accurate, high-quality data.

At the same time, analysis of this study from the perspective of medical economics indicates that it is impossible to avoid the additional costs of screening involved in the introduction of ultrasonography, but that the increase in the rate of early breast cancer detection will result in lowered drug treatment costs, and also reduce rates of reoccurrence and death, thereby allowing the avoidance of long-term drug treatment involved in end-of-life care, and facilitating reduced medical costs and losses to society. A comprehensive evaluation from the perspective of medical economics is extremely important, in reference to current economic information, and future urgent research/study issues will include the cost of introducing ultrasonography and increasing detailed examinations, and surveys into the physical disadvantages of undergoing needle biopsy, etc., while at the same time looking not only at the medical costs of treating breast cancers occurring during the study, but also at the social burden caused by the requirement for detailed examinations. We hope to cooperate with specialists in pharmacoepidemiology and medical economics to further this research to greater levels.

Mortality rates from cancer are the most important indicators in evaluating the efficacy of cancer screening. The long natural history of breast cancer, however, means that in order to demonstrate a significant difference between the two groups in terms of benefit in reducing mortality rates by screening, a structure that can implement long-term follow-up studies of participants is an absolute prerequisite.

CONCLUSION

This study was the first large-scale RCT carried out in Japan. It required objective judgment regarding the advantages and disadvantages of the introduction of ultrasonography screening, and it is anticipated that this J-START project will make a significant contribution to the establishment of a scientific justification for its introduction. Furthermore, it is extremely significant for Japan to have been able to realize such a

large-scale RCT study, which it is considered will provide important pointers in a wide range of clinical trials in the future.

REGISTRATION OF THE PROTOCOL

The J-START was registered on the University Hospital Medical Information Network Clinical Trial Registration (UMIN-CTR), Japan (registration number: UMIN000000757), in 2007.

Acknowledgements

Funding

Conflict of interest statement

None declared.

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— 総　説 —

がん登録とがん検診に関する最近の動向について

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要旨：2006年にがん対策基本法が成立し，2007年にがん対策推進基本計画・都道府県計画が策定された。がん対策を証拠に基づいて実施するには，正確ながん統計が必須であり，がん登録は計測システムとして中心的な役割を果たす。今後は，地域がん登録，院内がん登録，臓器がん登録，小児がん登録，National Clinical Databaseが連携を図り，効率のよいデータ収集システムを整備すると共に，がん統計利用の促進を図る必要がある。がん検診は，たばこ対策，がん診療の均てん化と並んで，がん死亡減少を達成するための主要な手段の1つであり，5年以内に受診率50%以上とすることが個別目標として設定された。有効な（死亡減少について十分な証拠のある）検診を，正しく（適切な精度管理を行うことで高い質を保ちつつ対象集団における受診率を100%に近づける）行う必要がある。加えて，検診に伴う不利益に関する証拠を集積し，集団全体としての利益が不利益を上回ることを事前に確認する必要がある。
　キーワード：がん対策，がん登録，がん検診，基本計画

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Recent Trends in Cancer Registration and Screening

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[ABSTRACT]

With the introduction of the Cancer Control Act in 2006 and the development of basic and prefectural Programes for the Promotion of Cancer Control in 2007, the Japanese government presented its policy for comprehensive and systematic cancer control. Evidence-based implementation of cancer control requires accurate statistical data on cancer. Thus, registration of cancer patients is crucial for obtaining measurements necessary to create such statistical data. An efficient data collection system should therefore be established by coordinated efforts toward registration of cancer patients in the community and in hospitals as well as registration of affected organs and pediatric cancer patients. The National Clinical Database should also be updated regularly in order to encourage its use.

Cancer screening, tobacco control, and the universalization of quality cancer care are important means of reducing cancer mortality. The basic Program for the Promotion of Cancer Control sets a target of achieving a consultation rate of 50% within 5 years. As a control measure, cancer screening is designed to reduce mortality of the target group. Thus, an effective screening (supported by sufficient evidence of mortality reduction) needs to be implemented. Accurate implementation of screening involves (maintaining high quality through appropriate accuracy control while aiming for a 100% consultation rate in the target group). In addition, information on the risks and benefits of cancer screening should be accumulated to verify that the benefits for the target group outweigh the risks.

Key Words : cancer control, cancer registration, cancer screening, basic program

はじめに　―がん対策―

2006年にがん対策基本法が成立し，2007年にがん対策推進基本計画・都道府県がん対策推進計画が策定されて，わが国においても，がん対策を総合的かつ計画的にがん対策を推進する方向性が示された。基本計画では，「がんによる死亡者の減少（75歳未満のがんの年齢調整死亡率を2005～2015年の10年間で20％減少）」と「すべてのがん患者及びその家族の苦痛の軽減並びに療養生活の質の向上」の2つが全体目標として掲げられた。基本計画を実施するための仕組みとして，国立がんセンターにはがん対策情報センターが設置され，各県にはがん診療連携拠点病院（現在388）が指定された。2010年6月に中間報告書が公表され，2012年6月には5年後の見直しを経た新基本計画が策定された。現在，新基本計画に対応して都道府県がん対策推進計画の更新作業が進められている。

世界的には，2002年にWHOからNational Cancer Control Programmeが刊行されたが[1]，これと前後して国レベルのがん計画を策定してがん対策を推進している国が多い。イギリスでは，ブレア政権の時代に，自国のがん生存率が諸外国よりも低いことが問題視され，2000年にNHS Cancer Planを作り上げて精力的にがん対策に取り組んだ。すでに見直しを経て2007年からNHS Cancer Reform Strategyを開始している。アメリカは，1998年以来，CDCが州ごとのがん計画策定を支援するComprehensive Cancer Control Programを展開しており，2005年には，ほぼすべての州でがん計画の策定が完了した。また，カナダ，オーストラリアにおいても，州単位でのがん計画を基本として，連邦政府レベルでの連携を図っている。一方，アジア諸国においても，韓国・台湾などでがん登録の整備が進み，特に韓国では，2003年にがん管理法を成立させて，WHOのNational Cancer Control Programmesの内容に則った施策を順次展開してきている。このように，がん対策は多くの国での共通の問題であり，諸外国の

好事例に関する情報を積極的に収集して，わが国の施策に反映させていくことが効率的である。

新基本計画においては，全体目標として従来の2つに加えて，「がんになっても安心して暮らせる社会の構築」が追加された。また，重点的に取り組むべき課題として，「放射線療法，化学療法，手術療法の更なる充実とこれらを専門的に行う医療従事者の育成」，「がんと診断された時からの緩和ケアの推進」，「がん登録の推進」に加えて，「働く世代や小児へのがん対策の充実」が盛り込まれた。

1．がん登録

1）がん登録の仕組み

がん対策を進めるには，がん統計指標によるモニタリングが欠かせない。がんの実態を表す主な統計指標としては，死亡率（数），罹患率（数），生存率，有病率（数），生涯リスク，受療率がある。死亡率，罹患率，有病率，受療率は，住民数を分母とするのに対し，生存率はがん患者数を分母とする。死亡は人口動態統計（政府統計），罹患は地域がん登録（県（市）と研究班推計値）が唯一の計測システムであるのに対し，生存率は，分母の定義により，地域がん登録（地域の全症例を分母とする生存率），院内がん登録（施設の全症例を分母とする生存率），臓器がん登録（病期・治療法などの詳細な臨床情報ごとに分母を分けた生存率）など，複数の計測システムがあり，それぞれで目的が異なる。有病率，生涯リスクは，通常他の指標からの計算値として求める。受療率は，調査日に医療施設で受療した患者数を患者調査（政府調査）から推計して計算される。死亡率，罹患率は「率（rate，時間の逆数を単位とする，通常1年あたり）」であるのに対し，生存率，有病率，生涯リスク，受療率は「割合（proportion，無次元を単位とする）」である。

我が国のがん死亡情報は，人口動態統計にて全数が実測されており，2011年死亡データの確定値が2012年9月に報告されて，即時性も良好

である。一方，がん罹患情報は，一部の府県市の地域がん登録に基づいて，厚労省研究班が全国値を推計している状態であり，全国値の実測はされていない。また，2007年罹患データの推計値が2012年3月に報告されているのが最新値であり，4〜5年遅れての報告となっている。がん死亡は，人生で1回のイベントであり法律による届出義務が課せられているため，全数把握が比較的容易である。それに対して，がん罹患は人生で複数回の可能性があり（多重がん），同一がんでも複数の医療機関から報告可能性あり（初発・再発），かつ，法律による届出義務がないため，把握が非常に複雑となる。加えて，把握漏れの補足情報としてがん死亡を利用（さかのぼり調査）するため，死亡情報が固定されてからさかのぼって罹患情報が固定される（例えば，2013年の死亡例について，さかのぼり調査を行うと，通常罹患年が2010年あたりとなり，2013年の死亡データが固定されない限り，2010年の罹患データは固定できなくなる）。このため，がん罹患情報は，がん死亡情報よりも遅れて固定される。

我が国では，地域がん登録はおおむね県を単位として行われている（図1）[2]。地域がん登録

中央登録室では，医療機関から報告される届出票と人口動態統計死亡情報を個人情報付きで利用することにより，同一人物・同一腫瘍の判断をしながら，1腫瘍1レコードとして登録する。各県がん登録は独自の集計に加えて，匿名化した個人単位のデータを厚労省研究班に提出し，「地域がん登録全国集計」としてがん罹患率全国値を推定している。一方，拠点病院の院内がん登録については，国立がん研究センターが直接収集することにより，「院内がん登録全国集計」を行っている。また，これらとは別に，学会・研究会が実施する臓器がん登録・小児がん登録があり，全国の専門病院を中心に詳細な臨床情報を収集している。地域がん登録は，一定地域（通常は県）の住民に生じたすべてのがんを把握して正確な罹患率を計測する必要がある。そのため，登録時には個人の同意を確認しない。一方，二重登録を防ぐ・予後確認を行うために個人情報を必要とする。この結果，個人の同意を確認せずに個人情報を医療機関から地域がん登録中央登録室に提供することになり，個人情報保護法の原則と対立する。これを現状では，利用目的による制限・第三者提供の制限に対する適用除外にあたるという健康局長通知
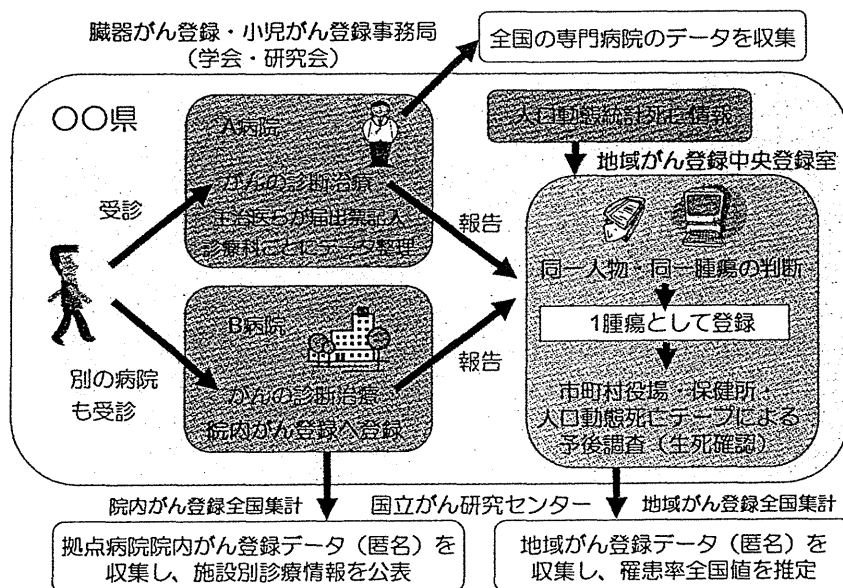

図1　がん登録のしくみ

をもって，違法性はないとの公的見解を得て実施されている。多くの先進国では，医療機関に対して届出義務を課す法律をつくることで，この問題を整理している。

2）がん登録の最近の進歩

第3次対がん戦略研究事業（2004年〜）やがん対策推進基本計画（2007年〜）などの取り組みの成果として，地域がん登録および院内がん登録については，近年かなりの進展がみられた。まず，基本計画（2007年）の中では，拠点病院における院内がん登録の整備が中心的に進められた。院内がん登録は，拠点病院の指定要件とされ，大規模な医療機関を中心に397拠点病院にて実施されている。さらに，国立がん研究センターが行う研修を受講した専任の実務担当者を雇用することが求められ，実務者初級者研修修了者も2993名に達した（2007-2011年7月現在）。2007年診断例より拠点病院院内がん登録全国集計（22または44項目）を開始し，2010診断例データでは，387施設より548,979例を収

集した[3]。これは，全罹患の66.9％と推定される。これらのデータをもとに，2008年診断例より施設別集計を公表している。また，標準ソフトHos-CanRを無償配布し，200施設以上で利用されている。

一方，地域がん登録においても，大きな進展が見られている。地域がん登録実施県は，2003年から15県増加し，本年ついに全47都道府県（＋広島市）で実施されるに至った（図1，図2）。全国集計は1975年より研究班活動として実施されているが，最新の2008年罹患例データ（14項目）では36府県より399,759件を収集した[4]。このうち，登録精度が基準以上（DCO[1]＜25％またはDCN[2]＜30％　かつ　I/M[3]≧1.5）であった25県（総人口の44.2％）のデータを用いて，全国罹患数推定値（749,767例）を求めた。推計に用いた県の数は，2007年推計時より4県増加している。また，標準データベースシステム（研究班で開発，国立がん研究センターに譲渡）を29県に導入することで，標準化を進めている。
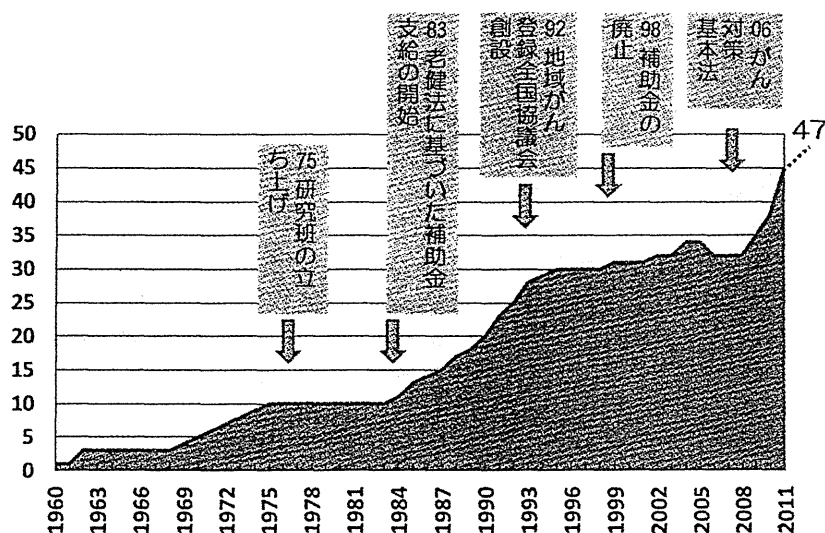

図2　地域がん登録実施地域数の変遷

[1]DCO: death certificate only
[2]DCN: death certificate notified
[3]I/M: incidence/mortality

3）現状におけるがん登録の課題

このような進展をみたものの，依然としていくつかの課題が存在する。地域がん登録については，やはり登録精度の向上（把握漏れをなくす）ことが第一の課題であり，実施県全体の数字で全国値を実測することが理想である。2007年罹患データにおいても，全国推計に使用できた県は，近年増加したとはいえ，データ提出33県中21県に留まっている。また，21県についても，DCOが10％未満（概ね国際的な登録精度基準）を満たしている県は数県に過ぎない。第二に，標準化・効率化の推進（比較できるデータを提供する，無駄をなくす）がある。標準化に関しては，研究班で標準登録項目を定義し，標準登録票を作成して，インプット部分での標準化を図り，また，標準モニタリング項目（研究班に提出するデータ），標準集計表を定義してアウトプット部分での標準化を進め，さらに，途中の作業プロセスについても，集約ルールなどを標準化し，それらをシステム化した標準データベースシステムを研究班で開発して，これを普及することで，中央登録室での作業の標準化を推進した。その結果，既に29県において標準データベースシステムが導入され，また現在独自システムを使用している県においても，システム更新の際に導入される傾向にあるので，将来的にはさらに標準化が進むものと期待される。一方，効率化については，未だに登録票，死亡転記票など紙媒体で作業をするところが多い点は改善の余地がある。第三に重要な点は，データ利用の促進（指標を計算して使う，外部ファイルと照合して使う）で，精度の高いデータが集まったからといって，必ずしも効果的に利用されるとは限らず，この点が将来的に向けて最も大きな課題となる。

院内がん登録においては，①登録項目の整理と地域がん登録との共通項目化（作業の効率化），②がん登録担当者の質の向上（地域がん登録への電子データ提供の前提），③診療の質評価指標の測定（均てん化達成度の確認）などの課題がある。一点目については，現在，地域がん登録の登録項目は，概ね院内がん登録に含まれそのまま提出が可能であるが，一部変換を要する。これを，無変換で提出可能なように（すなわち，地域がん登録の登録項目が院内がん登録の登録項目に完全に含まれるように），項目定義を改訂する作業が進んでいる。二点目の人材育成については，現在のがん登録担当者の要件は，初級者研修（主要5部位をカバー）を受けていること，であり，初期の普及段階としては適切なレベルかもしれないが，今後はこれを中級者研修に格上げして，量から質への転換が必要な時期に来ている。院内がん登録データを地域がん登録に磁気媒体で提出する前提として，院内がん登録のデータの質が高いことが前提条件としてクリアされなければ，地域がん登録でのデータチェックを簡素化することができない。三点目の診療の質評価については，院内がん登録のデータ項目だけでは十分な質評価は難しいが，DPCデータなど詳細な診療内容を含むデータと照合することにより，測定可能な範囲を拡大することができる。

また，臓器がん登録・小児がん登録については，他のがん登録との連携促進（無駄を省きつつ自由度を確保）が挙げられる。一方，各がん登録に共通の課題としては，予後調査の効率化・円滑化（電子化された個人情報付き既存情報の有効活用）と国際連携（諸外国の好事例に学ぶ，比較できるデータを提供する）がある。特に，予後調査については，生存率を指標として使用する以上，全がん登録に共通する課題であり，国としての体制整備が必要である。

地域がん登録と院内がん登録それぞれについて，全国集計機能を想定しているが，これは，測定する指標と想定される利用者が異なるためである。地域がん登録全国集計は，従来から研究班として行われてきた活動であるが，測定する指標は罹患数・率，生存率，有病者数・率であり，がん対策における施策立案・評価に主として用いられる。一方，院内がん登録全国集計は，拠点病院に限られるが，より詳細な診療情報を収集することにより，施設別診療実態集

計，部位・Stage・治療法別生存率を測定し，これらの情報を，主として患者・家族や医療従事者に提供する。ここで，ポイントとなるのは，データの即時性である。地域がん登録は，二重登録を防ぐ意味で厳密な名寄せを繰り返すため，集約作業に時間を要し，通常4～5年遅れで全国集計が公表される。一方，院内がん登録は，データ収集の周期を短くすれば，1ヶ月遅れでもデータを公表することが可能であり，二重登録のチェックはされないものの，むしろ施設別集計が容易であるという特徴をもつ。地域がん登録全国集計は，研究班の活動として1975年から継続されており，国レベルの罹患データの情報源として重要な役割を果たしてきたが，一般の人々に対して，地域がん登録データを役に立つものとして感じてもらうには，やや実感に乏しかった。院内がん登録全国登録は，開始してまだ数年だが，この点を補うものとして今後の展開を期待したい。

4）今後の体制の基本的考え方

　今後の体制整備を考える際の基本的考え方としては，①無駄を省く（既存データの活用，重複作業の回避，項目の共通化，電子データ化，IT化），②質を保つ仕組みを確立する（主に，データを集める段階，資源の乏しい県に対する支援，精度を保つための仕組み〈標準の決定，研修，データによる検証〉），③先進的な取り組みをサポートする（主に，データを使う段階，研究的活動の支援〈ミクロデータ[4]使用権限，研究費〉）がある。①については，既存資料を個人情報付きで使用する権限を確保することが必要となるが（後述），それらに加えて，重複入力作業を減らすために，院内がん登録，臓器がん登録，National Clinical Databaseなどの間での連携が重要な課題となるし，がん登録以外の疾病登録との調整が生じてくる可能性もある。②については，これまでのがん登録が一部の限られた地域・病院で実施されてきた状況に

おいては，関心のある専門家の篤志的な努力によってデータの質が保たれてきた側面が強い。これを広く一般の制度として普及した場合，質を保つためには別の仕組みが必要となる。すなわち，標準的な作業を決め，教育し，実施状況を確認するとともに，収集されたデータを用いて，恒常的に精度をモニタリングする仕組みを設置する必要がある。一方で，③として，これまで先進的に取り組んできた県のがん登録にとっては，標準化の作業は，時として先進的な取り組みに対して逆行を迫ることになりかねない。データを収集する段階では，この点はやむを得ない場合が多いかもしれないが，データを利用する段階については，先進的な取り組みを積極的にサポートする姿勢が必要となる。精度の高いデータが収集できるようになったからといって，きちんと利用されるかどうかは保証の限りではない。むしろ，利用する局面にこそ最大限の知恵を絞って取り組む必要がある。

　地域がん登録については，これまで研究班活動として行ってきた標準化の推進，全国集計などについて，適宜事業化していくことが考えられる。このためには，地域がん登録の法制化の議論が必須となるが，その際には，①国の事業として位置づけること，②届出を医療機関の義務とすること，③既存資料（特に電子化された）が個人情報付きで利用できる権限を，地域がん登録に与えること，が重要なポイントと考えられる。

　特に，③の既存資料の利用については，予後調査に関わるデータ利用と，罹患把握漏れの補足に関わるデータ利用の2つの場合がありうる。予後調査のデータソースとして，住民基本台帳住民票と人口動態統計死亡票の2つがあるが，現在両者を用いて予後調査を行っているのは，県単位の地域がん登録であり，これらのデータソースを全国単位で電子化された形での利用を可能とすることで，作業を効率化することができる。地域がん登録で整理をした予後情

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[4]ミクロデータ：個人を観察単位とするデータ

報を，届出票を提出した病院に還元し，各病院を通じて臓器がん登録やNational Clinical Database へ反映することが考えられる。また，地域がん登録の把握漏れを補足する情報として，現在は死亡票を利用しているが，罹患から死亡までの時差のために罹患情報の固定が遅れることになる。死亡データに代わって，レセプトデータや病理レポート等を利用して，登録候補症例について個々の患者を特定した形で，医療機関に問い合わせをすることで，より即時性の高い補足調査が可能となる。

2．がん検診

1）がん検診の基本的な考え方

がん検診は，がん対策においてがん死亡を減少させる重要な方法の1つである。対象とするがん死亡率を減少させるためには，「有効な検診を正しく行う」必要がある。「有効な検診」とは，「死亡率減少効果を示す科学的証拠がある検診」であり，「正しく行う」とは，「質の高い検診を多くの対象者に受診していただく」ことを意味する。死亡率減少効果を検証するための研究方法としては，個人単位のランダム割り付けによる比較試験（randomized controlled trial, RCT）が国際標準であり，これまで，便潜血検査（化学法）による大腸がん検診とマンモグラフィによる乳がん検診について，複数の比較試験により有効と判断されている。近年，PSAによる前立腺がん検診，低線量CTによる肺がん検診などついてもRCTによる研究成績が報告されているが，結果が不一致であったり，単独の結果であったりして，評価については未確定である。

検診を実施すると，死亡率減少をはじめとする利益がもたらされるが，同時に必ず不利益をもたらす。検診においては，がんがあるのに検査の結果が陰性（偽陰性）だったり，がんがないのに検査の結果が陽性（偽陽性）だったり，間違って判断される人がある一定の確率で発生する。これらの人に対しては，偽陰性者に対する治療遅延，偽陽性者に対する不必要な精密検

査といった問題が生じる。また，寿命に比べて臨床的に意味のないがんを診断・治療する（過剰診断）の問題がある。過剰診断については，前立腺がんに対するPSA検査（アメリカ），甲状腺がんに対する超音波検査（韓国）などで，国レベルの罹患率が増加する影響が生じている。

2）がん検診ガイドライン

がん検診の有効性評価研究や不利益に関するデータをまとめて，科学的根拠に基づいて，がん検診を対策として導入すべきかどうかを判断する必要がある。がん検診ガイドラインは，系統的レビューに基づいて，検診の利益・不利益に関する証拠をまとめ，利益・不利益のバランスを考慮して「推奨」を決定する文書である。厚労省研究班浜島／祖父江班では，アメリカ予防サービス特別委員会（US Preventive Services Task Force, USPSTF）の活動を参考にして，がん検診ガイドラインの作成手順を定式化し，大腸がん，胃がん，肺がん，前立腺がん，子宮頸がんについての検診ガイドラインを作成してきた[5]。その際に，検診の目的によって，対象集団全体の死亡率を減少させるために行う「対策型検診」と個人の死亡リスクを減少させるために行う「任意型検診」に分けて，推奨レベルの判断基準を取り決めてきた。

2012年5月にUSPSTFは，PSA検査による前立腺がん検診について，全年齢の男性に対して使用を控えるべきであるという推奨を公表した。すなわち，「前立腺がんは，数千人の男性とその家族を巻き込む重大な健康問題である。しかし，PSA検査を受ける前に，全ての男性は，現在の科学がPSAについて語っていることを知るべきである。それは，非常に小さな利益をもたらすかもしれないが，大きな不利益をもたらすかもしれない，という点である。我々は臨床家がこの証拠を考慮して，個々の受診者がPSA検査について理解し，小さな利益の可能性でも不利益を上回る価値があると個々に判断しない限り，PSA検査を行わないことを勧

める。」という内容である。これ以外にも，65歳以上の子宮頸がん検診，85歳以上の大腸がん検診について同様の推奨がなされており，高齢者については，不利益が利益を上回るとの判断がされる傾向にある。高齢者に対するがん検診について，我が国においても適切なガイドラインを早急に設定する必要がある。

3）対策としてのがん検診

　我が国のがん検診は，1960年代から胃がん，子宮頸がんに対して，臨床家の篤志的努力によって行われていた活動を，国が支援する形で始まった（表1）。1982年に老人保健法が施行され，1983年より老人保健事業が開始されて，胃がん（X線），子宮頸がん（細胞診）が，国の施策として導入された。これに続き，1987年には肺がん（X線と喀痰細胞診）・乳がん（視触診）・子宮体がん（細胞診）が，1992年には，大腸がん（便潜血）が導入された。これらは，国の施策として行われたがん検診としては世界に先駆けて行われた取り組みである。しかし，1998年にがん検診が老健法保健事業から外され，補助金が一般財源化（地方交付税に積み上げ）された。これは，中央から地方への分権化の名のもとに実施されたが，結果的には，がん

検診を管理する中央組織と地方組織が分断化され，その後のがん検診に関わる施策の混乱の根源となる大きな失策であった。その後も，厚労省からは「がん予防重点健康教育及びがん検診実施のための指針」（平成10年3月31日老健64号）としてがん検診の実施方法について定めた文書が発出されているが，予算的な縛りを持たないため，ほとんど拘束力を持たないものとなってしまった。また，各市町村のがん検診実施状況を報告する「老人保健事業報告」は，一般財源化後も「地域保健・老人保健事業報告」として継続されているが，厚労省統計情報部が集計をするのみであり，国レベル，県レベル，市町村レベルの精度管理等に有効に使用されている状況とは言いがたい。2006年のがん対策基本法成立に引き続き，2007年にがん対策推進基本計画が策定され，我が国においても，がん対策を総合的かつ計画的に実施する方向性が示された。がん検診は，がん対策の全体目標の1つであるがん死亡減少のための，重要な施策の1つと位置づけられた。がん検診については，5年以内に受診率を50％に引き上げることが個別目標として掲げられた。これに対応して，2009年に「がん検診50％推進本部」が設置され，乳がん検診，子宮頸がん検診に対して無料クーポ

表1　わが国におけるがん検診の主な経緯

年	内容
1966（S41）:	胃がん検診への国庫補助開始
1967（S42）:	子宮頸がん検診への国庫補助開始
1982（S57）:	老人保健法施行
1983（S58）:	老健法第1次5ヵ年計画　胃・子宮頸がん検診導入
1987（S62）:	老健法第2次5ヵ年計画　肺・乳・子宮体がん検診導入
1992（H4）:	老健法第3次計画　大腸がん検診導入
1998（H10）:	がん検診が老健法保健事業から一般財源化
1998（H10）:	厚生省研究班がん検診の有効性に関する報告書（久道班①）
2000（H12）:	マンモグラフィーによる乳がん検診導入（第4次計画）
2001（H13）:	厚生省研究班がん検診の有効性に関する報告書（久道班③）
2002（H14）:	肝炎ウイルスキャリア検査導入
2003（H15）:	がん検診に関する検討会（1～18回，～2007）
2004（H16）:	乳がん・子宮がん検診の指針改正
2009（H21）:	がん検診50％推進本部設置・女性特有のがん検診推進事業
2011（H23）:	働く世代への大腸がん検診推進事業

ン券及び検診手帳を配布する「女性特有のがん
検診推進事業」が実施されたりした。一方で，
2008年より始まった特定健診（いわゆるメタボ
健診）では，保険者が実施主体となったため，
がん検診の実施主体（市町村）とのずれ（特に，
被用者保険の家族の扱い）のために，大腸がん，
胃がん，肺がんなどのがん検診では，受診率が
低下する事態を招いた。がん対策推進基本計画
に基づいてがん対策を展開することはよいが，
中央と地方の仕組みが全く乖離している状況
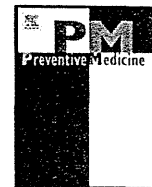で，中央が施策を打ち出すたびに地方が混乱す
る事態に陥っている。

おわりに　—今後の課題—

　わが国のがん検診は，1983年老人保健事業と
して開始された時点では，世界のトップを行く
仕組みであったが，1998年の一般財源化を境
に，仕組みとしての機能不全に陥っている。有
効性評価研究においても，2000年に低線量CT
の評価研究を開始するチャンスがあったにもか
かわらず，研究費がつかないために実施され
ず，2002年に開始されたアメリカのRCTに先
を越されてしまった。幸い，わが国において
も，乳がん検診における超音波検査の有効性を
検証するための比較試験（J-Start）が，わが国
初の大規模RCTとして実施されつつあるが，
これをきちんと完遂することが重要である。ま
た，こうした大規模な介入研究を長期間サポー
トする研究費の枠組みが今後は必須である（大
規模介入研究は，対象者の生体試料をバンク化
する仕組みとしても重要である）。がん検診の

実施体制については，まず中央機能を整理し
て，司令塔的な役割をいくつかの専門機関に集
約する必要がある。そこには，有効性評価ガイ
ドラインに基づいて，がん検診指針を策定する
機能と，実施主体から報告されてくる検診デー
タに基づいてがん検診データを集計する機能が
必須となる。今後，高齢者人口の増加に伴い，
高齢者にとってがん検診は利益よりも不利益が
上回ることが多いことを，きちんとしたメッ
セージとして対象者に伝える必要がある。一
方，働き盛りのがん死亡を減らすための有効な
手段として，職域におけるがん検診を組織化す
る必要がある。

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Contents lists available at SciVerse ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Association between cancer screening behavior and family history among Japanese women

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ARTICLE INFO

Keywords:
Family history of cancer
Cervical cancer screening
Breast cancer screening
Health promotive lifestyle
Japanese women

ABSTRACT

Objective. To examine lifestyle habits and cancer screening behavior in relation to a family history of cancer among Japanese women.

Methods. A cross-sectional study was conducted based on baseline data from the Japan Nurses' Health Study collected from June 2001 to March 2007. Participants were 47,347 female nurses aged 30–59 years residing in 47 prefectures in Japan. We compared lifestyle habits and the utilization of cancer screenings (cervical and breast) between women with and without a family history of the relevant cancer.

Results. Although there were no differences in lifestyle habits with the exception of smoking status, women with a family history of uterine cancer were more likely to have undergone cervical cancer screenings (p<0.01). Women with a family history of breast cancer were also more likely to have undergone breast cancer screenings regardless of their age (p<0.01), but lifestyle behaviors did not differ. Among women with a family history of uterine cancer, those with a sister history were more likely to have undergone not only cervical (OR, 1.89; 95% CIs, 1.39–2.58), but also breast cancer screenings (OR, 1.54; 95% CIs 1.13–2.09).

Conclusion. Having a family history of cancer was associated with cancer screening behavior, but not health promotive behaviors.

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Introduction

Many studies have reported that having a family history of breast or endometrial cancer particularly among first-degree relatives was associated with an increased risk of developing those cancers (Beral et al., 2001; Colditz et al., 1993; Lucenteforte et al., 2009; Poole et al., 1998). In addition, public health and preventive medicine have become focused on the use of family history for breast cancer prevention (Audrain-McGovern et al., 2003; Yoon et al., 2002, 2003). Because a family history of breast cancer is among the known risk factors of the disease, women at risk due to their family history should be more motivated to participate in cancer screenings and encouraged to make changes in lifestyle habits to promote health than those without such a family history. However, little is known about whether Japanese women with a family history of cancer utilize cancer screening opportunities, and to what extent having a family history of cancer may influence a woman's health behaviors. The purpose of the present study was to examine lifestyle habits and cancer screening behavior in relation to their family history of cancer among Japanese women.

Methods

Study population

We conducted a cross-sectional study based on baseline data from the Japan Nurses' Health Study (JNHS). While public awareness of women's health has increased, there has been little research documenting the health status and behaviors of Japanese women. The JNHS is the first large-scale cohort study aiming to acquire epidemiological data which may shed light on the lifestyle habits, health practices, and health status of Japanese female nurses and to examine the extent to which these health behaviors differ from those found in other countries (Fujita et al., 2007; Hayashi et al., 2007). The study protocol was approved by the institutional review board at Gunma University and the ethics review board at the National Institute of Public Health.

During a 6-year entry period after the inception of the study in 2001, a total of 49,927 female nurses from all 47 prefectures in Japan completed the baseline questionnaire. We limited the current analytic data set to women 30 to 59 years of age because at that time, cervical and breast cancer screenings in population-based programs targeted women at least aged 30 years for initial screenings (Hamashima et al., 2010; Hisamichi, 2001; MHLW, 2004; Morimoto, 2009). The total of 47,347 female nurses

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0091-7435/$ – see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.ypmed.2013.01.017

included in the primary analyses comprised 21,350 (45.1%) of the women aged 30–39 years, 17,832 (37.7%) of those aged 40–49 years, and 8165 (17.2%) of those aged 50–59 years. The mean age was 41.3 ± 7.54 (SD) years, 82.0% were registered nurses, and 68.6% were married.

To note, when examining the association of uterine cancer family history with lifestyle habits and cervical cancer screening practice, we excluded 2008 women who had reported a previous diagnosis of uterine (endometrial or cervical) cancer and/or a hysterectomy, leaving a total of 45,339 women eligible for the analyses. Similarly, after excluding 362 women who had developed breast cancer, we analyzed 46,985 women to estimate the association of breast cancer family history with lifestyle habits and breast cancer screening practice.

Measures and assessments

We obtained information on family histories of cancers, selected lifestyle habits, and the utilization of cancer screenings from the self-administered questionnaires. The family cancer histories examined in the present study included breast and uterine cancers (endometrial or cervical cancer was not specified), and the family members we inquired about included the participants' mothers, sisters, and their maternal and paternal grandmothers. We defined women with a family history of uterine or breast cancer as those who had any female family members with a previous diagnosis of each cancer, regardless of the age at which female relatives were diagnosed.

Participants were asked to provide the total time spent engaging in three levels of physical activity outside of work. Those who engaged in light or moderate activity for 150 min or more per week, or vigorous activity for 60 min or more per week were considered to be physically active individuals. These recommended time estimates were used based on the criteria for reducing the risk of cancers established by the National Cancer Institute in the United States (NCI, 2009). Breakfast consumption habits were derived from the following response options: "Never," "Once a week," "2–3 days per week," "4–5 days per week," and "Daily." The responses were categorized into three groups: "Never," "Sometimes," and "Every day." Smoking history was ascertained through the question: "Have you ever smoked more than 20 packs of cigarettes?" with the following response options: "No," "Yes: smoked in the past, but quit," and "Yes: currently smoke." Responses were coded as: "Never," "Former," and "Current" smokers. Additionally, the frequency of alcohol consumption was categorized into three groups: "Non-drinker," "Drinker (<3 days per week)," and "Drinker (≥3 days per week)."

Participants were asked to report on the utilization of cervical cancer screening (Pap smear) and breast cancer screening (mammography or ultrasound examination), regardless of the screening programs they had attended, along with a summary question: "During the past 5 years, did you undergo each cancer screening?" The responses were coded as binary (yes, no) variables.

Statistical analysis

All analyses were conducted without substituting missing values. First, health behavioral characteristics of participants in relation to a family history of cancer were descriptively summarized using frequencies. The differences in lifestyle habits and cancer screening behavior between family history groups–1) women with and without a family history of cancer among female relatives and 2) women with and without a family history of cancer among first-degree relatives–were determined by chi-square tests for variables with two categories and by two-sided Wilcoxon's rank sum tests for variables with more than two levels. Next, odds ratios (OR) and 95% confidence intervals (CIs) were calculated to estimate the magnitude of the association between cancer screening practice and a family history of cancer for each female relative. In multivariate logistic regression analyses, covariates simultaneously adjusted for in the model included body mass index (BMI; <18.5, 18.5–<25, 25–<30, or ≥30 kg/m^2), physical activity (active or inactive), breakfast intake (every day, sometimes, or never), smoking status (never, former, or current), alcohol consumption (never, <3 days/week, or ≥3 days/week), family history of cancer in interest among other family members (yes or no), and age at taking the questionnaire (years). The level of significance was set at $p=0.05$. All analyses were performed using the SAS 9.2 statistical software.

Results

Table 1 presents the comparisons of lifestyle habits and cervical cancer screening behavior between women with and without a family history of uterine cancer. Among 45,339 women who did not have a diagnosis of uterine (endometrial or cervical) cancer and/or a hysterectomy, 2681 women had reported having a family history of uterine cancer. Although there were no differences between the groups with regard to physical activity, breakfast intake, and alcohol consumption, women without a family history of uterine cancer were less likely to be current smokers than those with such a family history (17.2% versus 19.0%, p<0.01). Also, women with a family history of uterine cancer were more likely to have undergone cervical cancer screenings than those without such a family history (60.6% versus 53.6%, p<0.01). In analyses stratified by age group, women in all age groups with a family history of uterine cancer were more likely to have undergone cervical cancer screenings (52.0% versus 45.3% of the women aged 30–39 years, p<0.01, 67.0% versus 60.0% of those aged 40–49 years, p<0.01, and 68.3% versus 63.3% of those aged 50–59 years, p=0.03). These associations did not differ appreciably when we compared women with and without a family history of uterine cancer among their first-degree relatives.

The comparisons of lifestyle habits and breast cancer screening behavior between women with and without a family history of breast cancer are presented in Table 2. Among 46,985 women who did not have a diagnosis of breast cancer, 2217 women had reported having a family history of breast cancer. Lifestyle behaviors including smoking status did not differ between the groups. However, women were more likely to have undergone breast cancer screenings if they had a family history of the disease (23.0% versus 16.6%, p<0.01). When the data were analyzed using age-stratification, women with a family history of breast cancer were more likely to have undergone breast cancer screenings regardless of their age (13.8% versus 8.4% of the women aged 30–39 years, p<0.01, 27.6% versus 21.9% of those aged 40–49 years, p<0.01, and 35.6% versus 26.9% of those aged 50–59 years, p<0.01). The results remained unchanged when we compared women with and without a family history of breast cancer among their first-degree relatives.

Table 3 presents the association of cancer screening practice with a family history of uterine cancer for each female relative. Women with a family history of uterine cancer were more likely to have undergone cervical cancer screenings than those without a family history of the disease, regardless of a degree of relationship. Of those, women who had sisters with a diagnosis of uterine cancer had the highest odds of having undergone cervical cancer screenings (OR, 1.89; 95% CIs, 1.39 to 2.58). They were also found to have undergone breast cancer screenings (OR, 1.54; 95% CIs, 1.13 to 2.09).

Table 4 presents the association of cancer screening practice with a family history of breast cancer. For each family member, women with a family history of breast cancer were more likely to have undergone breast cancer screenings than those without such a family history. Of those, women with a maternal history had as high odds of having undergone breast cancer screenings as those with a sister history (OR, 1.47; 95% CIs, 1.23 to 1.78, OR, 1.43; 95% CIs, 1.13 to 1.80, respectively). When stratified by age group, women both aged 30–39 years and 40–49 years with a sister history were more likely to have undergone breast cancer screenings than those with a maternal history (Table 5). Having a family history of breast cancer was not associated with cervical cancer screening practice.

Discussion

Overall, 54.0% (45.7% of the women aged 30–39 years, 60.4% of those aged 40–49 years, and 63.6% of those aged 50–59 years) of Japanese women who participated in the present study had undergone cervical cancer screenings and 16.9% (8.7%, 22.1%, and 27.3%,

Table 1

Association of uterine cancer family history with lifestyle habits and cervical cancer screening among 45,339 Japanese females, 2001–2007.

	Family history of uterine cancer among female relatives			Family history of uterine cancer among first-degree female relatives		
	Yes (n=2,681)	No (n=42,658)	p	Yes (n=1,184)	No (n=44,155)	p
	n (%)	n (%)		n (%)	n (%)	
Physical activity			0.56			0.59
Active	728 (27.2)	11,802 (27.7)		319 (26.9)	12,211 (27.7)	
Inactive	1953 (72.8)	30,856 (72.3)		865 (73.1)	31,944 (72.3)	
Breakfast intake			0.46			0.41
Every day	1684 (62.8)	26,522 (62.2)		733 (61.9)	27,473 (62.2)	
Sometimes	426 (15.9)	7058 (16.5)		185 (15.6)	7299 (16.5)	
Never	223 (8.3)	3570 (8.4)		92 (7.8)	3701 (8.4)	
Smoking status			<0.01			0.01
Never	1806 (67.4)	29,799 (69.9)		787 (66.5)	30,818 (69.8)	
Former	333 (12.4)	4913 (11.5)		145 (12.2)	5101 (11.6)	
Current	509 (19.0)	7349 (17.2)		235 (19.8)	7623 (17.3)	
Alcohol consumption			0.51			0.16
Non-drinker	789 (29.4)	12,480 (29.3)		334 (28.2)	12,935 (29.3)	
Drinker (<3 days/week)	1111 (41.4)	17,837 (41.8)		499 (42.1)	18,449 (41.8)	
Drinker (≥3 days/week)	638 (23.8)	9686 (22.7)		291 (24.6)	10,033 (22.7)	
Cervical cancer screening			<0.01			<0.01
Yes	1625 (60.6)	22,870 (53.6)		743 (62.8)	23,752 (53.8)	
No	1056 (39.4)	19,788 (46.4)		441 (37.2)	20,403 (46.2)	
Cervical cancer screening by age group						
30–39 years			<0.01			<0.01
Yes	613 (52.0)	9046 (45.3)		225 (52.7)	9434 (45.5)	
No	566 (48.0)	10,933 (54.7)		202 (47.3)	11,297 (54.5)	
40–49 years			<0.01			<0.01
Yes	699 (67.0)	9531 (60.0)		325 (68.1)	9905 (60.2)	
No	345 (33.0)	6364 (40.0)		152 (31.9)	6557 (39.8)	
50–59 years			0.03			0.06
Yes	313 (68.3)	4293 (63.3)		193 (68.9)	4413 (63.4)	
No	145 (31.7)	2491 (34.4)		87 (31.1)	2549 (36.6)	

The total of n may not be 45,339 because of the missing.
P values calculated by Wilcoxon's rank sum test for breakfast intake, smoking status, and alcohol consumption.
P values calculated by chi-square test for physical activity and cervical cancer screening.

respectively) of those had undergone breast cancer screenings. Data from a national survey collected in 2004 showed that the rate of cancer screening, both cervical cancer screening among women aged 20 years or older and breast cancer screening among women aged 40 years or older was about 20% (NCC, 2012). Thus the rate of breast cancer screening among our participants was at about the same level as the general population.

Consistent with the previous studies, Japanese women were more likely to have undergone cancer screenings if they had a family history of the disease (Antill et al., 2006; Cook et al., 2009; Gierisch et al., 2009; Madlensky et al., 2005; Oran et al., 2008). The likelihood of having undergone a cancer screening was consistent regardless of a family history of diagnosis for uterine or breast cancer. Because the majority of our participants were registered nurses, they were similar in terms of having healthcare knowledge and access to medical services. Our results demonstrated that having a family history of cancer, particularly having a sister history, was strongly associated with cancer screening behavior. We found that having a sister history of breast cancer was associated with undergoing breast cancer screening among not only women aged 30–39 years, but also women aged 40–49 years, the age group for which breast cancer screening is encouraged. A diagnosis of cancer among female relatives who were closer in age prompted individuals to undergo cancer screenings, suggesting that it served as a "cue to action" as described by the Health Belief Model (Glanz and Rimer, 2005). Thus, having a

family history might have become a more important factor in making the decision to undergo cancer screening.

Interestingly, our results revealed that women with a sister history of uterine cancer had also undergone breast cancer screenings. Having a family history of one type of female-specific cancer might raise women's perceptions of developing a different type of female-specific cancer (Rubinstein et al., 2011). On the other hand, having a family history of breast cancer was not associated with cervical cancer screening practice. The inconsistent findings may be explained by the heightened risk perception and worry about breast cancer specifically among women with a family history of cancer (Acheson et al., 2010; Kim et al., 2008; Wang et al., 2009).

One study in particular found that women changed their lifestyle habits in some way after learning of a diagnosis of breast cancer among their first-degree relatives (Lemon et al., 2004). It was possible that a family history of cancer and lifestyle habits were correlated; that is, women with a family history of cancer might adopt health-oriented lifestyle behaviors. In our study, however, there were no differences in lifestyle habits between women with and without a family history of cancer. Although smoking habits differed between women with and without a family history of uterine cancer, the difference was not observed between women with and without a family history of breast cancer. Rather, we found a higher prevalence of physical inactivity and smoking among women with a family history of cancer. Thus, Japanese women may also be more likely to receive medical services

Table 2

Association of breast cancer family history with lifestyle habits and breast cancer screening among 46,985 Japanese females, 2001-2007.

	Family history of breast cancer among female relatives			Family history of breast cancer among first-degree female relatives		
	Yes (n = 2,217)	No (n = 44,768)	p	Yes (n = 1,389)	No (n = 45,596)	p
	n (%)	n (%)		n (%)	n (%)	
Physical activity			0.07			0.09
Active	652 (29.4)	12,385 (27.7)		413 (29.7)	12,624 (27.7)	
Inactive	1565 (70.6)	32,383 (72.3)		976 (70.3)	32,972 (72.3)	
Breakfast intake			0.84			0.11
Every day	1381 (62.3)	27,911 (62.3)		884 (63.6)	28,408 (62.3)	
Sometimes	396 (17.9)	7311 (16.3)		235 (16.9)	7472 (16.4)	
Never	165 (7.4)	3719 (8.3)		88 (6.3)	3796 (8.3)	
Smoking status			0.78			0.96
Never	1547 (69.8)	31,220 (69.7)		964 (69.4)	31,803 (69.7)	
Former	268 (12.1)	5172 (11.6)		174 (12.5)	5266 (11.5)	
Current	369 (16.6)	7753 (17.3)		229 (16.5)	7893 (17.3)	
Alcohol consumption			0.07			0.15
Non-drinker	612 (27.6)	13,141 (29.4)		388 (27.9)	13,365 (29.3)	
Drinker (<3 days/week)	935 (42.2)	18,640 (41.6)		568 (40.9)	19,007 (41.7)	
Drinker (≥3 days/week)	530 (23.9)	10,222 (22.8)		338 (24.3)	10,414 (22.8)	
Breast cancer screening						
Yes	509 (23.0)	7439 (16.6)	<0.01	358 (25.8)	7590 (16.6)	<0.01
No	1708 (77.0)	37,329 (83.4)		1031 (74.2)	38,006 (83.4)	
Breast cancer screening by age group						
30–39 years			<0.01			<0.01
Yes	136 (13.8)	1710 (8.4)		90 (17.4)	1756 (8.4)	
No	849 (86.2)	18,604 (91.6)		427 (82.6)	19,026 (91.6)	
40–49 years			<0.01			<0.01
Yes	222 (27.6)	3691 (21.9)		150 (28.0)	3763 (22.0)	
No	583 (72.4)	13,181 (78.1)		386 (72.0)	13,378 (78.0)	
50–59 years			<0.01			<0.01
Yes	151 (35.6)	2038 (26.9)		118 (35.1)	2071 (27.0)	
No	276 (64.4)	5544 (73.1)		218 (64.9)	5602 (73.0)	

The total of n may not be 46,985 because of the missing.
P values calculated by Wilcoxon's rank sum test for breakfast intake, smoking status, and alcohol consumption.
P values calculated by chi-square test for physical activity and breast cancer screening.

for early detection, but not be amenable to lifestyle changes for disease prevention even if they had a family history of cancer.

The results from the present study should be taken with several limitations in mind. First, although the JNHS comprised the largest cohort of Japanese women to date, the sample was limited only to nurses; therefore, our findings may not be generalizable to the entire Japanese female population. However, the effects of potential confounding variables of socioeconomic status, including education and occupation, were minimized by using a homogenous population. Moreover, we have no reason to suspect that the general population of women would differ in terms of having a family history of cancer.

Table 3

Association of cancer screening practice with family history of uterine cancer among Japanese females, 2001-2007.

		Cervical cancer screening[a] (n = 45,339)			Breast cancer screening[b] (n = 45,011)		
		Total	Yes (%)	OR (95% Cis)	Total	Yes (%)	OR (95% Cis)
History of uterine cancer							
Mother	Yes	927	555 (59.9)	1.19 (1.02–1.39)	921	147 (16.0)	0.90 (0.73–1.10)
	No	44,412	23,940 (53.9)	1.00	44,090	7282 (16.5)	1.00
Sisters	Yes	282	201 (71.3)	1.89 (1.39–2.58)	278	75 (27.0)	1.54 (1.13–2.09)
	No	45,057	24,294 (53.9)	1.00	44,733	7354 (16.4)	1.00
Maternal grandmother	Yes	932	546 (58.6)	1.18 (1.02–1.37)	926	178 (19.2)	1.30 (1.08–1.56)
	No	44,407	23,949 (53.9)	1.00	44,085	7251 (16.4)	1.00
Paternal grandmother	Yes	666	402 (60.4)	1.38 (1.15–1.65)	662	127 (19.2)	1.22 (0.98–1.53)
	No	44,673	24,093 (53.9)	1.00	44,349	7302 (16.5)	1.00

Abbreviations: OR, odds ratios, CI, confidence interval.
OR and 95% CIs, adjusted for BMI (<18.5, 18.5–<25, 25–<30, or ≥30 kg/m2), physical activity (active or inactive), breakfast intake (every day, sometimes, or never), smoking status (never, former, or current), alcohol consumption (non, <3 days/week, or 3 days/week+), family history of uterine cancer in other family members (yes or no), and age (years).
[a] Those who had a previous diagnosis of endometrial/cervical cancer and/or a hysterectomy were excluded.
[b] Those who had a previous diagnosis of endometrial/cervical/breast cancer and/or a hysterectomy were excluded.

Table 4
Association of cancer screening practice with family history of breast cancer among Japanese females, 2001–2007.

		Breast cancer screening[a] (n = 46,985)			Cervical cancer screening[b] (n = 45,011)		
		Total	Yes (%)	OR (95% CIs)	Total	Yes (%)	OR (95% CIs)
History of breast cancer							
Mother	Yes	950	217 (22.8)	1.47 (1.23–1.76)	910	496 (54.5)	1.04 (0.89–1.21)
	No	46,035	7731 (16.8)	1.00	44,101	23,783 (53.9)	1.00
Sisters	Yes	471	152 (32.3)	1.43 (1.13–1.80)	427	279 (65.3)	1.11 (0.88–1.40)
	No	46,514	7796 (16.8)	1.00	44,584	24,000 (53.8)	1.00
Maternal grandmother	Yes	503	89 (17.7)	1.29 (1.00–1.66)	481	252 (52.4)	1.03 (0.84–1.26)
	No	46,482	7859 (16.9)	1.00	44,530	24,027 (54.0)	1.00
Paternal grandmother	Yes	400	80 (20.0)	1.41 (1.06–1.87)	382	205 (53.7)	1.04 (0.83–1.31)
	No	46,585	7868 (16.9)	1.00	44,629	24,074 (53.9)	1.00

Abbreviations: OR, odds ratios, CI, confidence interval.
OR and 95% CIs, adjusted for BMI (<18.5, 18.5–<25, 25–<30, or ≥30 kg/m2), physical activity (active or inactive), breakfast intake (every day, sometimes, or never), smoking status (never, former, or current), alcohol consumption (non, <3 days/week, or 3 days/week+), family history of breast cancer in other family members (yes or no), and age (years).
[a] Those who had a previous diagnosis of breast cancer were excluded.
[b] Those who had a previous diagnosis of breast/endometrial/cervical cancer and/or a hysterectomy were excluded.

Table 5
Association of cancer screening practice with family history of breast cancer in first-degree relatives among Japanese females by age group, 2001–2007.

Age 30–39 years

History of breast cancer		Breast cancer screening[a] (n = 21,299)			Cervical cancer screening[b] (n = 21,108)		
		Total	Yes (%)	OR (95% CIs)	Total	Yes (%)	OR (95% CIs)
Mother	Yes	467	75 (16.1)	1.93 (1.46–2.56)	463	217 (46.9)	1.04 (0.85–1.27)
	No	20,832	1771 (8.5)	1.00	20,645	9413 (45.6)	1.00
Sisters	Yes	63	16 (25.4)	3.77 (1.99–7.14)	62	32 (51.6)	1.60 (0.90–2.86)
	No	21,236	1830 (8.6)	1.00	21,046	9598 (45.6)	1.00

Age 40–49 years

History of breast cancer		Breast cancer screening[a] (n = 17,877)			Cervical cancer screening[b] (n = 16,797)		
		Total	Yes (%)	OR (95% CIs)	Total	Yes (%)	OR (95% CIs)
Mother	Yes	357	94 (26.3)	1.15 (0.87–1.51)	334	198 (59.3)	0.92 (0.71–1.18)
	No	17,320	3819 (22.0)	1.00	16,463	9943 (60.4)	1.00
Sisters	Yes	186	59 (31.7)	1.54 (1.08–2.19)	177	117 (66.1)	1.08 (0.78–1.52)
	No	17,491	3854 (22.0)	1.00	16,620	10,024 (60.3)	1.00

Age 50–59 years

History of breast cancer		Breast cancer screening[a] (n = 8009)			Cervical cancer screening[b] (n = 7106)		
		Total	Yes (%)	OR (95% CIs)	Total	Yes (%)	OR (95% CIs)
Mother	Yes	126	48 (38.1)	1.28 (0.83–1.97)	113	81 (71.7)	1.39 (0.86–2.24)
	No	7883	2141 (27.2)	1.00	6993	4427 (63.3)	1.00
Sisters	Yes	222	77 (34.7)	1.23 (0.88–1.73)	188	130 (69.1)	1.14 (0.79–1.65)
	No	7787	2112 (27.1)	1.00	6918	4378 (63.3)	1.00

Abbreviations: OR, odds ratios, CI, confidence interval.
OR and 95% CIs, adjusted for BMI (<18.5, 18.5–<25, 25–<30, or ≥30 kg/m2), physical activity (active or inactive), breakfast intake (every day, sometimes, or never), smoking status (never, former, or current), alcohol consumption (non, <3 days/week, or 3 days/week+), family history of breast cancer in other family members (yes or no), and age (years).
[a] Those who had a previous diagnosis of breast cancer were excluded.
[b] Those who had a previous diagnosis of breast/endometrial/cervical cancer and/or a hysterectomy were excluded.

Second, some responses were collapsed into binary variables, which may have resulted in a non-differential misclassification bias (Ziogas and Anton-Culver, 2003). For example, among women without a sister history of cancer, some may not have had any sisters. Alternatively, among women with a family history of cancer, some may have had multiple relatives with a diagnosis of cancer. Therefore, women with varying levels of cancer risk due to the number of affected family members may have been erroneously categorized into the same features. This misclassification of family history of cancer may have underestimated, rather than overestimated, the effects on health behaviors. Nevertheless, having a family history of cancer was strongly associated with cancer screening behavior.

Finally, due to the cross-sectional nature of the present study, we could not establish temporal sequences of events or make any causal inferences from the results. Although we observed a high likelihood of having undergone cancer screening among women with a family history of cancer, it was uncertain whether the women had undergone the screenings after learning a diagnosis of cancer among their female relatives or some other opportunities.

Conclusion

Our results indicated that Japanese women were more likely to have undergone cancer screenings if they had a family history of cancer. However, lifestyle habits did not differ between women with and without a family history of cancer. Women with a family history of cancer should be more motivated to participate in cancer screenings and to follow evidence-based recommendations for cancer prevention.

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IX 肺癌の検査・診断

検　診

肺がん検診の現状と成績

The present situation and the results of lung cancer screening in Japan

中 山 富 雄

Key words ：肺がん検診, screening

1　国内での肺がん検診の歴史

胸部単純X線写真を用いた検診として，かつては結核予防法に基づく結核検診が広く行われてきた．結核検診の大規模な施行は昭和26年の結核予防法改定に基づくものであり，撮影や読影などの技術的なことに関しては何も縛りのないものであった．しかし結核の死亡率の減少と相反して肺がんが増加するにつれ，昭和62年に老人保健法第2期計画として肺がん検診が開始されるに至った．肺がん検診として開始される前年度の秋に，肺がんの初期像を検出しうる撮影や読影の方法をとりまとめた‘肺がん検診の手引き’が日本肺癌学会の集団検診委員会により作成され，それを運用上の指針という形で開始されるようになった[1]．しかし，結核予防法が18歳以上の全国民を対象とした幅広いものであり，検診の提供元が自治体に加えて勤め先も含まれるのに比べて，肺がん検診が自治体のみであったことから，国内では撮影・読影方法の縛りのない結核検診と，縛りのある肺がん検診が混在するという状況がみられている．雇用者を対象に行われている胸部X線検診は現在では労働安全衛生法に基づくものであり，その撮影方法や読影方法の縛りはなく結核検診に該当するため，どの程度肺がんが発見されてい

るのか，といった統計は収集されていない．一方，市町村を実施主体とし40歳以上の住民を対象とした肺がん検診は毎年の受診者数，発見肺がん数などの詳細な統計が公開されている．その成績について概説する．

2　肺がん検診の現状

肺がん検診として市町村で行われている検診は，現在は健康増進法をその根拠とし，健康増進事業報告として毎年都道府県を通じて集計され，政府統計の総合窓口 e-Stat に公開されている．

検診の対象者数・受診者数・要精検者数までは1年遅れで掲載されており，例えば平成23年度成績は25年度の5月頃に掲載されている．一方精密検査以降の成績は，年度末の受診者の診断および治療内容の把握に時間がかかることから，更に1年後(平成23年度では26年度初め)に掲載されている．

対象者は‘住民から職場で健康診断を受診する機会のないもの’として定義されているが，これを自治体が正確に把握することは困難であり，市町村によって定義や計算方法がまちまちである．現在国立がん研究センターのがん情報サービスにおいて，全市町村を同じ定義で計算

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