

Mortality for laryngeal cancer by age group, year of death

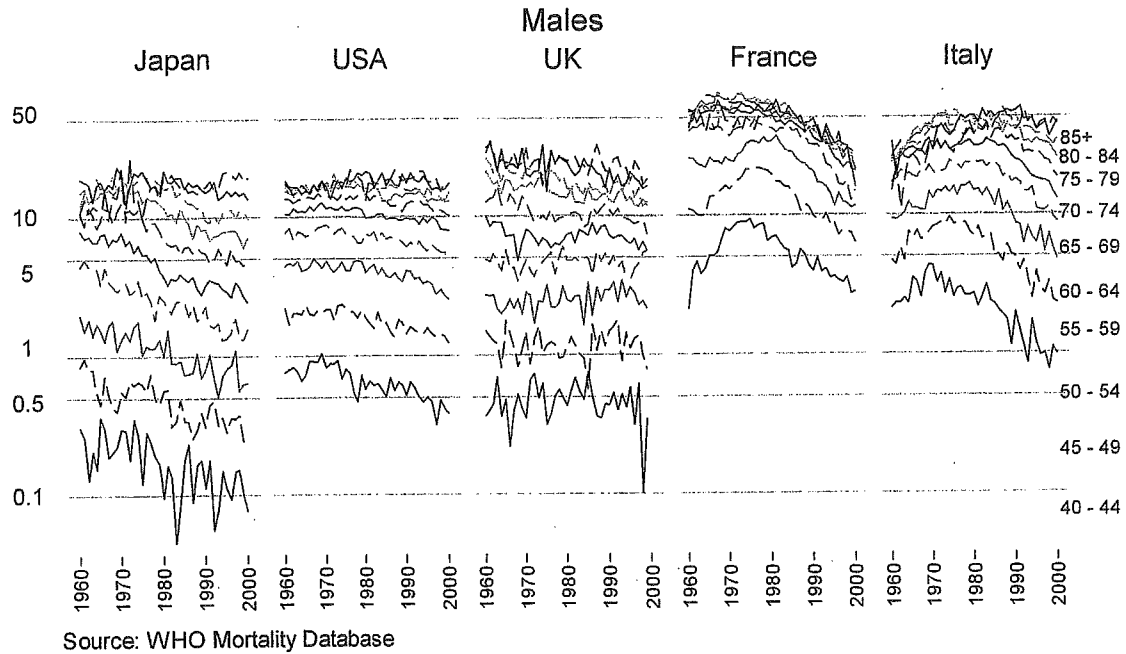


Figure 2. Age-specific rates over 40 years of age by year of death for laryngeal cancer in five countries, males, rates per 100 000.

Mortality for laryngeal cancer by age group, year of death

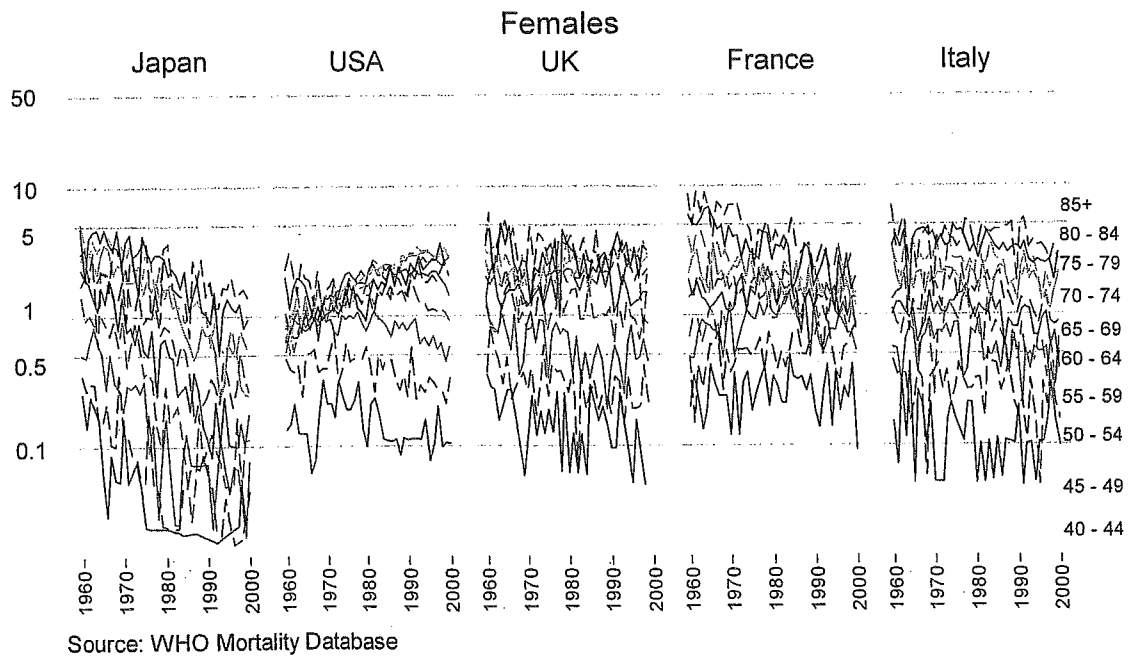


Figure 3. Age-specific rates over 40 years of age by year of death for laryngeal cancer in five countries, females, rates per 100 000.

Mortality for laryngeal cancer by age group, year of birth

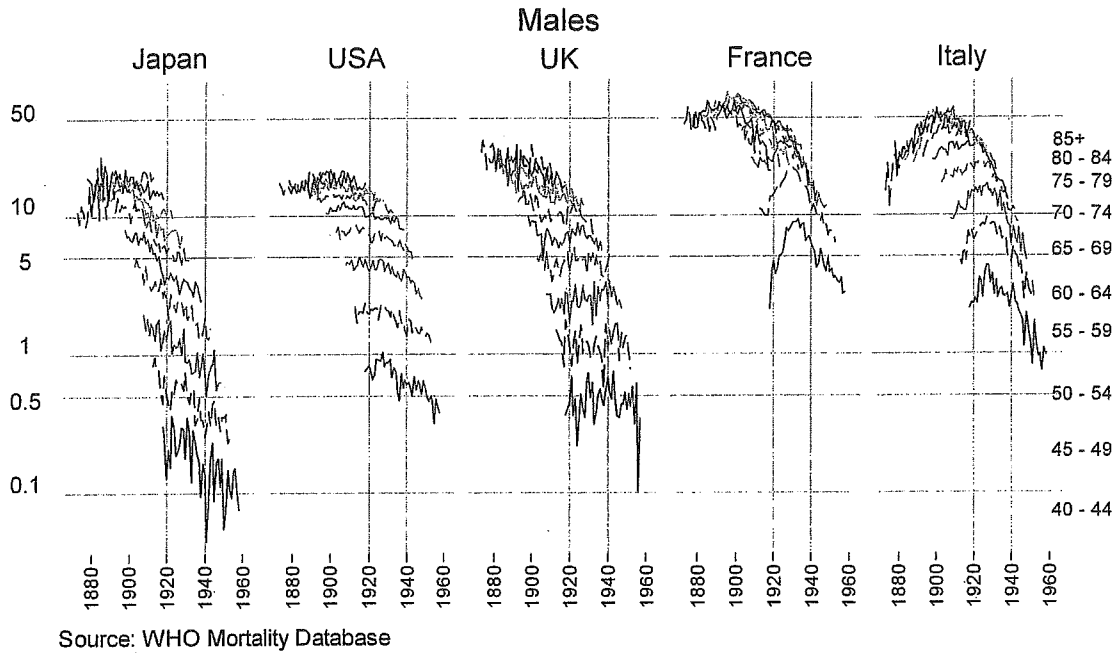


Figure 4. Age-specific rates over 40 years of age by birth cohort for laryngeal cancer in five countries, males, rates per 100 000.

Mortality for laryngeal cancer by age group, year of birth

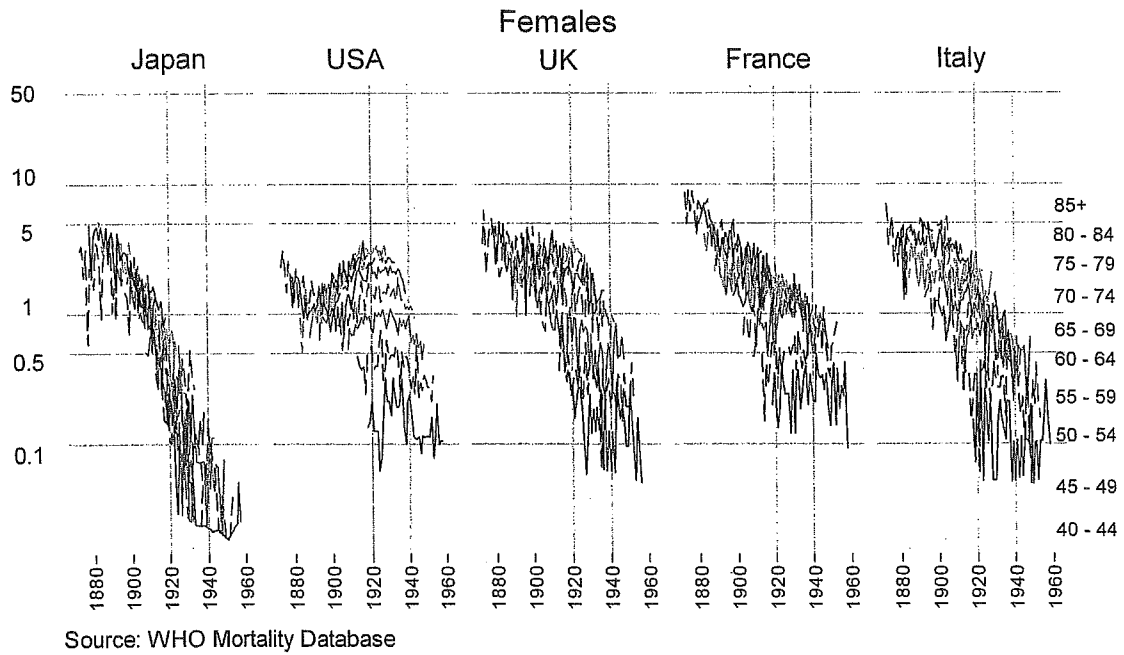


Figure 5. Age-specific rates over 40 years of age by birth cohort for laryngeal cancer in five countries, females, rates per 100 000.

Note: Original data is downloaded from WHO Mortality Database (version as of August, 2004). The data was then tabulated by I. Yoshimi with 161 (ICD-7,8,9), and C32 (ICD-10). Responsibility for this presentation and interpretation lies with the authors, not the WHO Mortality Database.

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2 | 高齢社会におけるスポーツ・身体運動の意義

C. 医療行政の立場から

濱島ちさと*

はじめに

身体活動・運動による予防対策は、1978年の第一次国民健康づくり対策以来、その重要性が認識されており、生涯を通じた健康づくりを目標とした基盤整備が進められてきた。当初は、健康づくりの3要素である栄養、運動、休養のうち、栄養に重点があったが、1988年からの第二次国民健康づくり対策アクティブ80ヘルスプランでは、運動習慣の普及に重点が置かれた。2000年には、さらなる健康づくりを推進する新たな保健政策として「健康日本21」が公表された。

近年、諸外国においても健康増進・改善の予防対策として、科学的根拠に基づくガイドラインの作成や、また今後の対策を行うための根拠を新たにするための研究の推進がすすめられている。この中で、身体活動は、重要な課題として多くのガイドラインで取り上げられている。

1 諸外国の動向

IARC (International Agency for Research on Cancer) では、肥満がもたらすがんのリスクと身体活動に関する科学的根拠を評価し、今後の研究と公衆衛生対策への勧告を公表している¹⁾。体重の増加を避けることは、大腸、乳房、子宮体部、腎細胞、食道がんの予防対策としても十分な根拠があると判定されている。身体活動のもたらす効果についても、大腸がん、乳がんにおいて十分な根拠があると認め、子宮体部、前立腺がんの減少

の可能性も示唆している。欧米をはじめとする先進国では、肥満の原因として、食物摂取以上に身体活動の低下が問題視されている。肥満の予防や身体活動の推進を図る場合、個人のレベルで達成することは困難であり、政府、企業、メディア、地域、個人などが一丸となって、環境改善を図る公衆衛生対策の必要性が述べられている。また、肥満や身体活動に関する適切な情報提供も重視している。

肥満による健康への影響は、先進国ばかりではなく、発展途上国においても検討すべき課題となっている。主に発展途上国における慢性疾患の予防を目的とした Oxford Vision 2020 では、喫煙とともに、食事、身体活動などの包括的な予防対策の必要を提言している²⁾。

2 米国における予防対策：
Healthy People 2010

Healthy People 2010の目的は、すべての国民の余命の延長とQOLの改善である³⁾。米国においては、人種、教育、収入、地域などが健康結果に格差を与えていることから、保健サービスの公平性に重点が置かれている。2010年までに、二つの目標を達成するために、28の分野に467の目標値を設定している。28分野には、糖尿病、心臓疾患などとともに、身体活動・運動が含まれている。

身体活動がもたらす死亡率の減少、心疾患、糖尿病や大腸癌のリスクの減少だけでなく、身体的・精神的な健康結果についても示されている。特に、高齢者においては、定期的な運動により筋力の増強や機敏性を培うことで、転倒の危険性の

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I. 総論

表1 Healthy People 2010における成人の身体活動に関する目標値

方法	対象	カバー率	
		現在値 (1995~1999)	目標値 (2010年)
運動をしていない	成人	40%	20%
中等度の運動は毎日少なくとも30分行っている	成人	15%	30%
激しい運動	成人	23%	30%
筋力トレーニング	成人	18%	30%
ストレッチング	成人	30%	43%
1マイル以内のウォーキング	成人	17%	25%
5マイル以内の自転車	成人	0.6%	2%

減少や独立した生活の維持に寄与するとされている。Healthy People 2010は、日常生活において、身体活動や運動を取り込んでいくことを目標としており、レジャーを含むあらゆる身体活動も健康結果に良好な影響を与えるものとみなしている。

こうした点を踏まえ、現在のデータを基本に2010年の目標値を掲げている。目標値が設定されている15項目のうち、高齢者を含む成人を対象とした身体活動6項目を表1に示した。たとえば、運動をしていないという成人が現在40%いるが、これを2010年には半分の20%にする目標が設定されている。この他にも、成人を対象として運動の種類別に目標値が提示されている。

3 身体活動に関する公衆衛生ガイドライン

Community Preventive ServiceはCDC (Centers for Disease Control and Prevention, 米国疾病予防センター)が中心となり、作成された公衆衛生ガイドラインである。1996年から作成に着手し、雑誌やホームページを通じ、公開されている。その内容は、タバコ、身体活動、アルコール、性行動などを対象にした一次予防、糖尿病やがんといった特定疾患、環境改善などである。

身体活動に関するガイドラインでは、公衆衛生

対策としての適切な方法について科学的根拠を示している^{4,5)}。身体活動が影響を及ぼす健康結果は多岐にわたることから、本ガイドラインでは、虚血性心疾患、高血圧、糖尿病(タイプII)、大腸がん、骨折、健康関連QOLに健康結果として限定し、骨粗鬆症、うつ病、脳虚血性疾患、動脈硬化、胆石、感冒を副次的な疾患としている。

身体活動を普及させることにより、中間的な健康結果が改善し、その結果、最終的な指標となる疾患の罹患率、死亡率、QOLの改善が達成できるモデルが作成されている(図1)。ただし、身体活動の影響は単独では評価しづらいことから、タバコや食生活の要因も考慮されなくてはならない。また、最終的な健康結果の改善は長期にわたる研究が必要なことから、中間結果による代替指標の評価が広く行われている。このため、身体活動の評価の中間結果の指標を明確にし、共通の指標として最大酸素摂取量を取り上げている。

身体活動の普及方法として推奨されたのは、地域ベースのキャンペーン、「階段の利用」に関するPoint-of-decision、学校における健康教育、地域における社会的支援、個人に適応した行動変容、身体活動を行うための環境整備である(表2)。これらの方法は、有効性を支持する科学的根拠があるとして、運動の推進のために推奨されている。

4 身体活動に関する予防対策ガイドライン

US Preventive Service Task Force (米国疾病予防委員会)は、Community Preventive Serviceとは異なり、臨床現場における予防対策ガイドラインである。このため、検討課題は、身体活動に関する検討も運動指導の有効性に限定されている。1996年の検討では医師による運動指導は健康改善を導くとして推奨していたが、2002年の見直しで、その証拠は不十分であると判定を改めている^{6,7)}。しかし、身体活動そのものの効果を否定するものではなく、心疾患、糖尿病、肥満などの生活習慣病のリスクを低減する対策として位置づけている。

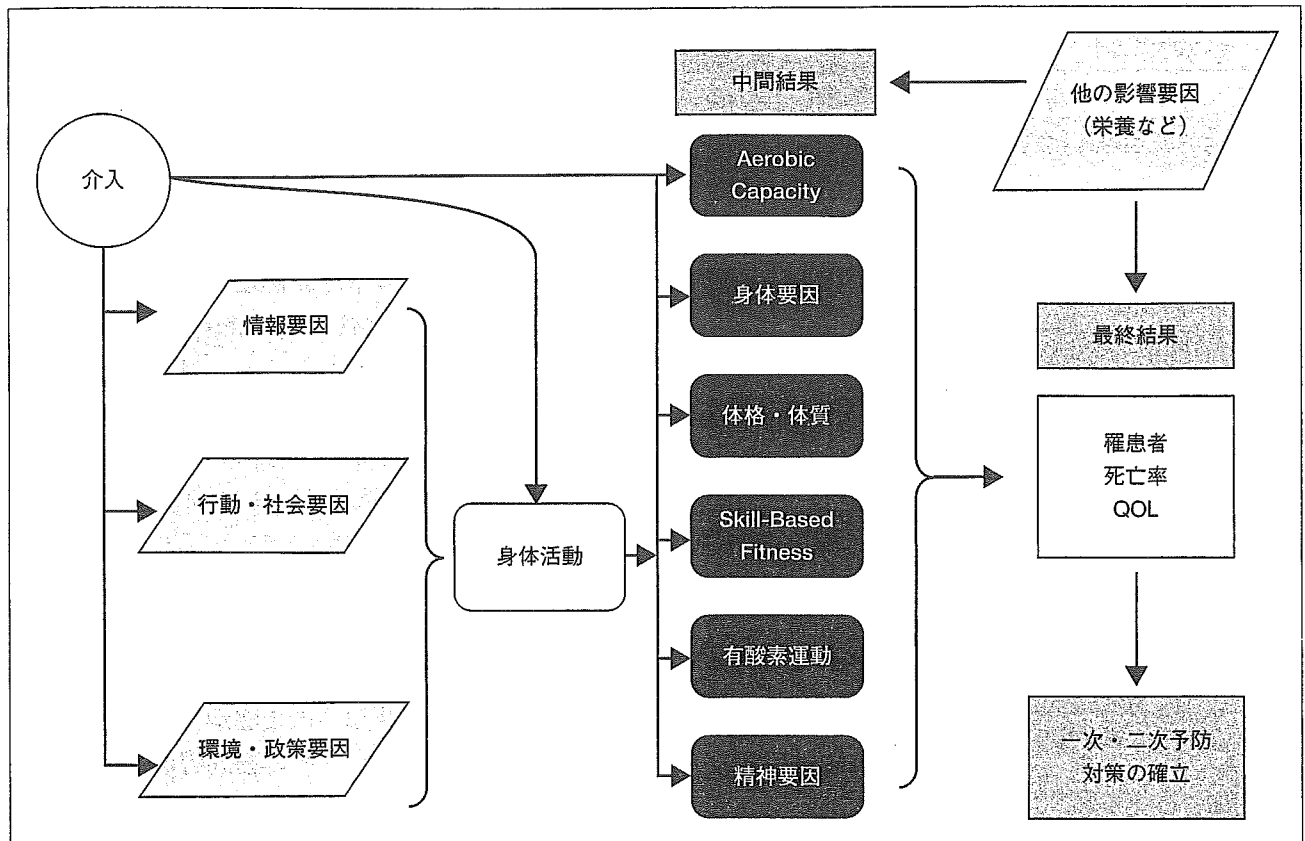


図1 身体活動と健康のモデル (Community Preventive Service, 2001)

しかしながら、運動指導にはさまざまな方法があり、医師が担当する場合もあれば、看護師の場合もある。患者の身体活動を評価するだけのものから、実際に身体活動のプランを立案することもある。効果を評価する研究方法もさまざまであり、研究の質にも問題があり、また結果も同一ではない。運動指導に関する系統的総括の結果、健康結果の改善に利益をもたらすかどうか不明なことから、推奨も反対もしない保留の「I」の判定になっている。Canadian Task Force on Preventive Health Careでも、同様に、医療指導は証拠不十分のため判定保留の「I」となっている⁸⁾。

5 情報提供の方法

予防対策ガイドラインの内容は、専門知識を有する医療従事者以外には容易に理解しがたい。しかし、実際に身体活動を日常的な習慣として取り入れるためには、一般向けの情報提供の場も必要

になる。CDCやPublic Health Agency of Canadaでは、情報提供のためのホームページを開設している。

Public Health Agency of CanadaのPhysical Activity Unit (<http://www.phac-aspc.gc.ca/pau-uap/paguide/older/index.html>)では、若年者とは別に高齢者向けのガイドが準備されている(図2)。この中では、高齢者における運動習慣が少ない現状を提示するとともに、そのために生じる疾患や、なぜ高齢者にも運動が必要かをわかりやすく解説し、これから取り組むことができる運動のプランを提示している。高齢者であっても活動的であるべき理由としては、年齢相応の健康維持や独立性の不可欠であり、身体活動を行わないことは身体の高齢化を加速することと説明している。さらに、「遅すぎることはない」という励ましのメッセージや、簡単な運動、運動がもたらす健康上の利点、事例報告、地域における支援対策などが紹介されている。また、運動をしたくない場合、骨粗鬆症の場合、冬季で外出が心配な場合な

I. 総論

表2 Community Preventive Service (2001)における身体活動に関する勧告

介入方法	勧告
身体活動を推進するための情報提供	
地域ベースのキャンペーン	推奨に値する十分な根拠がある
一定の時期に決断を促す：point-of-decision	推奨に値する相応な根拠がある
情報提供のための健康教室	有効性を支持する根拠は不十分
マスメディア・キャンペーン	有効性を支持する根拠は不十分
学校におけ健康教育	推奨に値する十分な根拠がある
社会的支援	推奨に値する十分な根拠がある
身体活動を推進するための行動的・社会的アプローチ	
個人に適応した行動変容	推奨に値する十分な根拠がある
テレビ・ビデオのゲームに伴う健康教育	有効性を支持する根拠は不十分
大学レベルの健康教育	有効性を支持する根拠は不十分
家族をベースとした社会的支援	有効性を支持する根拠は不十分
身体活動を推進するための環境・政策的アプローチ	
情報提供を伴う身体活動の場の提供と拡充	推奨に値する十分な根拠がある

ど、Q & Aで具体的な回答を示している。

CDCでも、同様に一般向の情報提供を行っている Physical Activity Everyone (<http://www.cdc.gov/nccdphp/dnpa/physical/index.htm>), 青少年を対象とした VERB (<http://www.cdc.gov/youthcampaign/>), 高齢者を対象とした Growing Stronger: Strength Training for Old Adults (http://www.cdc.gov/nccdphp/dnpa/physical/growing_stronger/index.htm)などがある。

6 わが国における予防対策


21世紀における国民健康づくり運動として、2000年に「健康日本21」が公表された。その趣旨は、個人の健康観を尊重したうえで、個々人が主体的に健康づくりに取り組めるようにするための社会的に支援を行い、最終的に壮年期死亡を減少、健康寿命を延伸させることを目指している。なかでも、健康増進を目的とした一次予防は重視されており、健康づくりの目標値が設定されている。目標値が設定されているのは、栄養・食生活、身体活動・運動、休養・こころの健康づくり、タバコ、アルコール、歯の健康、糖尿病、循環器病、がんの10項目である。

身体活動・運動については、生活習慣病の発生を予防する効果を認め、また健康づくりの重要な要素となることから、成人と高齢者にわけて、日常生活における身体活動に対する意識や運動習慣について目標値を設定している(表3)。成人では、意識的に運動を心がけている人の増加、日常生活における歩数の増加、運動習慣者の増加について、目標値が掲げられている。「意識的に運動を心がけている人」とは、日常生活の中で、健康の維持・増進のために意識的に運動している人を意味し、「運動習慣者」は1回30分以上の運動を、週2回以上実施し、1年以上持続していると定義している。一方、高齢者の目標値は、外出について積極的な態度を持つ人の増加、何らかの地域活動を実施している者の増加、日常生活における歩数の増加において具体的に設定されている。

7 今後の課題

身体活動が健康に与える影響は大きく、その定着は医療経済における効果が期待されている。しかし、身体活動の評価は断面的ではなく、生涯にわたる評価が必要である。今後、身体活動の影響を考えいく上では、CDCのCommunity Preventive Serviceにおけるように、個別の運動の経済性を検討する方法と、マクロな側面から、生涯医


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図2 身体活動推進のための情報提供ホームページ (Public Health Agency of Canada)

療費に及ぼす研究が必要になる。ただし、両者を正確に評価する前提となるのは、身体活動が特定の疾患や健康状態の改善にどの程度影響しているか、真の改善を導いているかという有効性評価の研究である。

わが国における予防対策のガイドラインとして、癌検診については、系統的な評価が行われており、その評価方法が定式化されている。しかし、一次予防については、わが国独自のデータベースやガイドラインは構築されていない。今後は、他の臨床ガイドラインと同様に、科学的根拠に基づくガイドラインの作成が必要である。また、根拠に基づく身体活動推進のための対策については、医療経済的な評価を経て、政策決定に応用されることが期待される。同時に、すべての人々に、身体活動に関する適切な情報を伝えることも合わせて検討されなくてはならない。

表3 健康日本21における身体活動・運動の目標値

対象	目標設定の項目	性別	年齢	現状	目標値 (2010年)
成人	意識的に運動を心がけている人の増加	男性		52.6%	63%以上
		女性		52.8%	63%以上
	日常生活における歩数の増加	男性		8,202歩	9,200歩以上
女性			7,282歩	8,300歩以上	
高齢者	運動習慣者の増加	男性		28.6%	39%以上
		女性		24.6%	39%以上
		全体			
	外出について積極的な態度をもつ人の増加	男性	60~79歳	59.8%	70%以上
		女性	60~79歳	59.4%	70%以上
		全体	80歳以上	46.3%	56%以上
何らかの地域活動を実施している者の増加	男性	60歳以上	48.3%	58%以上	
	女性	60歳以上	39.7%	50%以上	
日常生活における歩数の増加	男性	70歳以上	5,436歩	6,700歩以上	
	女性	70歳以上	4,604歩	5,900歩以上	

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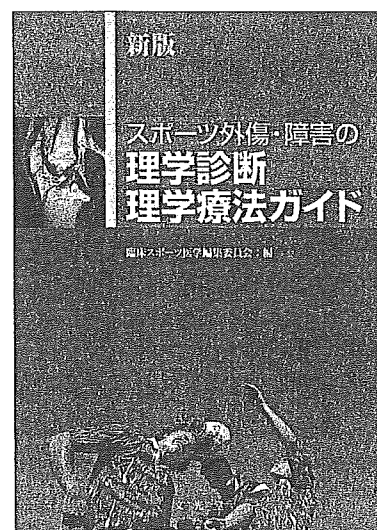
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胃がん検診の方法, 効果と問題点

飯沼 元・濱島ちさと・斎藤 博



▶ 胃がん検診方法として, 有効性と不利益に関する評価から推奨される方法は胃 X 線検査(特に間接撮影)であり, 死亡率減少効果が証明されている唯一の方法でもある。しかし検診実施機関の間における精度管理の差はきわめて大きく, 受診者数の増加のため全国レベルでの標準的かつ効果的なシステム構築が今後の課題と考えられる。

本邦における胃がんの推移

2001年のわが国における胃がんの死亡数は49,958人であり(図1), 肺がんに次いで2番目に多いがんである¹⁾。しかし罹患率, 死亡率とも毎年減少傾向にあり, 特に死亡率の減少は顕著で過去20年の間に人口10万人当たり49.4(1980年)から25.5(2000年)へと半数近くに減少している。これは胃がんに対する X 線・内視鏡による早期診断と, 外科切除を中心とした治療法の進歩が大きく貢献し, 特に内視鏡検査の普及によって日常的に早期胃がんが診断されるようになったことが大きな理由と考えられる。

胃がん検診の方法

わが国の胃がん検診における主な方法は胃 X 線検査(直接撮影・間接撮影)である。その他に胃内視鏡検査, ペプシノゲン法や最近ではヘリコバクターピロリ抗体法などがあり, これらの併用方法も研究されている。胃 X 線検査による胃がん検診の歴史は50年近くに及び, 二重造影法による早期診断の進歩を背景として, 多数の早期がんが発見されてきた²⁾。その後, 内視鏡検査法の進歩により早期胃がん診断における主な役割を譲り渡しているが, いまだ胃がんの診断において全国的に広く用いられている検査法である。最近, がん

検診の死亡率減少に対する有効性が問題となっているが, こうした胃がん検診方法のなかで, 間接胃 X 線撮影に関しては標準化と精度管理に対する研究が多数行われ, かつその死亡率減少効果もほぼ証明されている³⁾。一方, 胃内視鏡検査については有効性評価の研究は行われていない。

胃がん検診の効果と問題点

個人を対象とした職域検診や人間ドックにおいては, 早期胃がんの診断に感度の高い内視鏡検査が用いられる傾向にある。しかし費用効果や偶発症(検査自体, 前投薬, 感染症など)の面で問題があり⁴⁾, 死亡例の報告(0.00076%)もあることから健常者を対象とする検診には問題がある。さらに診断が検査医のレベルに大きく依存し検査件数も限られるなど検診方法として問題点は大きい。また胃 X 線検査のように死亡率減少効果に関する有効性も明らかでないことから, 集団を対象とした胃がん検診には不向きと考えられる。血中ペプシノゲンの測定, および血清や尿中ヘリコバクターピロリ抗体測定は簡便に集団に対して実施可能な検査であるが, 胃がん検診としての有効性は明らかでない。現状では有効性と不利益に関する評価から胃がん検診として推奨される方法は基本的に間接胃 X 線検査と考えられている。

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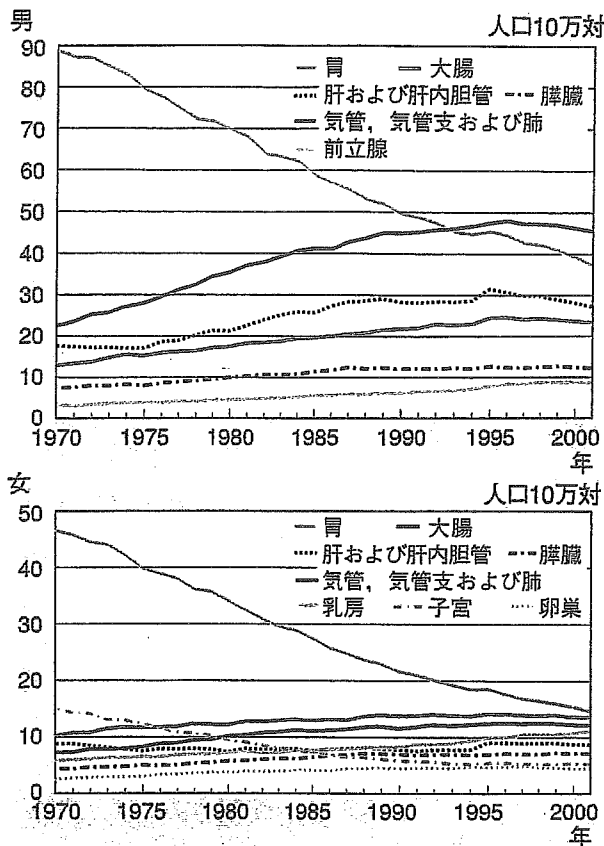


図1 がんの主要部位別・年次別・性別・年齢調整死亡率(1970~2001年)
(文献1より引用)

胃がん検診における X線検査の現状と将来展望

1983年に法的な老人保健事業として胃X線検査による胃がん検診が実施されてから20年以上になるが、1993年の436万人をピークとして受診者は横ばいであり(図2)、対象となる40歳以上人口におけるカバー率も最高で7%程度に過ぎない。胃がん検診法としての方法論が確立し死亡率減少効果が認められているにもかかわらず、受診者が伸び悩む状況は胃X線検査への信頼性の低さが関係していると思われる。実際に検診実施機関における精度管理の状況は、うまく機能している施設と多くの問題を抱えている施設間の差がきわめて大きい。さらに臨床において胃内視鏡検査が著しく普及したため、胃X線検査の件数は激減しており検診の質に最も影響する医師・技師

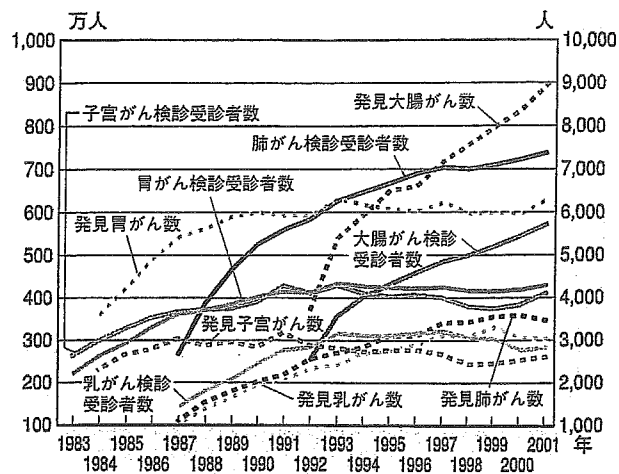


図2 老人保健事業におけるがん検診受診者数の推移
(文献1より引用)

の撮影技術や読影力が確実に低下している。こうした状況を改善するため撮影法に関するガイドラインも作成され、検診環境を整備して行く努力がなされている⁵⁾。しかし検診システムとして精度管理がうまく機能していない施設を如何に全国レベルで“底上げ”するかが大きなポイントである。また撮影技術・画質改善などハード面では十分に検討が行われているが、最終的な読影医の診断能に関する評価は少なく、標準的な診断システムを目指して客観的な手法を用いた評価が必要になる。今後はこうしたソフト面における研究と改善を積極的に進めることで、胃X線検査による信頼性の高い魅力ある胃がん検診が可能になると考えられる。幸いにも画像工学の進歩によってdigital radiographyが登場し、消化管X線検査の画像デジタル化が可能になった⁶⁾。医療情報の電子化が進むなか、胃がんX線検診においても全国レベルで画質と診断能の改善に関する情報が共有可能になると予想される。画像デジタル化のメリットを生かした診断の効率化、画像の最適化、診断能の標準化が胃がんX線検診において期待される。

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八尾恒良, 飯田三雄 編集

書評

小腸疾患の臨床

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「小腸疾患の診療」と聞くと、今でもマイナーだと感じられる方もおられるかもしれない。しかし、実は小腸は消化管のなかで最も長く、最も重要な働きをしている臓器である。食道、胃、大腸は全摘しても生きていくことが可能だが、小腸を全摘しては生きていくことはできない。それにもかかわらず、これまで消化器病学のなかで中心的に取り扱われることは少なく、軽視されてきたきらいがある。

そのなかで編者の八尾恒良先生、飯田三雄先生は小腸二重造影の開発をはじめ 30 年以上前から一貫して小腸疾患の診療、研究に力を注がれてこられたのである。

本書はお二人の先生方を中心とする九州大学病態機能内科学(第二内科)と福岡大学筑紫病院の消化器グループの長年にわたる研究成果の集大成である。

本書の特徴は日本の消化管診断学の最も得意とする X 線画像、内視鏡画像、病理組織構築を対比したうえでの画像診断学を小腸疾患の診断にも取り入れ、なおかつ小腸疾患の診断には欠かせない病態の解説も十分になされた包括的な小腸診断学の実用書となっていることである。本書の随所に盛り込まれた豊富な症例、美しい画像には驚嘆させられる説得力がある。

総論では小腸疾患へのアプローチのための諸検査

法に関し、最新のカプセル内視鏡、ダブルバルーン内視鏡も含めて詳細かつ実用的に解説されており、各論では各小腸疾患に関して、カテゴリー別に症例の画像を提示しながらわかりやすく網羅的に解説されている。

「小腸病学」を学ぶために通読するのもよいだろう。また小腸疾患に遭遇したとき診断、鑑別診断を進めるうえで参照するのもよいだろう。まさに痒いところに手が届く高い完成度で仕上がっている。

はからずも今、ダブルバルーン内視鏡、カプセル内視鏡という小腸全域の内視鏡観察を可能とした二つの新たな内視鏡法の登場により小腸ブームが幕を開けようとしている。本書は長年の小腸診療、研究の蓄積に加え、このような新しい手法も取り入れた最新の内容となっており、まさにタイムリーに発刊された待望の書である。

新たな内視鏡手技の登場により小腸への新しい扉が開かれた今、小腸疾患に対し興味がますます注がれ大きく注目を集めていくものと考えられる。この時期にタイムリーに発刊された小腸病学の集大成といえる本書は、21 世紀の消化管学において必携の書といっても過言ではない。

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Clinicopathologic Features of Peripheral Squamous Cell Carcinoma of the Lung

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Background. The clinicopathologic features are still unknown in peripheral squamous cell carcinoma of the lung, unlike centrally located carcinomas. In this retrospective study, we investigated the clinicopathologic characteristics of patients with peripheral squamous cell carcinomas.

Methods. Of 1,381 primary lung carcinomas surgically resected at the National Cancer Center Hospital, Tokyo, from 1995 through 2001, 70 (5.1%) peripheral squamous cell carcinomas of 3.0 cm or less in diameter were studied retrospectively in terms of clinicopathologic characteristics such as age, sex, past history, smoking, tumor size, mode of operation, extent of lymph node dissection, pathologic lymph node status, mode of recurrence, and cause of death.

Results. These patients ranged in age from 49 to 82 years, with a mean age of 69.2 years. Thirty-nine patients (56%) were at increased risk preoperatively. The incidence of lymph node metastasis was 25%, and larger

tumors tended to be associated with a higher prevalence, although this difference was not significant ($p = 0.12$). None of the patients with N2 disease had skipping metastasis. Recurrence was observed in 13 patients (19%). There was no significant correlation between recurrence and the extent of lymphadenectomy or the mode of operation. The 5-year overall and disease-specific survival rates were 73.4% and 85.9%, respectively. The cause of death was recurrence in 53% and other disease in 47%.

Conclusions. We propose that mediastinal hilar lymphadenectomy should be routinely conducted as a curative operation for low-risk patients with small peripheral squamous cell carcinoma. We further propose that for patients who may have difficulty tolerating this procedure, pathologic examination of intraoperative frozen sections from the hilar node could be useful for planning a surgical strategy.

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Many squamous cell carcinomas of the lung arise in central airways, where the tumor shows both endobronchial and invasive growth into the peribronchial tissue, lung parenchyma, and nearby lymph nodes, sometimes compressing the pulmonary artery and vein. The clinicopathologic features such as carcinoma in situ and extension along the bronchus are well known in centrally located squamous cell carcinoma [1-5]. On the other hand, in peripheral squamous cell carcinoma, a smaller tumor is supposedly associated with the "early stage" of tumor development. Several reports have indicated that peripheral squamous cell carcinoma is accompanied by a quite low prevalence of lymph node metastasis, especially in tumors 2 cm or less in diameter [6-12]. This might reflect its tendency to remain localized and slow in tumor growth [11, 13]. However, few, if any, studies have specifically examined the clinical and histopathologic features of peripheral squamous cell carcinoma because of its relative infrequency.

So far a causal relationship between cigarette smoking and squamous cell carcinoma of the lung has been established from many epidemiologic and laboratory

studies [3, 14, 15]. Smoking is an important risk factor for cardiovascular disease and impaired pulmonary function with chronic obstructive pulmonary disease [16]. With regard to surgical treatment, we sometimes are obliged to performed lesser resection, irrespective of surgical curability, for patients with peripheral squamous cell carcinoma because of their risk factor, although major lung resection has been the standard operation of choice for non-small cell lung cancer [17]. However, if peripheral squamous cell carcinomas actually tend to remain localized, even lesser resection may be considered curative resection.

In this retrospective study, we sought to clarify the clinicopathologic features of patients with surgically resected peripheral squamous cell carcinoma and to work out the surgical strategy.

Patients and Methods

For the 7-year period from January 1995 through December 2001, a total of 1,381 patients underwent surgical resection for primary lung carcinoma at the National Cancer Center Hospital, Tokyo. Among these, 70 patients (5.1%) with peripheral squamous cell carcinomas of 3.0 cm or less in diameter were considered for this analysis. These patients accounted for 22% of all 317 patients with

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primary squamous cell carcinomas that were resected during the same period. Their TNM stages were determined according to the Union Internationale Contre le Cancer (International Union Against Cancer) staging system [18]. Peripheral squamous cell carcinoma was defined as that arising from subsegmental or other distal bronchi and bronchioli, based on a previous report by Shimosato and colleagues [19]. The medical record of each patient was reviewed for age, sex, past history, smoking, tumor size, mode of operation, extent of lymph node dissection, curability, pathologic lymph node status, mode of recurrence, and cause of death. The following patients were considered preoperatively as being at increased risk as previously reported [20, 21]: (1) patients older than 75 years of age; (2) patients with pulmonary dysfunction, defined as forced expiratory volume in 1 second of less than 800 mL; (3) patients with a past history of myocardial infarction or angina pectoris; (4) patients with a past history of cerebral infarction; and (5) patients with insulin-dependent diabetes mellitus. Patients were considered as being at increased risk when they had diabetes based on history and need of insulin. Smoking status (never, former, or current) was recorded at the time of admission. Smoking history was categorized as negative for "never" cigarette smoker and as positive for "former" or "current" smoker. The extent of lymph node dissection or sampling was based on the lymph node map for lung cancer proposed by Naruke and colleagues [22]. In addition, we performed selective mediastinal lymph node dissection according to the report by Asamura and associates [23]. This report demonstrated that single-station lymph node metastasis to the subcarinal station without superior mediastinal involvement occurred rarely, less than 2%, for tumors of the right upper lobe and the left upper segment. In this procedure, for tumors of the upper lobes, subcarinal and lower mediastinal lymph node dissection could be omitted unless involvement of the pretracheal lymph nodes was noted by a frozen-section examination during the operation. Mediastinal metastasis was considered "skipping" if any of the mediastinal lymph nodes was involved by the tumor, without hilar or intrapulmonary node metastasis. Operative death was defined as any death within 30 days of the operation or during hospitalization. Cancer recurrence was carefully divided into three categories according to the site of the initial relapse: locoregional, distant, and at both sites simultaneously. Locoregional recurrence was defined as any recurrent disease within the ipsilateral hemithorax, mediastinum, or supraclavicular lymph nodes. All other sites of recurrence were considered distant metastases.

After discharge from the hospital, patients were followed at 3- to 4-month intervals for the first 2 years, 6-month intervals for the subsequent 3 years, and yearly thereafter. Follow-up evaluation included physical examination and routine hematologic and biochemical analyses, and chest roentgenograms were monitored for evidence of recurrent or other disease. Computed tomography was selectively used as a follow-up screening study when the screening roentgenographic studies

Table 1. Characteristics of Patients

Characteristic	Number
Sex	
Male	65 (93%)
Female	5 (7%)
Age (y)	
Range	49-82
Mean	69.2
Smoking	
Positive	69 (99%)
Negative	1 (1%)
Tumor size (cm)	
Range	1.0-3.0
Mean	2.2
Lymph node dissection	
Mediastinohilar	23 (33%)
Hilar only/ none	47 (67%)
Curability of surgery	
Complete	69 (99%)
Incomplete	1 (1%)

suggested a new abnormality. In some patients who were lost from this postoperative follow-up schedule, follow-up was obtained by direct patient contact by telephone interviews, and also obtained from the referring physicians if direct patient contact was not possible. Postoperative follow-up was complete with regard to survival and the time and location of any recurrent disease in all patients.

Survival rates were calculated by the Kaplan-Meier method using the date of operation as the starting point and the date of death or last follow-up as the end point. Disease-specific survival was defined as the time between operation and cancer-related death, where deaths by causes other than lung cancer were considered censored. Overall survival was defined as the time between operation and overall deaths. A χ^2 test was used to compare the various rates. Significance was defined as a *p* value of less than 0.05.

Results

Clinicopathologic Findings

The clinical characteristics of the 70 patients are presented in Table 1. Sixty-five patients (93%) were men and 5 (7%) were women. These patients ranged in age from 49 to 82 years, with a mean age of 69.2 years. Sixty-nine (99%) patients were smokers, whereas only 1 was a

Table 2. Patients at Increased Risk

Factor	Number
High age (≥ 75 y)	17 (24%)
Cardiac disease	10 (14%)
Pulmonary dysfunction	12 (17%)
Cerebral infarction	3 (4%)
Total	39 (56%)

Table 3. Mode of Operation for Patients and Percentage of Patients at Increased Risk

Mode of Operation	Number	Increased Risk
Pneumonectomy	2 (3%)	0 (0%)
Lobectomy	43 (62%)	17 (40%)
Segmentectomy	8 (11%)	7 (87%)
Wedge resection	17 (24%)	15 (88%)
Total	70 (100%)	39 (56%)

nonsmoker. The tumor size ranged from 1.0 to 3.0 cm, with a mean size of 2.2 cm. Curative lung resection was performed in 69 patients (99%). The exception was 1 patient who had a residual tumor because of a perinodal invasion extending from the hilar lymph node to the bronchus. Thirty-nine patients (56%) were preoperatively at increased risk (Table 2). Approximately a quarter of them were older than 75 years of age. With regard to the mode of operation, pneumonectomy was performed in 2 patients (3%), lobectomy in 43 (62%), segmentectomy in 8 (11%), and wedge resection in 17 (24%). No patients received adjuvant chemotherapy or radiotherapy after surgery. The fraction of preoperative increased-risk cases in each mode of operation is shown in Table 3. The prevalence of patients at increased risk was higher in limited resections such as segmentectomy and wedge resection. Intraoperative lymph node dissection or sampling was performed in 55 of 70 patients. It was omitted in the other 15 patients because of their increased risk. Among these 55 patients with lymph node dissection or sampling, the pathologic stage was IA in 39 patients, IB in 2, IIA in 8, IIB in 1, IIIA in 4, and IIIB in 1. The TNM stages for each of the tumor were also recorded (Table 4). Fourteen (25%) of these 55 patients had lymph node metastases. The relationship between tumor size and lymph node metastasis for the 55 patients is shown in Table 5. The incidence of lymph node metastasis tended to be higher in tumors larger than 2.0 cm in diameter (33%) than in those that were 2.0 cm or less in diameter (14%), but this difference was not significant ($p = 0.12$). Cancer recurrence was observed in 13 patients (19%) and was locoregional in 6, distant in 4, and both simultaneously in 3. The time intervals from the initial operation to the discovery of recurrence varied from 0.4 to 2.7 years.

Table 4. Stage by TNM Category

TNM Stage	No. of Patients
Stage I	Total = 41
T1 N0 M0	39 (70%)
T2 N0 M0	2 (4%)
Stage II	Total = 9
T1 N1 M0	8 (15%)
T2 N1 M0	1 (2%)
Stage III	Total = 5
T1 N2 M0	4 (7%)
T4 N2 M0	1 (2%)

Table 5. Lymph Node Involvement According to Tumor Diameter

Tumor Diameter (cm)	Lymph Node Metastasis		<i>p</i> Value
	Negative	Positive	
≤ 1.0	1 (100%)	0 (0%)	0.12
> 1.0 and ≤ 2.0	18 (86%)	3 (14%) ^a	
> 2.0 and ≤ 3.0	22 (67%)	11 (33%) ^b	
Total	41 (75%)	14 (25%)	

^a Two of 3 cases with N2 disease. ^b Three of 11 cases with N2 disease.

Cancer recurrence was analyzed retrospectively by taking into account the mode of operation and the extent of lymph node dissection (Tables 6, 7). First, patients were divided into two groups according to the mode of operation. The lobectomy group included 45 patients who underwent pneumonectomy or lobectomy. The limited group included the remaining 25 patients who underwent segmentectomy or wedge resection. There was no significant difference in cancer recurrence between these two groups (Table 6). Second, patients were divided into two groups according to the extent of lymph node dissection (Table 7). The regional group included 47 patients who underwent node dissection up to the hilum or who received no sampling. The systematic group included 23 patients who underwent systematic mediastinal hilar node dissection. There was no significant correlation between the extent of lymph node dissection and the mode of recurrence. Five (22%) of the 23 patients with mediastinal hilar lymph node dissection had N2 disease. Although the number of patients was limited, none of these patients had skipping metastasis (Table 8).

Prognosis

The median follow-up period was 3.5 years. The overall and disease-specific survival curves for all 70 patients are shown in Figure 1. The overall 3- and 5-year survival rates were 80.4% and 73.4%, respectively. In contrast, the disease-specific 3- and 5-year survival rates were 85.9% and 85.9%, respectively. None of the 15 deaths was considered an operative death. The cause of death was cancer recurrence in 8 patients (53%) and other disease in 7 patients (47%; Table 9).

Table 6. Relationship Between Cancer Recurrence and Mode of Operation

Mode of Recurrence	Mode of Operation		<i>p</i> Value
	Lobectomy (n = 45)	Limited (n = 25)	
Locoregional	3 (7%)	3 (12%)	0.65
Distant	3 (7%)	1 (4%)	0.45
Both simultaneously	2 (4%)	1 (4%)	0.93
Total	8 (18%)	5 (20%)	0.81

Table 7. Relationship Between Cancer Recurrence and Extent of Lymph Node Dissection

Mode of Recurrence	Node Dissection		p Value
	Systematic (n = 23)	Regional (n = 47)	
Locoregional	1 (4%)	5 (11%)	0.38
Distant	2 (9%)	2 (4%)	0.45
Both simultaneously	1 (4%)	2 (4%)	0.99
Total	4 (17%)	9 (19%)	0.86

Comment

Squamous cell carcinoma of the lung more often arises in the central airway. The prevalence of peripheral squamous cell carcinoma among all squamous cell carcinomas has been reported to range from 15% to 30% [24, 25]. Epidemiologically, cigarette smoking is likely to be a major factor in the causation of squamous cell carcinoma [14, 15]. In this study, peripheral squamous cell carcinoma was also closely associated with cigarette smoking. All of the patients except one woman were smokers. However, this one patient inhaled passive smoke and had worked with smoking colleagues for 25 years. Smoking is closely related to cardiovascular and pulmonary diseases, and the present study had increased risk as cardiovascular and pulmonary diseases in 35% of patients. There was also a marked male predominance in its incidence.

The incidence of nodal involvement in 70 patients with peripheral squamous cell carcinomas that were 3 cm or less in diameter was 25%. When stratified by tumor size, the incidence of nodal involvement was 14% in tumors 2 cm or less in diameter and 33% in those more than 2 cm in diameter. There was a lower tendency for nodal involvement in tumors 2 cm or less in diameter, although this difference was not significant. The rate calculated for tumors 2 cm or less in diameter was greater than those reported previously: 6.3% by Asamura and colleagues [6], 7.4% by Oda and colleagues [10], and 0% by Watanabe and colleagues [12].

In the present study, none of the patients with N2 disease had skipping metastasis, although the total number of patients in this study was limited. So far it has been reported that skipping metastases for peripheral non-small cell lung cancer occur in approximately 25% of N2 disease [26, 27]. On the other hand, Asamura and colleagues [6] reported that skipping metastasis occurred almost exclusively in adenocarcinomas. This rarity of

Table 8. Lymph Node Involvement in Patients With Mediastinal Hilar Node Dissection

Pathologic Node Status	Number
N0	16 (71%)
N1	2 (7%)
N2 ^a	5 (22%)
Total	23 (22%)

^a Zero of 5 cases of N2 disease involved skipping metastasis.

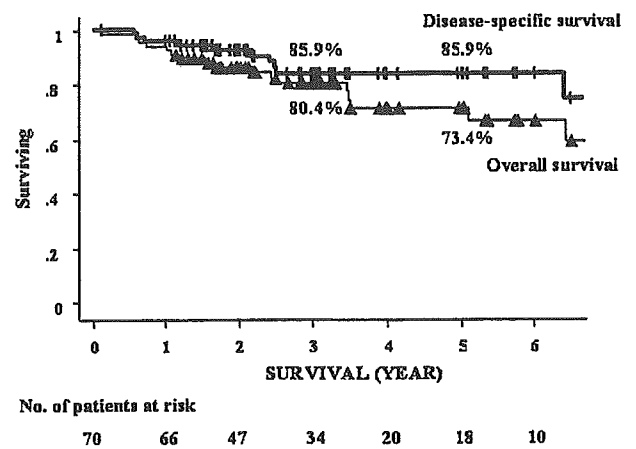


Fig 1. Overall and disease-specific survival curves for all 70 patients with peripheral squamous cell carcinomas 3.0 cm or less in diameter. The 3- and 5-year overall survival rates were 80.4% (95% confidence interval, 68.7% to 93.4%) and 73.4% (95% confidence interval, 52.7% to 89.0%), respectively. The 3- and 5-year disease-specific survival rates were 85.9% (95% confidence interval, 71.3% to 95.1%) and 85.9% (95% confidence interval, 66.8% to 99.2%), respectively.

skipping metastasis in squamous cell carcinoma may reflect the relatively slower growth and greater tendency to remain localized than the other cell types. None of the patients in the present study were included in that earlier study. Thus, as Asamura and colleagues [6] proposed, among small peripheral squamous cell carcinomas, mediastinal lymphadenectomy might be dispensable if the hilar lymph node is proven to be tumor-free on pathologic examination of frozen sections during the operation. The findings in the present study are consistent with this strategy for lymphadenectomy in patients with peripheral squamous cell carcinoma, as mediastinal nodal involvement is less common and no skipping metastasis occurred.

Most of the patients were at increased risk preoperatively, and this was the main reason that some were inevitably candidates for limited resection. The preoperative risk level for patients might determine the mode of operation. Moreover, this would account for the relatively high prevalence of noncancerous deaths. In the present study, 4 of the 7 patients who died of noncancerous diseases died of pneumonia. A policy of immunizing postoperative patients with a pneumococcal pneumonia

Table 9. Causes of Death

Cause of Death	Number
Perioperative	0 (0%)
Cancer-specific	8 (53%)
Other disease	7 (47%)
Pneumonia	4
Cardiac failure	1
Gastric cancer	1
Drowning	1
Total	15 (100%)

vaccine might be effective in preventing pneumonia, although we did not have this policy for any patients.

Lobectomy for T1 peripheral non-small cell lung cancers has been the standard operation of choice since the randomized trial conducted by the Lung Cancer Study Group [17]. This study demonstrated that the limited resection such as wedge or segmentectomy had three times more local recurrence than the lobectomy. In addition, several reports have suggested that complete mediastinal hilar lymph node dissection can improve survival for non-small cell lung cancer [28-30]. In the present study, there was no significant difference in cancer recurrence among the modes of operation. Regarding the extent of lymph node dissection, although the information in Table 7 indicates a slight suggestion that complete mediastinal hilar lymph node dissection improves survival, this difference was not significant. However, the lack of statistical significance might indicate a type II error because the numbers in our study were too small to draw inferences from.

We considered the clinicopathologic features of peripheral squamous cell carcinomas to be as follows:

- These tumors were closely associated with a smoking history.
- Patients with these tumors were frequently at increased risk.
- Larger tumors were associated with a higher prevalence of lymph node involvement.
- Skipping metastasis of N2 disease was rare.
- There was a relatively high prevalence of noncancerous death.

We conclude that mediastinal hilar lymphadenectomy should be performed routinely in peripheral squamous cell carcinomas that are 3 cm or less in diameter, as well as in peripheral non-squamous cell carcinomas if the patient is at good risk. Furthermore, if it is suspected that the patient will not easily tolerate this procedure because of his or her increased risk, pathologic examination of intraoperative frozen sections of the hilar node would be useful for planning a surgical strategy. On the evidence of no hilar lymph node metastasis, limited resection may be curable for peripheral squamous cell carcinomas in oncologic and physical aspects.

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Recent Results of Postoperative Mortality for Surgical Resections in Lung Cancer

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Background. Changes in the postoperative mortality rates and causes of death for lung cancer surgery at the specialized hospital for cancer in Tokyo, Japan during the last 16 years were investigated.

Methods. Data on 3,270 consecutive patients who underwent pulmonary resection for primary lung cancer between January 1987 and December 2002 at the National Cancer Center Hospital were retrospectively analyzed. The postoperative 30-day and in-hospital mortality rates and causes of death after pulmonary resection for lung cancer were investigated. Patients were divided into two period groups of almost equal number, the early (1,615 patients from 1987 to 1996) and the late (1,655 patients from 1997 to 2002) periods.

Results. Fifty-eight operative and postoperative deaths occurred during the last 16 years. Thirty-day and in-hospital mortality were 0.6% (21/3,270) and 1.6% (58/3,270), respectively. During the last 6-year period, 30-day and in-hospital mortality were 0.5% (8/1,655) and 0.8% (21/1,655), respectively. The difference was significant between the 30-day/in-hospital mortality for pneumonectomy (3.1%/5.9%) and lobectomy (0.3%/1.3%) ($p < 0.0001/p < 0.0001$). The difference in mortality between

lobectomy and segmentectomy or a lesser resection was not significant. The 58 deaths were caused by pneumonia/acute respiratory distress syndrome (ARDS) (36%, $n = 21$), bronchopleural fistula (BPF)/empyema (33%, $n = 19$), cerebrovascular accident (10%, $n = 6$), cardiac-related event (7%, $n = 4$), and others (14%, $n = 8$). The most frequent cause of death in the early period was BPF/empyema (18/45, 40%), while that in the late period was pneumonia/ARDS (6/13, 46%). Among the pneumonia/ARDS deaths in the late period ($n = 6$), 5 (83%) were due to acute deterioration of interstitial lung disease after lobectomy.

Conclusions. Recent postoperative mortality rates (30-day, 0.5%; in-hospital, 0.8%) in the treatment of lung cancer are quite acceptable. Special care must be taken for the patient after pneumonectomy, as reported by others. Furthermore, even after lobectomy, proper management of the patient with acute deterioration of interstitial lung disease will be required to improve the future outcome.

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A limited number of reports describe postoperative mortality rates in recent decades, and most reports have defined a postoperative death as one that occurs within 30 days after the procedure. However, with the recent developments in postoperative management, many complicated patients survive more than 30 days, and their deaths can be lost in such studies. This study analyzed the change in mortality rates, including both 30-day and in-hospital mortality, after pulmonary resection for lung cancer in the specialized institution for cancer in Tokyo, Japan during the last 16 years.

Patients and Methods

A total of 3,270 pulmonary resections for lung cancer between January 1989 and December 2002 at the National Cancer Center Hospital, Tokyo, were studied. The postoperative mortality rates, including 30-day and in-

hospital mortality, and causes of death were investigated. Thirty-day mortality was defined as a fatality that occurred within 30 days after pulmonary resection, and in-hospital mortality was defined as a fatality occurring at anytime in a postoperative hospital stay.

The 3,270 patients were divided into two period groups of almost equal number, the early (1,615 patients from 1987 to 1996) and the late (1,655 patients from 1997 to 2002) periods. A variety of analyses were performed to determine the changes in postoperative mortality in the last 16 years and to evaluate the risk factor for surgical resection for lung cancer. The result was compared with results from previous reports describing postoperative mortality in lung cancer surgery.

We normally perform the anatomic pulmonary resection for lung cancer through a standard posterolateral thoracotomy. In pneumonectomy cases, after closure of the main bronchial stump by suturing or stapling, we infold the stump with the membranous portion inside and oversew it with interrupted sutures, as we previously reported [1]. Then we prefer to cover the stump with a pericardial fat pad, especially for a right pneumonec-

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Table 1. Number of Lung Resections and Mortality Rates in the Last 16 Years

Years	No. of resections	30-day mortality		In-hospital mortality	
		No. of deaths	Mortality (%)	No. of deaths	Mortality (%)
1987-1996	1,615	13	0.8	45	2.8
1997-2002	1,655	8	0.5	13	0.8
Total	3,270	21	0.6	58	1.8

tomy. We have basically not used neoadjuvant preoperative therapy except for recent superior sulcus tumor cases.

Statistical analyses using the χ^2 test was performed to evaluate the differences in mortality according to the type of resection.

Results

Fifty-eight operative and postoperative deaths occurred during this period. Thirty-day and in-hospital mortality was 0.5% (21/3,270) and 1.6% (58/3,270), respectively. Among the recent 1,655 patients during the last 6-year period, 30-day and in-hospital mortality was 0.5% (n = 8) and 0.8% (n = 21), respectively (Table 1).

Of the 3,270 resections, there were 355 pneumonectomies, 2,594 lobectomies, and 321 segmentectomies or lesser resections. The 30-day/in-hospital mortality for pneumonectomy, lobectomy, and segmentectomy or lesser resections was 3.1%/5.9%, 0.3%/1.3%, and 0.3%/0.9%, respectively (Table 2). The difference in the 30-day/in-hospital mortality between the pneumonectomy and lobectomy group ($p < 0.0001/p < 0.0001$) was significant. The difference in the 30-day/in-hospital mortality between lobectomy and segmentectomy or lesser resection group ($p = 0.8641/p = 0.5701$) was not significant. The incidence of pneumonectomy cases decreased from 16.2% (262/1,615) in the early period to 5.6% (93/1,655) in the late period, although the in-hospital mortality of pneumonectomy has not improved between the early and late periods (6.1% vs 5.4%, $p = 0.7975$) (Table 3).

The 58 deaths were caused by pneumonia/acute respiratory distress syndrome (ARDS) (36%, n = 21), bronchopleural fistula (BPF)/empyema (33%, n = 19), cerebrovas-

cular accident (10%, n = 6), cardiac-related event (7%, n = 4), and others (14%, n = 8). The most frequent cause of death in the early period was BPF/empyema (18/45, 40%), while that in the late period was pneumonia/ARDS (6/13, 46%) (Table 4). Death that was due to BPF/empyema in the late period was only 8%. Among the six deaths due to pneumonia/ARDS in the late period, five (83%) were caused by acute deterioration of interstitial lung disease (ILD).

Comment

Lung cancer has been a major cause of death in many developed countries. Surgical resection continues to play an important role, especially in the earlier stage lung cancer. The detection of early cancer is increasing with the development of computed tomography (CT); therefore, it is important for surgeons to collect precise data on causes of postoperative deaths and try to improve the surgical mortality.

A limited number of previous reports describe postoperative mortality rates in recent decades, and most reports have defined a postoperative death as one occurring within 30 days after the procedure, as shown in Table 5 [2-8]. However, with the development of postoperative management techniques, complicated patients tend to survive more than 30 days and their deaths can be lost in such studies. We addressed this point by collecting all postoperative in-hospital deaths beyond the 30-day limit.

In 1983 Ginsberg and the Lung Cancer Study Group (LCSG) [2] determined the current standards for operative mortality associated with lung cancer resection. They reported that 81 postoperative deaths occurred among 2,220 resections, and the 30-day mortality was 3.7%. In 1999 Harpole and colleagues reported a large series with a 30-day mortality of 5.2% [4]. Our overall 30-day and in-hospital mortality was 0.6% and 1.6%, respectively. During the last 6-year period, 30-day and in-hospital mortality was 0.5% and 0.8%, respectively. These results were better than those noted by others, as shown in Table 5.

We believe this may be due to following reasons:

- The detection of early stage cancer is increasing in Japan with the development of CT scanners;

Table 2. Mortality Rates According to Type of Pulmonary Resections

Type of resections	No. of resections	30-day mortality		In-hospital mortality	
		No. of deaths	Mortality (%)	No. of deaths	Mortality (%)
Pneumonectomy	355	11	3.1 ^a	21	5.9 ^a
Lobectomy	2,594	9	0.3 ^b	34	1.3 ^b
Segmentectomy or less	321	1	0.3	3	0.9
Total	3,270	21	0.6	58	1.8

^a $p < 0.0001$ versus segmentectomy or less group;

^b $p = NS$ versus segmentectomy or less group.