Respiratory medicine in Saskatchewan: An historical perspective

Donald W Cockcroft MD FRCP(C)

EARLY DAYS: 1905 to 1957

Saskatchewan (capital Regina) was created out of the Northwest Territories on September 1, 1905, at the same time as Alberta, the second last provinces admitted to confederation. Its population has been relatively stable (one million ± 15%) since 1930. The University of Saskatchewan (U of S) was granted a provincial charter April 3, 1907, and, after considerable debate and controversy, Saskatoon was selected as the U of S site in April 1909; the first building was opened in 1912 and the first degree was also awarded in 1912. A two-year preclinical school of medical sciences (total faculty of five for many years) opened in 1926, initially with classes in converted greenhouses (1); clinical years were completed elsewhere. A university teaching hospital was conceived in 1911 (1), excavation began in 1948; the cornerstone was laid September 19, 1952, by Tommy Douglas, and the University Hospital (UH) opened May 14, 1955. The first class of MDs fully trained at the U of S graduated in 1957. The UH was renamed the ‘Royal University Hospital’ in 1990 (2).

THE SASKATCHEWAN ANTI-TUBERCULOSIS LEAGUE (1911 to 1987)

The Saskatchewan Anti-Tuberculosis League (75-year history documented in reference 3) was founded in 1911 to coordinate the fight against tuberculosis (TB). Three TB sanatoria with >800 beds were established: Fort Qu’Appelle (also known as ‘Fort San’, 1917), Saskatoon (1925) and Prince Albert (1930), for hospitalized management of the disease. George Ferguson (1883 to 1964) came to Fort San in 1917 for six months and remained as Medical Superintendent of the League until his retirement in 1948. The League, under George Ferguson’s direction, was the first in the Americas to offer free TB treatment (1920), to provide a mass Bacille Calmette-Guérin vaccination program (1930s) and to offer a mass TB screening program (1941). As drug therapy became available and successful, the three sanatoria were eventually closed in the 1960s and 1970s after a total of 10.5 million patient-days; the last patient was discharged from the Saskatoon San on June 26, 1978. In the 1960s, the League became progressively involved in other respiratory diseases and transitioned to the Saskatchewan Lung Association (SLA). The League continued to operate the TB control program until 1987. In 1987, the TB program was transferred to the Ministry of Health (provincial government) and the League was officially renamed the SLA, now the Lung Association of Saskatchewan (LAS) since 2000. In 1973, an historic agreement was signed between the Saskatchewan Anti-Tuberculosis League, the U of S and the UH to establish a respiratory disease unit in Saskatoon (3). The financial support for this unit continues to this day, and has allowed recruitment of an excellent group of clinicians and researchers.

RESPIRATORY MEDICINE IN SASKATCHEWAN (1970s)

The first (nonthoracic) pulmonologist in Saskatoon was Clive Deutcher (MD, U of S 1967, postgraduate training University of Alberta, Edmonton, Alberta), recruited to the Department of Medicine in 1972; he left the university in 1976. Things were very primitive in 1972; however, over his four years, with what must have been hard work and perseverance, Clive kick-started clinical respirology in Saskatchewan. Blood gas analysis – until then exclusively performed by anesthesiology – came under respiratory medicine until it was transferred to the biochemistry laboratory in 1976. He inherited a fledgling pulmonary function laboratory from John Merriman (cardiology) and upgraded it to then current standards. There was no intensive care unit; ventilator patients were managed in the postoperative recovery room. New volume-cycled ventilators were purchased to better manage respiratory failure patients. As the sole respiratory specialist in Saskatoon, providing clinical care along with patient education, undergraduate education, postgraduate education and continuing medical education consumed much of his time. Clive laid the foundations for what has become a very successful division in a (very) small Department of Medicine.

The Ferguson Professorship, named after George Ferguson, was created, with financial support from the Saskatchewan Anti-Tuberculosis League; the first recipient was Jim Dosman, recruited as Division Head in July 1975. The pulmonary research laboratory at the UH, dedicated to the memory of George Ferguson, was opened in November 1975. Brian Graham, biomedical engineer, was recruited in April 1976 and, with assistance of the League, David Cotton joined the Division in July 1976. July 1977 witnessed the arrival of Vern Hoeppner and Don Cockcroft, both applicants for the single position to replace Clive Deutcher, and both recruited with the help of the League. Remarkably, all five members (Figure 1) recruited over that 24-month period, remained active at the university 37 years later, in mid-2014. All four clinicians have been the Division Head, all four have held the Ferguson Professorship, and three of the four have been the Head of the Department of Medicine. Despite the continuing major teaching and clinical demands, this small group proved to be highly productive.

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Jim Dosman pioneered studies of respiratory disease in agricultural workers (4-6). The first two (of seven) international symposia on grain dust/agriculture and health were held in Saskatoon in 1977 (7) and 1985 (8) (Figure 2) while he was still within our division. Jim was Division Head (Ferguson Professor) from 1975 to 1984, the Head of the Department of Medicine from 2002 to 2003 and President of the Canadian Thoracic Society (CTS) from 1984 to 1985. In 1986, Jim founded what is now the Canadian Centre for Health and Safety in Agriculture (CCHSA), a separate Division within the Department of Medicine. The CCHSA currently has nine full-time faculty including one clinician, seven PhD researchers with appointments in three different departments, and Jim Dosman as an Emeritus professor. In the past two years (2012 to 2014), the CCHA has hosted a successful seventh international symposium, has approximately 54 peer-reviewed publications and received in excess of $15 million in peer-reviewed research funding. Jim continues to be heavily involved in the CCHSA research portfolio, and to do clinical work, self-described as 90% sleep medicine.

David Cotton and Brian Graham studied gas exchange and measurement of the diffusing capacity (9-11), resulting in the development of a three-equation (inspiration, breath-hold and expiration) method to more accurately calculate the diffusing capacity (10). The conventional method for measuring diffusing capacity relies on the breath-hold calculation, and requires rapid inflation and exhalation to be accurate, which is not always possible in disease states. The availability of a rapidly responsive carbon monoxide detector enabled continuous monitoring of carbon monoxide and, thus, an accurate assessment of diffusion during inhalation and exhalation as well as breath-hold (Figure 3). The three-equation method is now commercially available on several pulmonary function systems. David was the Division Head from 1984 to 1994 (Ferguson Professor for nine of those 10 years), the Head of the Department of Medicine from 1994 to 2000 and CTS president from 1992 to 1993. For the last several years before retirement in 2014, David focused on sleep medicine, both clinical and research. Brian was seconded to the Saskatchewan Anti-Tuberculosis League/SLA as executive director while maintaining his academic post as an associate professor of medicine. This unique relationship in 2014, David focused on sleep medicine, both clinical and research. Brian was seconded to the Saskatchewan Anti-Tuberculosis League/SLA as executive director while maintaining his academic post as an associate professor of medicine. This unique relationship extended to increases in the allergen-induced late response (18) and allergen-induced airway inflammation (19). This is a plausible explanation for beta agonist-induced worsened asthma control (20). Don was Division Head and Ferguson Professor from 1996 to 2006, CTS president 1998 to 1999 and was a founding member of the Allergy Genes and Environment (AllerGen) National Centres of Excellence (NCE) Clinical Investigative Collaboration (CIC) in 2006. The AllerGen NCE CIC is a multicentre collaboration co-chaired by Paul O’Byrne and Louis-Philippe Boulet using identical methods of bronchoprovocation (developed mainly by Freddy Hargreave), primarily with allergen, to study early stage new pharmaceutical agents with both a view to potential new treatments as well as further understanding the pathophysiology of allergen-induced asthma (21). He continues to be a full-time academic professor at the U of S, 50% clinical/teaching and 50% research.
RESPIRATORY MEDICINE IN SASKATCHEWAN:
1980 to 2015

In the years following the 1970s, our division has thrived and expanded with continued tremendous assistance from the LAS. The Lung Association has continued to provide salary support, both 41 years of Ferguson Professorships (eight individuals), and 135 person-years of additional Lung Association professorships (15 individuals). The John Moorhead Foundation funds research into asthma; these funds are administered by the LAS and have supported 18 research fellows (22 years). Table 1 outlines the academic members of the Division of Respirology, Critical Care and Sleep Medicine from 1972 to date. The division of Respirology, Critical Care and Sleep Medicine currently consists of 13 university-based faculty members (Figure 6): eight clinicians and five nonclinicians (two Emeritus). There are also 13 community-based clinicians, seven in Saskatoon (Kemp Gowda, Norm Joans, Mandeep Ubbi, Rod Hafezi, Greg Peters, Nathan Janzen and Richard Natraj) and six in Regina (Ram Abdulla, Prakash Patel, G Shridar, Abdalla Mufta, Shababz Sheikh and Zenon Belak). Jim Dosman is an Emeritus clinician in the CCHSA; this totals 22 clinical respirologists currently in the province. Table 1 Academic members, Division of Respirology, University of Saskatchewan (U of S) 1972–2015

<table>
<thead>
<tr>
<th>Member</th>
<th>Date</th>
<th>Expertise</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clive Deutcher</td>
<td>1972–1976</td>
<td>Clinical respirology</td>
<td>Retired</td>
</tr>
<tr>
<td>Jim Dosman</td>
<td>1975–1986</td>
<td>Agricultural medicine</td>
<td>CCHSA</td>
</tr>
<tr>
<td>David Cotton</td>
<td>1976–2014</td>
<td>Gas exchange, diffusion, CF, sleep</td>
<td>Retired</td>
</tr>
<tr>
<td>Don Cockcroft</td>
<td>1977–date</td>
<td>Asthma, CF</td>
<td>U of S</td>
</tr>
<tr>
<td>Vern Hoeppner</td>
<td>1977–date</td>
<td>TB</td>
<td>U of S</td>
</tr>
<tr>
<td>Jeremy Road</td>
<td>1983–1985</td>
<td>COPD, home ventilation</td>
<td>UBC</td>
</tr>
<tr>
<td>Irv Mayers</td>
<td>1985–1995</td>
<td>ICU, Sleep</td>
<td>U of A</td>
</tr>
<tr>
<td>Charlie Gallagher</td>
<td>1987–1996</td>
<td>Exercise</td>
<td>Ireland</td>
</tr>
<tr>
<td>Tom Hurst</td>
<td>1987–2007</td>
<td>Pulmonary function</td>
<td>Emeritus</td>
</tr>
<tr>
<td>Darcy Marcinik</td>
<td>1990–date</td>
<td>COPD, exercise</td>
<td>U of S</td>
</tr>
<tr>
<td>Mike Fitzpatrick</td>
<td>1992–1997</td>
<td>ICU, sleep</td>
<td>Queen’s</td>
</tr>
<tr>
<td>Karen Laframboise</td>
<td>1997-date</td>
<td>ICU, pulmonary hypertension, U of S</td>
<td>Health education</td>
</tr>
<tr>
<td>Anil Nagpal</td>
<td>1998–2000</td>
<td>Sleep</td>
<td>Kitchener</td>
</tr>
<tr>
<td>Robert Skomro</td>
<td>1998–date</td>
<td>Sleep</td>
<td>U of S</td>
</tr>
<tr>
<td>Brian McNab</td>
<td>2000–2006</td>
<td>Education, clinical respirology</td>
<td>U of A</td>
</tr>
<tr>
<td>John Gjevre</td>
<td>2002–date</td>
<td>ICU, sleep, CF</td>
<td>U of S</td>
</tr>
<tr>
<td>John Reid</td>
<td>2003–2014</td>
<td>ICU, sleep</td>
<td>Victoria</td>
</tr>
<tr>
<td>John Gordon</td>
<td>2007–date</td>
<td>Immunology, inflammation</td>
<td>U of S</td>
</tr>
<tr>
<td>Mark Fenton</td>
<td>2008–date</td>
<td>Transplantation, sleep</td>
<td>U of S</td>
</tr>
<tr>
<td>Chris Hergott</td>
<td>2009–2014</td>
<td>Interventional bronchoscopy</td>
<td>U of Calgary</td>
</tr>
<tr>
<td>Cam Pierce</td>
<td>2009–2011</td>
<td>Clinical respirology</td>
<td>Retired</td>
</tr>
<tr>
<td>Beth Davis</td>
<td>2010–date</td>
<td>Asthma clinical research</td>
<td>U of S</td>
</tr>
<tr>
<td>Erika Penz</td>
<td>2013–date</td>
<td>Health economics</td>
<td>U of S</td>
</tr>
<tr>
<td>Donna Goodridge</td>
<td>2014–date</td>
<td>Health systems improvement</td>
<td>U of S</td>
</tr>
</tbody>
</table>

*Current academic Respirology Division Members; †Queen’s University, Kingston, Ontario; ‡University of Calgary, Calgary, Alberta. CCHSA Canadian Centre for Health and Safety in Agriculture; CF, Cystic fibrosis; COPD, Chronic obstructive pulmonary disease; ICU, Intensive care unit; TB, Tuberculosis; U of A, University of Alberta, Edmonton, Alberta; UBC, University of British Columbia, Vancouver, British Columbia

Figure 4) Treatment adherence to tuberculosis prophylaxis. At six weeks, directly observed prophylaxis (DOP) was superior to education and standard treatment groups. Standard treatment was used from six weeks onward and adherence was dismal at 16 and 43 weeks in all groups. Modified from Wobeser, et al. The outcome of chemoprophylaxis on TB prevention in the Canadian plains Indians. Clin Invest Med 1989;12:149-53 and reproduced with the permission of Dr V Hoeppner and the journal. SAP Self-administered antituberculous prophylaxis

Figure 5) Allergen provocation concentration causing a 20% fall in forced expiratory volume in 1 s (PC_{20}) following two-week treatment with placebo (two puffs four times daily) and salbutamol 100 µg (two puffs four times daily). The solid circles are 12 h after the last dose of blinded medication: there is almost a twofold increase in airway response to allergen (fall in PC_{20}) after the regular use of the beta-agonist (P=0.0009). The open circles are repeat allergen PC_{20} measurements after a single dose of salbutamol 200 µg: after regular use of salbutamol, there is a significant reduction in the bronchoprotective effect of the beta-agonist (P=0.025)
Tom Hurst was a division member from 1987 to 2007. He upgraded and directed the clinical pulmonary function laboratory and provided valuable technical support for collaborative studies with David Cotton and Brian Graham, Jim Dosman, Don Cockcroft and, as a veterinarian, was particularly helpful in Irv Mayers’ animal research program. Tom is currently a professor Emeritus in the division.

Darcy Marciniuk joined the division in 1990. He and Charlie Gallagher developed both research and clinical laboratories to study exercise physiology in health and disease. The exercise laboratory has yielded numerous publications and trainees. An example is shown in Figure 7. In 16 subjects with COPD and normal oxygenation at rest, supplemental oxygen by mask or nasal prongs significantly improved the 6 min walking distance. However helium/hyperoxia (70%/30%) produced a substantially greater increase (22). Darcy and Charlie were the first to fully investigate the behaviour of operational lung volumes in interstitial lung disease (Figure 8) (23). Darcy also worked to establish the LiveWell Chronic Disease Management program, and remains the medical director of the LiveWell COPD program in Saskatoon. Darcy was president of the CTS from 2006 to 2007, and the (first non-American) president of the American College of Chest Physicians from 2012 to 2013. He has been active in the CTS COPD committee and is lead author on several CTS COPD guidelines (eg, reference 24). Darcy is well respected in his field, with >270 invited national and international presentations. Darcy has currently taken on a new role as Special Advisor, Research and International with the U of S.

Karen Laframboise joined the division in 1997, bringing expertise in critical care, pulmonary hypertension and medical education. She is a member of the CTS pulmonary vascular disease committee (chronic thromboembolic pulmonary hypertension guidelines [25]) and recently...
became program director for the Department of Medicine core internal medicine training program.

Robert Skomro joined the Division in 1998 with a major clinical and research interest in sleep medicine. He assumed the position of Medical Director of the Sleep Disorder Centre in 2000 and oversaw expansion of the unit from eight to 30 studies per week. The sleep group has established the first publically funded home monitoring program for obstructive sleep apnea (OSA) in Canada. The sleep laboratory has investigated and treated >3000 OSA patients. Together with colleagues from the Division, Robert established a sleep medicine research program that focused on the diagnosis, management and comorbidities of sleep-disordered breathing (SDB). The group has published >50 articles. Robert and colleagues documented in a randomized controlled trial the comparable diagnostic efficacy of in-home level 3 sleep studies compared with in-laboratory level 1 studies (26). He became the Chair of CTS SDB Clinical Assembly in 2011 and a member of the CTS Home mechanical ventilation clinical assembly. These collaborations with colleagues from across the country have led to publication of four position papers and guidelines in the Canadian Respiratory Journal.

John Gjevre joined the Division in 2002 with expertise in critical care, cystic fibrosis and sleep medicine. He has been director of the adult cystic fibrosis clinic until recently and is currently the director of the sleep laboratory. His research interests are in the area of SDB particularly as related to patients with rheumatoid arthritis (27).

John Reid joined the Division in 2003 and relocated to British Columbia in 2014. He brought expertise in both critical care and sleep medicine. John was program chair from 2006 to 2013, and Division Head from 2013 to 2014. His research interests focused on SDB in pregnancy (28).

John Gordon joined the division in 2007 transferring from the Department of Microbiology in the College of Veterinary Medicine. He adds expertise in basic immunology especially as related to both allergic/asthmatic diseases (29) and neutrophilic inflammatory conditions (30).

Mark Fenton joined the division in 2008. He brings expertise in both transplantation and SDB and established the Saskatchewan Lung Transplant Clinic. Research interests are in the respiratory health of First Nations, physiology and clinical evaluation of OSA (31).

Beth Davis joined the division in 2010 as a research scientist. She documented the additive/synergistic effect of single dose H1 blocker and leukotriene receptor antagonist inhibition of airway response to allergen (32). Beth runs the asthma (bronchoprovocation) laboratory with Don Cockcroft and is involved in numerous studies both within and outside the AllerGen CIC.

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16. Cockcroft DW, Murdock KY. Comparative effects of inhaled salbutamol, sodium cromoglycate, and beclomethasone dipropionate


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