Original Research

Incidence and duration of lactation and lactational performance among mothers of low-birth-weight and term infants

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The lactation experience of 55 mothers of 62 infants of low birth weight (2500 g or less) was prospectively compared with that of 55 mothers of 55 control infants (38 weeks' gestation or more, birth weight more than 2500 g) born at the same institution. The incidence rates of lactation at delivery were 73% for the control group and 58% for the low-birth-weight group; 11% of the infants of low birth weight fed breast milk were never put to the breast. The mean age at first suckling was 277.3 hours in the low-birth-weight group, compared with 3.3 hours in the control group ($p < 0.0005$). At first suckling 81% of the low-birth-weight infants and 25% of the control infants sucked poorly or refused the breast ($p < 0.001$). At discharge 65% of the breast-milk-fed control infants were exclusively breast-fed, compared with 3% of the low-birth-weight infants fed breast milk ($p < 0.001$). The incidence rates of lactation over time were similar in the control and low-birth-weight groups (51% v. 44% at 1 month, 29% v. 13% at 3 months, 13% v. 4% at 6 months and 4% v. 2% at 12 months). The mean duration of lactation was 3.2 months for the control group and 2.5 months for the low-birth-weight group. In the long term 37% of the low-birth-weight infants fed breast milk failed to breast-feed, compared with 2% of the control infants, and only 31% were exclusively breast-fed, compared with 85% of the control infants ($p < 0.001$). However, the degree of satisfaction with the lactation experience was similar in the two groups. We conclude that mothers of low-birth-weight infants have good potential for lactation.

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On compare de façon prospective l'expérience de lactation de 55 mères de 62 nouveau-nés de faible poids de naissance (au plus 2500 g) à celle de 55 mères de 55 nouveau-nés témoins (au moins 38 semaines, plus de 2500 g). La proportion de celles qui ont allaité est de 73% pour les mères témoins et de 58% pour les mères de nouveau-nés de faible poids de naissance. Parmi les enfants de faibles poids de naissance nourris au lait maternel 11% n'ont jamais été mis au sein. La première tétée a été retardée à l'âge moyen de 277,3 heures pour les enfants de faibles poids de naissance, par rapport à 3,3 heures pour les témoins ($p < 0,0005$). À la première tétée 81% des enfants de faible poids de naissance suçaient mal ou refusaient le sein, par rapport à seulement 25% des témoins ($p < 0,001$). Au congé 65% des enfants témoins nourris au lait maternel sont nourris exclusivement au sein, par rapport à 3% des enfants de faible poids de naissance ($p < 0,001$). Par la suite la proportion des mères qui allaitent sera semblable dans les deux groupes (51% contre 44% à 1 mois, 29% contre 13% à 3 mois, 13% contre 4% à 6 mois et 4% contre 2% à 12 mois). La durée moyenne de la lactation est de 3,2 mois pour les mères témoins et 2,5 mois pour les mères de nouveau-nés de faible poids de naissance. Parmi les enfants de faible poids de naissance nourris au lait maternel 37% n'ont jamais réussi à téter au sein, contre 2% des témoins, et seulement 31% ont été nourris exclusivement au sein, contre 85% des témoins ($p < 0,001$). Toutefois, les mères des deux groupes expriment le même degré de satisfaction à l'égard de leur allaitement. Les mères de nouveau-nés de faible poids de naissance peuvent donc fort bien allaiter.

In Canada between 1963 and 1982 the incidence rate of breast-feeding increased from 38% to 75%.[1] Studies of the incidence of breast-feeding in 1975–79 in the metropolitan Montreal area revealed rates of 45% for Mohawk

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Indian women,[2] 43% to 59% for Chinese women, depending on whether they had had prenatal counselling,[3] and 60% for French Canadian women.[4] A study in the regular nursery at our hospital in 1979 showed that 59% of mothers breast-fed.[5] Tanaka, Yeung and Anderson[6] reported an increase in the rate of breast-feeding from 71% for women in Montreal and Toronto in 1977–78[7] to 88% for women in Toronto in 1984–85.

In Norway, Finland and Brazil, where the incidence rates of breast-feeding of infants born at term are high (96%, 99% and 93% respectively), high rates for infants of low birth weight have also been reported (96%, 91% and 83% respectively).[8-10] In a study in Hamilton, Ont., 70% of mothers of premature infants of low birth weight (less than 36 weeks' gestation and less than 2500 g) chose to provide breast milk to their infants; the mean age at first suckling was 17 days, and in nearly 50% of cases effective suckling was not established.[11] Practical suggestions for breast-feeding the infant of low birth weight have been developed by nurses and by breast-feeding women themselves.[12-14] However, none of these studies compared the lactation experience of mothers of infants of low birth weight with that of mothers of infants born at term in the same institution.

We conducted a prospective study to explore differences between these two groups in the incidence and duration of lactation and in problems experienced during lactation. We examined the following questions: When did the women make their decision about breast-feeding? What were the reasons for not wanting to breast-feed? At what age was the first suckling, and what did the baby do? How many babies went home being exclusively breast-fed? How many were exclusively breast-fed at any time? How did the women perceive their experience, and why did they stop lactation?

Methods

All women who gave birth at Ste-Justine Hospital, Montreal, in June or July 1984 and their infants were eligible for the study. No attempt was made to enrol a predetermined number of patients. There was no promotion campaign for breast-feeding during this period, but the general philosophy at the hospital is to encourage breast-feeding. All women whose infants weighed 2500 g or less but were not seriously ill were asked to participate. The control group consisted of infants from the regular nursery who were born immediately after an infant of low birth weight, weighed more than 2500 g, had a length of gestation of 38 weeks or more, were of similar ethnic origin and had no medical problems.

An interview was conducted by one of us (M.D.) with each woman during her stay in hospital approximately 2 days after delivery. The women had to speak French or English and be willing to participate in the study. They were asked when and why they had decided to breast-feed or not and who had influenced their decision. Women who had decided to breast-feed were asked how long they planned to breast-feed, when their baby was first put to the breast and what he or she did. Obstetric information collected consisted of cesarean section rate and parity in relation to previous breast-feeding experience. Demographic information recorded included the woman's age, education, ethnic origin, social class (categorized according to Hollingshead's criteria[15]), marital status and employment. The medical records of the infants were reviewed, and the following information was recorded: birth weight, gestational age, twin birth, need for intensive care, discharge with mother, weight on discharge, mode of feeding on discharge and number of days in hospital. Infants were considered small for gestational age if their weight was below the 3rd percentile, large for gestational age if their weight was above the 97th percentile and of appropriate size for gestational age if their weight was between these percentiles.[16] Infants were considered preterm if born at 37 weeks' gestation or less.

All the breast-feeding women were interviewed by us and two nurses from the neonatal clinic 10 days after birth and then each month until the end of lactation (in this report lactation includes the period during which the woman expressed milk or breast-fed). The women were asked about the mode of feeding of their baby and whether they were satisfied with the experience. The degree of satisfaction was difficult to measure, but lactation was reported as very satisfying if the general comments of the woman were positive, as moderately satisfying if the woman had both positive and negative comments, and as unsatisfying if the woman's comments were frankly negative. The women's responses were analysed by two independent judges blinded to the birth weight of the infants; the degree of concordance between the judges was 87%.

At our hospital infants of low birth weight (2500 g or less) are admitted to the neonatal unit after birth, then sent to the regular nursery or discharged home. The infants are tube-fed until they reach 1600 g, then bottle-feedings are introduced according to tolerance. Medical condition permitting, infants have to weigh at least 1800 g to be put to the breast and be considered for transfer to the regular nursery, with the possibility of rooming-in with their mothers. In the neonatal unit a special breast-feeding room is available for intimacy. Women who wish to breast-feed their infant of low birth weight are usually taught by nurses with the help of a videotape on how to collect breast milk, which is done by manual expression or with a hand-operated breast pump.

We performed statistical analysis on a personal computer with a statistics package (StatView 1.0, BrainPower Inc., Calabrasas, California) using un-

paired *t*-tests, the chi-squared statistic and regression analysis. A probability of less than 0.05 was considered significant.

Results

All mothers and infants

During the study period 59 women gave birth to 66 infants of low birth weight. Two infants (880 g and 1000 g) died in the first few days of life, and their mothers were not interviewed. One woman of Asian origin was not interviewed because of the language barrier and because her baby had congenital anomalies. One woman was unavailable owing to transfer to another hospital after delivery. We thus studied 55 women with 62 infants of low birth weight and 55 women who gave birth to 55 control infants. The mean birth weight (and standard deviation [SD]) of the infants of low birth weight was 1946 (460) g, and the mean gestational age 33.7 (SD 3.4) weeks. Of the 62 infants of low birth weight 50 were preterm (46 of appropriate size, 2 small and 2 large for gestational age), and 12 were born at term (10 small and 2 of appropriate size for gestational age). The mean birth weight of the control infants was 3479 (SD 467) g and the mean gestational age 39.6 (SD 1.2) weeks.

The incidence rates of lactation at birth were 58% (95% confidence limits [CL] 45% and 71%) for the low- birth-weight group (32 mothers [35 infants]) and 73% (95% CL 61% and 85%) for the control group (40 mothers [40 infants]); the difference was not significant.

The decision whether to breast-feed had already been made at the beginning of pregnancy or earlier by 25 (78%) of the 32 mothers of breast-milk-fed infants of low birth weight, 38 (95%) of the 40 mothers of breast-milk-fed control infants and 13 (87%) of the 15 mothers of formula-fed control infants. However, only 10 (43%) of the 23 mothers of formula-fed infants of low birth weight had decided early in their pregnancy not to breast-feed; the difference between this group and the women in all the other groups was significant ($p < 0.01$). The mothers of the infants of low birth weight who were not lactating cited the following reasons for their decision: prematurity or twin pregnancy (in six cases), problems with own health or taking medication (in five), never wanted to breast-feed (in four), convenience because of planned absences of mother (in four) or smoking (in three); one woman gave no answer. The mothers of the control infants who were not lactating cited the following reasons: never wanted to breast-feed (in four cases), convenience because of planned absences of mother (in four), problems with own health or taking medication (in three), negative past experience with breast-feeding (in three) or smoking (in one).

Table I — Demographic characteristics of mothers of breast-milk-fed infants born at Ste-Justine Hospital, Montreal, in June or July 1984

Characteristic	Low birth weight (n = 32)	Control (n = 40)
Ethnic origin, no. (and %) of women		
French Canadian	26 (81)	36 (90)
Haitian	3 (9)	3 (8)
Other	3 (9)	1 (2)
Social class,[15] no. (and %) of women		
I–II (professionals)	6 (19)	11 (28)
III (clerical)	10 (31)	20 (50)
IV–V (manual workers)	16 (50)	9 (22)
No. (and %) of women married	23 (72)	29 (72)
No. (and %) of women working outside home	27 (84)	31 (78)
Mean age (and standard deviation [SD]), yr	27.3 (4.6)	27.7 (4.3)
Mean no. of years in school (and SD)	12.5 (3.5)	14.3 (3.2)*

*$p < 0.025$.

Breast-milk-fed group

The mothers of the breast-milk-fed infants of low birth weight were similar to the mothers of the breast-milk-fed control infants except for a lower number of years in school ($p < 0.025$) (Table I). Obstetric characteristics were also similar in the two groups. Eleven (34%) mothers of infants of low birth weight and four (10%) mothers of control infants gave birth by cesarean section.

Thirteen women in the low-birth-weight group and 20 control women could not trace any influence on their decision to breast-feed. Family, friends or culture was identified as a positive influence by 12 women in the former group and 11 women in the latter group and as a negative influence by 1 control woman. A doctor or nurse was cited as a positive influence by five women in the low-birth-weight group and three control women and as a negative influence by one woman in the former group. Finally, books and modern trends influenced one woman in the low-birth-weight group and five control women.

Of the 35 infants of low birth weight 29 were preterm (26 of appropriate size, 2 small and 1 large for gestational age), and 6 were born at term (all small for gestational age). Of the 35 infants 6 weighed 1500 g or less, 13 weighed 1501 to 2000 g and 16 weighed 2001 to 2500 g. There were three sets of twins. Half of the infants required intensive care, and most remained in hospital after their mother was discharged, in contrast to the control group (Table II).

In all cases there was complete follow-up until the end of lactation. There was a rapid decline in the incidence of lactation in both groups (Fig. 1).

The longest duration of lactation was 13 months in the control group (two women) and 15 months in the low-birth-weight group (one woman).

The mean duration of lactation was 2.5 months for the low-birth-weight group and 3.2 months for the control group; the difference was not significant (Table III). In the low-birth-weight group the mean duration of lactation was 1.8 (SD 1.9) months for infants weighing 1500 g or less, 3.1 (SD 4.0) months for infants weighing 1501 to 2000 g and 2.2 (SD 1.8) months for infants weighing 2001 to 2500 g; the differences were not significant. Twenty-two women in the low-birth-weight group and 35 control women reported a precise planned duration of lactation. There was a correlation between the planned and actual duration ($r = 0.642$, $p < 0.005$ for the low-birth-weight group; $r = 0.757$, $p < 0.0001$ for the control group).

Among the women in the low-birth-weight group the four most frequently cited reasons for stopping lactation were as follows: refusal of the breast or poor sucking by an infant previously bottle-fed (in eight cases), difficulty expressing milk (in seven), insufficient amount of milk (in five) and return to work or school (in four). Among the control women the four most frequently cited reasons were as follows: insufficient amount of milk (in nine cases), return to work or school (in seven), refusal of the breast after a successful period of breast-feeding (in four) and fatigue (in four).

The degree of satisfaction with the lactation experience was similar in the two groups (Table III).

Table II — Neonatal characteristics of the breast-milk-fed infants

Characteristic	Low birth weight (n = 35)	Control (n = 40)
No. (and %) of twins	6 (17)	0
No. (and %) admitted to intensive care unit	18 (51)	0
No. (and %) discharged with mother	13 (37)	40 (100)
Mean gestational age (and SD), wk	33.3 (3.4)	39.7 (1.2)
Mean birth weight (and SD), g	1863 (474)	3547 (443)
Mean weight on discharge (and SD), g	2168 (206)	3436 (427)
Mean no. of days in hospital (and SD)	24.2 (23.3)	4.0 (1.1)

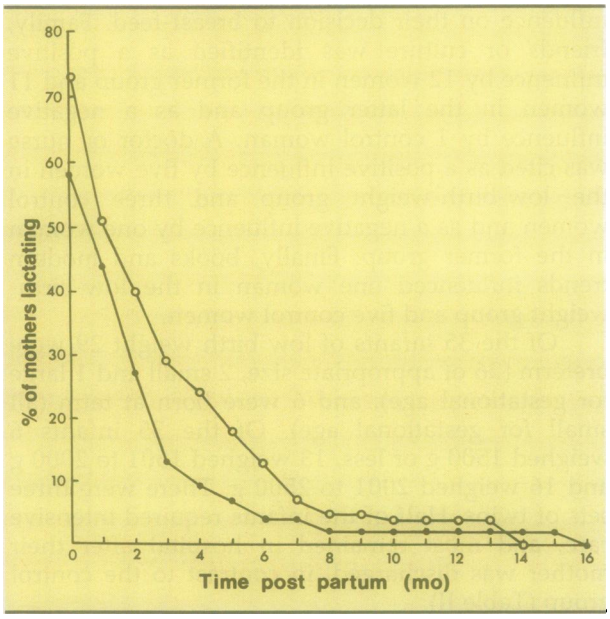

Fig. 1 — Incidence and duration of lactation among mothers of control infants (open circles) and mothers of infants of low birth weight (closed circles).

Discussion

The breast-feeding performance of infants of low birth weight in our study was quite different from that of babies born at term. The former were first put to the breast at a later age and with more difficulty, and only 1 of 35 was exclusively breast-fed at discharge. Despite the problems experienced with breast-feeding, mothers of infants

Table III — Summary of lactation experience

Factor	Group: Low birth weight	Group: Control
First experience at the breast		
Mean age of infants (and SD), h	277.3 (496.8)*	3.3 (6.7)†
No. (and %) of infants who refused the breast or sucked poorly	25 (81)*	10 (25)‡
No. (and %) of infants exclusively breast-fed at discharge	1 (3)	26 (65)‡
In the long term, no. (and %) of infants		
That failed to breast-feed	13 (37)	1 (2)‡
Both breast-fed and bottle-fed	11 (31)	5 (12)‡
Exclusively breast-fed	11 (31)	34 (85)‡
Mean duration of lactation (and SD), mo	2.5 (2.8)	3.2 (3.2)
Mean planned duration of lactation (and SD), mo	3.9 (2.5)	4.5 (2.8)
No. (and %) of women who perceived lactation		
Very satisfying	13 (41)	26 (65)
Moderately satisfying	12 (38)	10 (25)
Unsatisfying	6 (19)	3 (8)
No answer	1 (3)	1 (2)

*Data for 31 infants because 4 were never put to the breast.
†$p < 0.0005$.
‡$p < 0.001$.

Discussion

The breast-feeding performance of infants of low birth weight in our study was quite different from that of babies born at term. The former were first put to the breast at a later age and with more difficulty, and only 1 of 35 was exclusively breast-fed at discharge. Despite the problems experienced with breast-feeding, mothers of infants

of low birth weight maintained an incidence and duration of lactation similar to those of control women. This suggests that mothers of infants of low birth weight have good potential for lactation. Indeed, these women appeared to be quite highly motivated for breast-feeding even though their children were small and often immature, half of them required intensive care, which generated parental anxiety, and two-thirds of them had to stay in hospital after their mothers were discharged; for a few women these difficulties were compounded because they had twins. Although we could not find a difference in the incidence of lactation between the low-birth-weight and control groups this does not mean that the two groups were identical, as the statistical power of our study was low. At a β level of 0.2 the number of women in each group (55) would only permit us to detect a difference of 24% or more in the incidence of lactation between the two groups.

Except for the information on the timing of the decision to breast-feed, our results were obtained prospectively by frequent interviews with the women, in contrast to other studies.[8-10] In an uncontrolled group of infants of low birth weight[11] the mean age at first suckling, mean duration of lactation and rate of failure to establish effective infant suckling were similar to our findings. Like us, Meberg, Willgraff and Sande[8] found that fewer preterm infants than infants born at term went home being exclusively breast-fed; however, their proportions were considerably higher. Verronen[9] reported that one-third of infants of low birth weight required daily supplemental bottle feedings, a rate similar to that in our study. Meberg and colleagues[8] found that the duration of breast-feeding was longer for infants born at term than for preterm infants (7.0 v. 5.6 months), but among preterm infants there was no correlation between duration of breast-feeding and birth weight or gestational age. A study in Australia found that one-third of infants weighing under 1500 g were weaned off breast milk while in hospital.[17] A remarkable exception is the experience reported by Pearce and Buchanan[18] from New Zealand: all 17 consecutive babies weighing less than 1500 g received breast milk; 10 of them were exclusively breast-fed and were discharged at a mean weight of 1677 g.

There are wide variations in the incidence and duration of breast-feeding between countries, and infants of low birth weight are best compared with their peers born at term in the same geographic area. Canadian studies show a rapid decline in breast-feeding rates after the first few months. At 3 to 4 months the rates were reported to be between 19% and 28% in the metropolitan Montreal area in 1977–79[2,3,5] and 44% in the whole country in 1982.[1] The rates at 3 months in our study were 29% for the control group and 13% for the low-birth-weight group. The decline with time is reported to be much slower in Norway, Finland and Brazil, with incidence rates of breast-feeding at 6 months of 59%, 70% and 31% respectively for infants born at term and 45%, 46% and 23% respectively for infants of low birth weight.[8-10] In our study the corresponding rates were 13% and 4%. In the Australian study the proportions of surviving infants with a birth weight under 1500 g who were breast-milk-fed at birth, at 3 months and at 6 months were 75%, 44% and 23% respectively.[17]

In our study all 23 women who lactated for 3 months or more were satisfied with the experience.

Most of the women in our study had decided before the pregnancy or very early in the pregnancy on the mode of feeding they preferred for their infants. Mothers of formula-fed infants of low birth weight were an exception: more than half made their final decision during the pregnancy or at delivery. However, this information was collected retrospectively, which may have introduced a recollection bias. These findings are similar to those reported in a study of breast-feeding among infants weighing less than 1500 g.[17] In our study many women in the low-birth-weight group changed their minds about breast-feeding; for 26% the reason was prematurity or twin pregnancy. Prematurity was also the reason cited for not breast-feeding by more than half of the mothers of infants of very low birth weight.[17] Health care professionals must educate mothers of infants of low birth weight that prematurity and twin pregnancy do not preclude breast-feeding. Doctors should also discuss with their patients the mother's health and use of medications in relation to breast-feeding.

In our study more than two-thirds of the women in the low-birth-weight group stopped lactating because the infant sucked poorly or because of difficulty expressing milk or an insufficient amount of milk, whereas only one-third of the control women cited these factors. In other studies among infants of low or very low birth weight an insufficient amount of milk was the commonest reason for stopping lactation.[11,17] Here again, there may be a role for health care workers in teaching women the physiology of lactation.

Hopkinson, Schanler and Garza[19] examined the duration and frequency of daily milk expression and milk volume in mothers of premature infants and suggested that optimal milk production was associated with five or more periods of milk expression each day and durations of pumping (with an electric pump) exceeding 100 minutes each day. Our data are not complete enough to provide any new information on this subject. However, many women in the low-birth-weight group freely expressed their distaste for pumping breast milk, a factor that may be important in successful lactation.

In summary, because of inherent characteristics of infants of low birth weight, their mothers face more problems when breast-feeding than do mothers of healthy infants of appropriate weight born at term. When a mother of a low-birth-weight infant faces difficulties, she should be encouraged.

The health care professional should explain that it is not the woman's own abilities that are deficient, but, rather, her infant is behaving like a typical low-birth-weight infant, and patience and perseverance may overcome the problems. Mothers of infants of low birth weight have good potential for lactation.

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Upcoming Meetings

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June 16, 1989: 11th Annual Social Work Clinic Day — Symposium on Aging: Today's Trends, Tomorrow's Dilemmas — Is There a Future for Social Work?
Joseph E. and Minnie Wagman Centre, North York, Ont.
Sybil Gilinsky, Education Department, Baycrest Centre for Geriatric Care, 3560 Bathurst St., North York, Ont. M6A 2E1; (416) 789-5131, ext. 2365

June 23, 1989: Anatomic Pathology of AIDS (satellite symposium to the Canadian Association of Pathologists' June 24–28 annual meeting in Ottawa)
Toronto General Hospital
Continuing Medical Education, Faculty of Medicine, University of Toronto, Medical Sciences Building, Toronto, Ont. M5S 1A8; (416) 978-2718

June 24–28, 1989: Canadian Congress of Laboratory Medicine: CCLM '89 (incorporating the annual meeting of the Canadian Association of Pathologists)
Chateau Laurier Hotel, Ottawa
Events Management Inc., 209–4 Cataraqui St., Kingston, Ont. K7K 1Z7; (613) 547-5093

Aug. 5–10, 1989: World Congress on Health
Great Hall of the People, Beijing
Kenneth A. Garceau, director of medical programs, World Congress on Health, Dwight D. Eisenhower Building, Spokane, WA 99202, USA; (509) 534-0430, FAX (509) 534-5245

Aug. 20–24, 1989: Ethics, Justice and Commerce in Transplantation: a Global View (cohosted by the Department of National Health and Welfare and the Transplantation Society)
Ottawa Congress Centre
Abstract deadline is June 30, 1989.
Robert A. Davis, administration and logistics coordinator, Ethics, Justice and Commerce in Transplantation: a Global View, 185 Rideau St., 2nd Floor, Ottawa, Ont. K1N 5X8; (613) 563-3401

Sept. 7–10, 1989: Pediatric Orthopedics
Blachford Lake Lodge, Yellowknife
Mrs. P. Lessard, executive secretary, Northwest Territories Medical Association, c/o Stanton Yellowknife Hospital, PO Box 10, Yellowknife, NWT X1A 2N1

Sept. 14–16, 1989: Dermatology '89: Therapeutic Update
New World Harbourside, Vancouver
Dermatology '89, 204–402 W Pender St., Vancouver, BC V6B 1T6; (604) 669-7175, FAX (604) 669-7083

Oct. 1–5, 1989: Association of Canadian Medical Colleges, Association of Canadian Teaching Hospitals and Canadian Association for Medical Education Joint Annual Meeting
Westin Hotel, Winnipeg
Janet Watt-Lafleur, Association of Canadian Medical Colleges, 1006–151 Slater St., Ottawa, Ont. K1P 5N1; (613) 237-0070, FAX (613) 563-9745

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