Dr. Turgeon #1
April , 2016
No. S095493
Vancouver Registry

IN THE SUPREME COURT OF BRITISH COLUMBIA

BETWEEN:

DENNIS JONES and SUSAN WILKINSON

Plaintiffs

AND:

ZIMMER GMBH, ZIMMER, INC., and
ZIMMER OF CANADA LIMITED

Defendants

Brought under the *Class Proceedings Act*, R.S.B.C. 1996, c. 50

AFFIDAVIT OF DR. THOMAS TURGEON #1

I, DR. THOMAS TURGEON of the City of Winnipeg, in the Province of Manitoba,

MAKE OATH AND SAY AS FOLLOWS:

1. I am an orthopedic surgeon and the Director of Arthroplasty Research in the Section Orthopedics, and an Assistant Professor at the University of Manitoba.

2. I have been asked by Plaintiff to prepare an expert report in this matter. This is attached as **Exhibit A**.

3. A copy of my *curriculum vitae* is attached as **Exhibit B**.

SWORN before me at the)
City of Winnipeg,)
in the Province of Manitoba,)
this 6th day of April , 2016.)
)
)

Tom Turgeon
Dr. Thomas Turgeon

Keith Lenton
A Notary Public in and for
the Province of Manitoba.

This is the Exhibit "A" referred to in the Affidavit of Dr. Thomas Turgeon Sworn before me this 8th day of April A.D. 2016
A Notary Public in and for the Province of Manitoba

February 25, 2015

Douglas Lennox
Klein Lawyers
5600 – 100 King Street West
Toronto, ON M5X 1C9

Thomas Turgeon
Concordia Hip and Knee Institute
310-1155 Concordia Ave
Winnipeg, MB R2K 2M9

Dear Mr. Lennox,

Re: Jones v. Zimmer GMBH et al,

You have retained me as a Canadian orthopedic surgeon to provide an objective opinion that may be of assistance to the court in this lawsuit. In this report, I address the following questions

1. Please describe your professional qualifications.

2. What is a hip implant?

3. What conditions are hip implants used to treat?

4. Do all hip implants eventually fail?

5. What are the consequences to a patient of premature hip implant failure?

6. What expectations does the medical community have for the survivability of hip implants? How is survivability measured? How does the performance of the Zimmer Durom Cup compare relative to other hip implants?

7. What does the available medical literature say about potential problems with the Zimmer Durom Cup?

8. Assuming that the Zimmer Durom Cup was available for sale in Canada between 2004 and 2010, with 84% of sales occurring by 2008 or earlier, for patients suffering from a failure of the Durom Cup to properly adhere to the bone, would such a problem likely have been detected and treated in those patients by September 1, 2015?

My answers are set out below. In providing this report, I certify that I am aware of my duty to assist the court and not be an advocate for any party, to provide opinion evidence that is objective and non-partisan, to provide opinion evidence that is related only to matters that are within my professional area of expertise, and to provide any additional assistance that the court may reasonably require to determine a matter in issue. I have made my report in conformance with these duties, and if called to give oral or written

testimony, I will give that testimony in conformance with those duties.

Question #1: Professional Qualifications

My personal qualifications to act as an expert in this case are as follows: after graduating from medical school, I completed a five-year residency training program at the University of Saskatchewan in orthopedic surgery. Following this, I completed a two-year fellowship program in joint reconstruction focusing on hip and knee replacement surgery. This was done at the San Diego Arthritis Surgery Center it was affiliated with the University of California San Diego. I have been practice as an academic joint replacement surgeon since October, 2005. During that time, I have performed over 3000 operations, the majority of which, were hip and knee replacement surgeries. I am currently the Director of Arthroplasty Research in the Section of Orthopedics and an Assistant Professor at the University of Manitoba. I am a member of the Concordia Joint Replacement group and currently operate out of Concordia Hospital in Winnipeg Manitoba. I am a member of the Canadian Orthopaedic Association, the Canadian Arthroplasty Society, the American Academy of Orthopedic Surgeons and the American Association of Hip and Knee Surgeons.

Question #2: What is a hip implant?

A hip implant would be any device that is implanted in or around the hip joint. This can include plates and screws as well as nails that are used in the treatment of hip fractures where the joint is retained. This can also include joint replacement implants such as a hip replacement where the hip joint is partially or completely replaced. Hip replacement implants are predominantly metal. Much of the developmental work in hip replacement occurred in the 1960s. Sir John Charnley is largely credited as being the greatest pioneer of hip replacement surgery. His original design called the "low friction arthroplasty" became the standard by which all subsequent hip replacement devices were measured.

A hip replacement implant is used to replace one or both sides of the hip joint. The hip joint is made up of the top end of the thighbone or femur, which is also called the femoral head. The hip joint is a ball and socket joint. The femoral head acts as a ball and sits inside a large depression in the pelvis called the acetabulum. A hip replacement where only half of the hip is replaced is called a hemiarthroplasty. Hemiarthroplasties generally involve the replacement of just the femoral head and keep the patient's original acetabulum untouched. This is generally only used for elderly hip fracture patients. It is occasionally used in patients with arthritis that may be at extremely high risk of dislocation after surgery.

A full hip replacement, also known as a total hip arthroplasty, replaces both the femoral head and acetabulum. The surface of the acetabulum is reamed away to expose healthy bleeding bone. The acetabular component of the hip replacement

can then be secured to the bone using either cement or by the body's natural healing response two in-grow and secure the acetabular component. On the thighbone or femur side, the femoral head for is cutaway with traditional hip replacement. The top end of the thighbone shaft is then prepared with tools such as reamers and broaches. The thighbone or femoral component is then secured inside the thigh bone using either cement or in-growth. The vast majority of modern hip replacement components are modular. This means that the components of the implant that are fixed to bone are separate from the components that rub against each other in the joint itself. Most hip replacements have four components consisting of the femoral stem, femoral head, acetabular shell, and acetabular liner. Some implants on the acetabular side do come as a monoblock or single component which encompasses both the bone fixation side as well as the articulation side. This is the case with hip resurfacing.

Hip resurfacing technology is a relatively new concept in the hip replacement. It involves similar preparation of the acetabulum with an in-growth cup. Instead of removing the head of the femur, the surface of the head is reamed away keeping the femoral neck. A large, hollow metal head with a narrow central shaft can then be cemented onto the existing femoral neck and remaining femoral head. The large head offered by this metal-on-metal articulation gives significant reduction in dislocation risk versus traditional designs and additional benefits were also purported. One risk that was present with this design that was new to hip replacement, was fracture of the remaining femoral neck. Because of the resurfaced acetabulum, traditional hip replacements were incompatible. To deal with this complication, implant manufacturers created modular femoral head components similar to the hemiarthroplasty components that were compatible with the resurfacing acetabular components and that could be mounted on traditional hip replacement stems. These are generally referred to as "large head" metal-on-metal hip replacement.

Most of the parts of a hip replacement are made of metal. The femoral stem components are generally made of titanium, stainless steel or an alloy of cobalt and chromium. The acetabular shell can also be made of titanium, or cobalt chromium. The acetabular liner can be made of polyethylene, ceramic, or cobalt chromium. The femoral head can be made of cobalt chromium, ceramic, stainless steel or an oxidized zirconium alloy. The most common and traditional bearing surface is a cobalt chromium head on a polyethylene liner. The original "low friction arthroplasty" used a stainless steel stem with a polyethylene acetabular component. The monoblock acetabular components are made of either polyethylene or cobalt chromium. Titanium is too soft to be an effective bearing surface and is not used. Titanium is used for the acetabulum and femoral modular components as it is highly biocompatible with the human body.

Over the decades, improvements have been made in total hip replacement implants. When they first started, both the femoral and acetabular components were secured to the bone using bone cement. While this worked well on the femoral

side, there were significant problems on the acetabular or pelvis side. Parts tended to come loose after 7 to 10 years prompting interest in developing other fixation technologies. The most common fixation technology used in North America for the last 15 years has been that of bony ingrowth into metallic implants. If metals are biocompatible and have a roughness with an appropriate shape, the body is fooled into thinking that this is a fracture with an adjacent piece of bone. The body will latch onto the metal implant and secure it to the skeleton. Because of the biological components of this fixation, it is believed that almost indefinite fixation of the implants can be achieved. Another problem that was regularly seen to the 1980s and 1990s, was bone destruction and premature loosening of the implants. This was attributed to the debris that was created as the femoral head rubbed back and forth on the polyethylene liners. Other bearings other than metal on polyethylene had been experimented with since the 1960s and 1970s. These included ceramic on ceramic and cobalt chromium on cobalt chromium. While the early trials with these materials failed in a number of patients, it was difficult to determine if the failure of the device was due to the bearing surface or the inferior design and fixation of femoral and acetabular components. While some of these devices failed very early in the 1960s and 1970s, a small number of patients had successes that far outlasted any of the metal on polyethylene bearing hips. Faced with the challenge of polyethylene wear leading to failure of the devices, implant manufactures went looking to these alternative bearings, and with new manufacturing techniques and more accurate manufacturing tolerances, brought three modern bearing options to orthopedics. These included a new version of the polyethylene that had been made harder with gamma radiation called "cross-linked" polyethylene. Next third (and subsequently fourth) generation alumina ceramic that was stronger and far more resistant to breaking. The third technology was cobalt chromium on cobalt chromium with much improved manufacturing tolerances that provided maximal strength with minimal wear of the device surfaces. In addition to these, another technology evolved called hip resurfacing. This technology is only available in cobalt chromium on cobalt chromium. Because of the large head shape, the acetabular components also had a very large geometry. This provided excellent stability of the hip replacement with a very small risk of dislocation, much lower then in total hip replacement.

Question #3: What conditions are hip implants used to treat?

There are a variety of conditions that hip replacement implants are used to treat. The most common would be osteoarthritis. Osteoarthritis is likely multiple different medical conditions which all have a common endpoint. The endpoint includes loss of the joint cartilage, hardening of the bone under the joint surface, out-growths a bone around the margin of the joint, and cysts that grow down into the bone under the joint. Osteoarthritis in all of its causes generally results from either an overload of force on healthy cartilage or unhealthy cartilage that is unable to support a normal load. There are also childhood conditions of the hip that eventually lead to overload of the cartilage and arthritis. Some of these include

developmental dysplasia of the hip (also known as hip dysplasia), slipped capital femoral epiphysis (SCFE) and Legg-Calve-Perthes disease. Traumatic arthritis is another common cause. This is much like osteoarthritis. It results from damage to the hip joint from an injury. In these cases, hardware is often present from fixing fractures to the bone around the joint. Avascular necrosis is a condition where the blood supply to the femoral head is lost and the femoral head dies. Overtime, the head will generally collapse and the joint will become quite arthritic. This can happen with trauma and is also commonly associated with alcohol abuse and the use of steroids. There are other rare conditions that can cause this problem. There are also many cases of avascular necrosis where medicine cannot explain why it has occurred. Acute hip fracture is becoming a more common indication for hip replacement. While hemiarthroplasty has been used for years, hemiarthroplasties will slowly wear the cartilage of the acetabulum away and result in arthritis. While this is a good option in elderly patients with only a few years of life expectancy, this is not a great option for younger active patients who suffer a hip fracture. If the hip fracture causes displacement of the femoral neck, there is a high risk of developing avascular necrosis and subsequent collapse and arthritis of the hip. When this occurs in younger patients, total hip replacement is often now considered. In the past, inflammatory arthritis such as rheumatoid arthritis, psoriatic arthritis, and ankylosing spondylitis as well as others were much more common than they are today. Despite this, some cases still come to require hip replacement in patients with advanced or poorly controlled disease.

Question #4: Do all hip implants eventually fail?

All artificial devices do slowly wear with time. The traditional metal on polyethylene hips wear down most quickly. With cross-linking, the polyethylene wears approximately 10 times more slowly. Ceramic on ceramic wears about 10 times more slowly than the cross-linked polyethylene. The metal-on-metal bearings wear almost as well as the ceramic-on-ceramic. If humans had unlimited life, all implants would eventually wear out over time. For joint replacement in patients over the age of 60, most implants will out-last the life expectancy of the patient. Unfortunately, in patients under the age of 60, the same is likely not true. Many of these patients will wear out their implants over time. This has been one of the great drivers of alternative bearings. The medical community has been trying to improve the longevity of the bearing surfaces to reach a point where the wear is no longer an issue.

There are many reasons for implant failure. When most patients think about why an implant may fail, they envisioned the parts wearing out like the parts of a car. This can occur. This is predominately a function of the wearing of the two components rubbing together. As they wear, tiny particles are generated of polyethylene, metal, or ceramic. The body's response to these particles is to try to eliminate them. They are captured by cells of the immune system that will try to break down these particles. The cells are not capable of doing this, so they

ultimately die releasing their toxic chemicals. This is generally adjacent to the joint replacement components. These chemicals then trigger a response from the body that ultimately results in the bone next to the implant being dissolved and removed. Over time, this process is called "osteolysis" and will eventually lead to the implant coming free of the bone. When this happens the joint becomes painful and there's a potential for joint dislocation and bone fracture.

While wear of the implant is of significant concern to patients and surgeons, the vast majority of joints that fail currently are due to infection and dislocation. In a case of infection, there is generally nothing wrong with the implants. In the case of dislocations, the implant can play a role, however, the ligaments and muscles around the hip also play a major role. Dislocation can occur in implants that have had significant wear overtime changing the geometry of the implants and predisposing them to dislocation. Alternatively, dislocation can occur with perfectly normal implants that are not properly positioned or where the muscles and ligaments of the hip are too loose.

Question #5: Consequences of premature implant failure

The consequences of failure of a hip replacement depend on the nature of how the hip replacement failed. For most failures, a revision hip replacement surgery is required. This involves opening up the hip joint again, removing one or more the failed hip implants, and implanting new devices. This has the obvious risk of pain and the temporary disability that comes with additional surgery. Additionally, several complications are at substantially higher risk of occurring with revision surgery versus the "primary" surgery when the initial device was inserted. The risk of infection and dislocation are significantly increased in revision patients versus primary patients. There are higher risks of leg length discrepancy and nerve injury. The satisfaction rates are slightly lower with the long-term outcome of surgery for revision versus primary surgeries. Generally, the function of revision surgeries is quite good, however it is often not as good as a primary joint replacement that has not failed. Certain failure mechanisms for joint replacement have greater consequences. Infection, for example, has a much greater impact often requiring multiple operations and long courses of intravenous antibiotics. If the patient develops an adverse reaction to metal debris, there can be significant tissue damage and destruction as part of the body's response. Fortunately, these destructive reactions are quite uncommon.

Question #6: Reasonable expectations for implant performance

Hip replacement surgery is one of the most successful medical interventions ever developed. As such, new devices are held to a high standard. Implant survival is the percentage of the implants that are still in place and functioning at a given time point. Unfortunately, the latter portion of "functioning" is often poorly defined and

studied. Most of the data comes in one of two fashions: 1) early cohort studies and 2) large national registries. The early cohort studies have been the basis for most of the data in joint arthroplasty collected over the last 40 years. These studies often consist of 100 to 300 patients who have been implanted with the new implant design. These patients are monitored usually out to the minimum of 10 years. These are the types of studies are generally required to have implants approved by national standards bodies such as the Food and Drug Administration of the United States and Health Canada. Large national registries have become quite powerful tools to also assess implants, however, they cannot be used until the device is already licensed and released for general use. By tracking all of the uses of a device within a single country and all the failures that occur subsequently, these massive data sets provide real-world data and can often identify a device that is performing worse than expected because of the power of such large data sets.

There is no clear and accepted definition of an acceptable hip implant. The medical community generally accepts survival of devices demonstrating between 90 and 95% at 10 years. Unfortunately part of the challenge is that at least medium-term data in the neighborhood of five to eight years is required to be able to identify devices that are going to fall just short of these targets. Devices that fail rapidly can be identified early, however devices that do slightly worse than existing implants are much harder to identify. There is no national registry in United States. While there is a national registry in Canada, participation is not mandatory. Only in the last 18 months have implant result reportings been mandated in 3 of the 10 Canadian provinces allowing for assessment of outcomes of specific designs.

The literature does not clearly define issues with the Durom cup as a separate device. The literature can only point to failures that involve the Durom cup as one of the two components either as a resurfacing construct or as the large-head metal-on-metal construct. The first notification to the orthopedic community that a problem may exist with the Durom cup came from a letter from Dr. Larry Dorr in 2008 to the American Association of Hip and Knee Surgeons. This was a highly unusual case for a single surgeon to send out a mass letter in this fashion. This was followed up by publication in February 2010 indicating an extremely high failure rate of constructs that included the Durom cup. They reported that approximately 28% of just over 200 patients who had the Durom hip resurfacing had either required revision surgery or had evidence on x-ray that the implant was beginning to fail.[1] There have been at least eight Studies published since the paper by Dr. Dorr.[2-10] While most of the papers have found the failure rate of the Durom cup to be higher than that of similar devices, none have found the degree of failure reported by Dr. Dorr's paper. The studies have reported failure rates either equal to or between 1.67 and 3 times the failure rate of gold-standard implants. The largest data sets looking at this issue that are available would be the British Arthroplasty Registry and the Australian Arthroplasty Registry.[5, 11] Both of these registries suggest that the failure rate of the Durom cup is approximately 1.7 times that of the reference gold standard devices.

Question #7: Medical literature concerning problems with the Durom cup

The medical literature is not entirely clear on the exact causes of failure of the Durom hip implants. There are two key areas of concern. The first is what is called "aseptic loosening". This is when an implant that should be or was once fixed to bone becomes loose for a reason other than infection. This was the biggest concern raised by Dr. Dorr's group in 2008 and 2010.[1] It has not been consistently identified in subsequent studies. The other concern with this product line, has been adverse reactions to metal debris. These are sometimes called "pseudotumors". The acronym of ALVAL is commonly used to describe these lesions but the acronym itself is actually to describe the changes seen by pathologists when looking at microscopic images of these tumors.[12] These reactions can be damaging to local tissues. The medical and orthopedic communities are currently investigating metal reactions within the body and how they relate to implants. This is not an area that is fully understood. Much of impetus for undergoing the research in this area has been driven by the problems with the Durom implants and other similar products. It is not yet clear if the loosening of the implants observed is related to the adverse reaction to metal debris or was a separate issue with the Durom cup.

Question #8: Timing of detection and treatment of problems with Durom Cup

The Australian Arthroplasty Registry would certainly support the notion that the majority of patients with a problematic Durom hip arthroplasty should present within the first 4.5 years following implantation. The registry found that there was an increased revision rate during this time.[11] After 4.5 years, the Durom resurfacing arthroplasty appears to do at least as well or perhaps even slightly better in the reference hip resurfacing arthroplasties. Given that the Durom cup was removed from the Canadian market in 2010 and the settlement was reached in September 2015, it is unlikely that there would be a significant number of individuals with this device who would be presenting late with loosening of the implants beyond what would be typically expected for any joint replacement device.

If you have any further questions, please do not hesitate to contact me.

Sincerely,

Tom Turgeon

Thomas Turgeon BSc MD MPH FRCSC

LIST OF REFERENCES

1. Long WT, Dastane M, Harris MJ, Wan Z, Dorr LD. Failure of the Durom Metasul acetabular component. Clin Orthop Relat Res 468(2): 400, 2010
2. Berton C, Girard J, Krantz N, Migaud H. The Durom large diameter head acetabular component: early results with a large-diameter metal-on-metal bearing. J Bone Joint Surg Br 92(2): 202, 2010
3. Illgen RL, 2nd, Heiner JP, Squire MW, Conrad DN. Large-head metal-on-metal total hip arthroplasty using the Durom acetabular component at minimum 1-year interval. J Arthroplasty 25(6 Suppl): 26, 2010
4. Naal FD, Pilz R, Munzinger U, Hersche O, Leunig M. High revision rate at 5 years after hip resurfacing with the Durom implant. Clin Orthop Relat Res 469(9): 2598, 2011
5. Jameson SS, Baker PN, Mason J, Porter ML, Deehan DJ, Reed MR. Independent predictors of revision following metal-on-metal hip resurfacing: a retrospective cohort study using National Joint Registry data. J Bone Joint Surg Br 94(6): 746, 2012
6. Hutt J, Dodd M, Briffa N, Bourke H, Hazlerigg A, Ward D. The Durom acetabular component. a concise follow-up of early revision rates at a minimum of 2 years. Hip Int 22(5): 562, 2012
7. Leclercq S, Lavigne M, Girard J, Chiron P, Vendittoli PA. Durom hip resurfacing system: retrospective study of 644 cases with an average follow-up of 34 months. Orthop Traumatol Surg Res 99(3): 273, 2013
8. Mokka J, Makela KT, Virolainen P, Remes V, Pulkkinen P, Eskelinen A. Cementless total hip arthroplasty with large diameter metal-on-metal heads: short-term survivorship of 8059 hips from the Finnish Arthroplasty Register. Scand J Surg 102(2): 117, 2013
9. Li J, He C, Li D, Zheng W, Liu D, Xu W. Early failure of the Durom prosthesis in metal-on-metal hip resurfacing in Chinese patients. J Arthroplasty 28(10): 1816, 2013
10. Saragaglia D, Belvisi B, Rubens-Duval B, Pailhe R, Rouchy RC, Mader R. Clinical and radiological outcomes with the Durom acetabular cup for large-diameter total hip arthroplasty: 177 implants after a mean of 80 months. Orthop Traumatol Surg Res 101(4): 437, 2015
11. Australian Orthopaedic Associate National Joint Replacement Registry. Annual Report. In: Graves S, ed. Adelaide: Australian Orthopaedic Association. 2015
12. Willert HG, Buchhorn GH, Fayyazi A, Flury R, Windler M, Koster G, Lohmann CH. Metal-on-metal bearings and hypersensitivity in patients with artificial hip joints. A clinical and histomorphological study. J Bone Joint Surg Am 87(1): 28, 2005

This is the Exhibit "B"
referred to in the Affidavit
of Dr. Thomas Turgeon
Sworn before me this 8th
day of Aug. A.D. 2016
A Notary Public
in and for the Province of Manitoba

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Curriculum Vitae

Dr. Thomas R Turgeon

Address

Primary Affiliation Address

Concordia Joint Replacement Group
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CANADA (R2K 2M9)

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Primary Phone:	(204) 926-1230	Primary FAX:	(204) 940-2263
Secondary Phone:		Temporary FAX:	
Temporary Phone:		Web Address:	
E-Mail Address:	tturgeon@cjrg.ca		

Languages: English

Academic Background and Training

Degree / Training Type	Specialty	Degree Name	Organization	Country	Date received MM/YYYY
Master's	Epidemiology	Public Health	San Diego State University	UNITED STATES	05/2006
Fellow (Health Professional)	Adult Reconstructive Surgery	Adult Reconstructive Surgery	Arthritis Surgery Center of San Diego	UNITED STATES	09/2005
Postdoctorate	Orthopaedic Surgery	Surgical Residency	University of Saskatchewan	CANADA	06/2003
Doctor (Medical)		Medicine	University of Western Ontario	CANADA	05/1998
Bachelor's	Chemisty	Science	University of Western Ontario	CANADA	06/1995

Distinctions and Credentials

Distinction

Award of Merit, Canadian Orthopaedic Association, Canada, Effective: 06/2010, New Care Models to Reduce Surgical Wait Times

Credential

Board Certified, American Board of Orthopaedic Surgery, United States, Effective: 07/2009

Manitoba Medical Licence, College of Physicians and Surgeons of Manitoba, Canada, Effective: 10/2005

Fellow, Royal College of Physicians and Surgeons of Canada, Canada, Effective: 05/2004, Orthopaedic Surgery

California Medical Licence, Medical Board of California, United States, Effective: 08/2003

Licentiate, Medical Council of Canada, Canada, Effective: 01/2000

Distinctions and Credentials

Research award

Dr. Kloppenberg Award, Department of Surgery, University of Saskatchewan, Canada, Effective: 04/2002, $75

Dr. Kloppenberg Award, Department of Surgery, University of Saskatchewan, Canada, Effective: 04/2001, $75

Dr. F.R. Eccles Scholarship Award, Faculty of Medicine, University of Western Ontario, Canada, Effective: 05/1998, Highest standing in final year of medical school, $1,200

Mosby Company Scholarship Award, Faculty of Medicine, University of Western Ontario, Canada, Effective: 05/1995, $50

Canada Scholarship, Government of Canada, Canada, Effective: 1991, Ending: 1994, $6,000

Renewable Entrance Scholarship, University of Western Ontario, Canada, Effective: 1991, Ending: 1995, $12,000

Work Experience

Position	Organization Department	Country	Start Date - End Date (MM/YYYY)
Assistant Professor	The University of Manitoba Surgery Medicine	CANADA	10/2005 -
Adult Reconstructive Surgical Fellow	Arthritis Surgery Center of San Diego Other	UNITED STATES	07/2003 - 09/2005
Orthopaedic Surgical Resident	University of Saskatchewan Other Medicine	CANADA	07/1998 - 06/2003

Expertise

My research interests are in the following areas:
analysis; arthroplasty; hip; knee; radiostereometric; statistics

Areas of Discipline

These are the disciplines that best correspond to my research interests:

	Main discipline	Sub Discipline
1.	MEDICAL SCIENCES, CLINICAL (OTHER)	Orthopedics and Surgical Orthopedic
2.	STATISTICS AND PROBABILITY	Multivariate Analysis

Research Support and Funding

Support Period	Title	Program Name Organization	Principal Investigator	Co-Applicant	Total Amount
03/2010 - 03/2012	Stability Analysis of a LEGIONTM Total Primary Uncemented Knee	- Smith & Nephew Richards Inc (Memphis, TN)	**Thomas Turgeon**		$37,800
01/2010 - 01/2012	Development of Patient-Centred Joint Replacement Educational Video	- Pfizer Canada Inc.	Petrak, Martin	**Thomas Turgeon**	$100,000
04/2009 - 04/2011	Development of in vivo knee arthroplasty wear using radiostereometric analysis	Alexander Gidson Fund - University of Manitoba	**Thomas Turgeon**		$30,000

Research Support and Funding

Support Period	Title	Program Name Organization	Principal Investigator	Co-Applicant	Total Amount
04/2008 - 04/2009	Implant Retrieval and Analysis Program	Alexander Gidson Fund - University of Manitoba	Bohm, Eric	**Thomas Turgeon**	$39,000
04/2007 - 04/2008	Implant Retrieval and Analysis Program	Alexander Gidson Fund - University of Manitoba	Bohm, Eric	**Thomas Turgeon**	$22,426
01/2005 - 12/2007	The impact of OP-1 Implant intra-articular injections on arthritis progression in the ACLT rabbit model for both prevention and treatment	Stryker Biotech - Stryker Orthopaedics	Coutts, Richard	**Thomas Turgeon**	$217,993
03/2004 - 06/2005	Proposal for the Study of OP-1 in a new rabbit model of osteoarthritis	Stryker Biotech - Stryker Orthopaedics	Coutts, Richard	**Thomas Turgeon**	$34,893

Supervisory Experience

Master's	1	Doctorate	0	Post-Doctoral	1

Contributions - Summary

Patents and Intellectual Property Rights

Record the total numbers of patents / copyrights in the following table.

Obtained			Applications under process			Total patents and intellectual property rights
Total individual	Total collective	Sub-total	Total individual	Total collective	Sub-total	
0	0	0	0	0	0	0

Publications and Presentations

Give the number of publications and presentations in the course of your career. Detailed information should be attached as specified in the "Contributions - details" section.

Publications	Refereed Articles	Books and Monographs	Proceedings / Book Chapters / Contributions to a collective work	Abstracts / Notes	Totals
Already published	5	2	2	0	9
Accepted or in the Press	0	0	0	0	0
					9
Invited presentations					22

Literary and Artistic Works

Provide the number of literary and artistic works created in the course of your career. Detailed information should be attached as specified in the "Contributions - details" section.

In circulation			In progress			Total Literary and Artistic Works
Total individual	Total collective	Sub-total	Total individual	Total collective	Sub-total	
0	0	0	0	0	0	0

PUBLICATIONS AND PRESENTATIONS

Peer-Reviewed Papers

Hiscox CM, Bohm ER, Turgeon TR, Hedden DR, Burnell CD. Randomized Trial of Computer-Assisted Knee Arthroplasty: Impact on Clinical and Radiographic Outcomes. *J Arthroplasty*. 2011 May 16. [Epub ahead of print]

Poggie RA, Turgeon TR, and Coutts RD: Failure Analysis of a Ceramic Bearing Acetabular Component. J Bone Joint Surg Am. 2007;89:367-375.

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MacDermid J, Turgeon T, Richards R, Beadle M, Roth J: Patient Rating of Wrist Pain and Disability: A Reliable and Valid Measurement Tool. *J Orthop Trauma* 12(8):577-586, 1998.

Dimov SS, Lipson RH, Turgeon TR, Vanstone J, Wang P, and Yang DS. Vacuum ultraviolet laser/time-of-flight mass spectroscopy: Ion-pair spectra of $^{79}Br^{35}Cl$. *J Chem Phys*. 100(12): 8666-72, 1994.

Review Articles

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Santore RF, Turgeon TR, Phillips WR, Kantor S. Pelvic and Femoral Osteotomy in the Treatment of Hip Disease in the Young Adult. In *Instructional Course Lectures*. Light TR Ed. Vol 55: 2006. pp 131-44.

Turgeon TR, Phillips W, Kantor SR, Santore RF. The role of acetabular and femoral osteotomies in reconstructive surgery of the hip: 2005 and beyond. *Clin Orthop Relat Res*. 2005 Dec;441:188-99.

Texbook Chapters

Santore RF, Turgeon TR. Non-Arthroplasty Approahes: Femoral Osteotomy. In *Master's Techniques in Orthopaedic Surgery: The Hip*. 2nd Ed. Barrack RL and Rosenberg AG Eds. Lippincott Williams & Wilkins, Philadelphia. 2005. pp 103-23.

Case Reports

Burnell CD, Turgeon TR, Hedden DR, Bohm ER. Paraneoplastic Clostridium septicum Infection of a Total Knee Arthroplasty. *J Arthroplasty*. 26(4):666.e9-11, 2011.

Marsh JP, Turgeon TR and Guzman R. Acute Limb Ischemia Following Closed Reduction of a Hip Arthroplasty Dislocation. *Orthop*. 33(10);768, 2010.

Invited Presentations

Turgeon TR, Petrak M, Slobodian I, Bohm ER. Touch Screen Technology Improves Data Collection and Efficiency in a High Volume Orthopaedic Clinic. Presented at Canadian Orthopaedic Association Annual Meeting, St. John's, NL: July 8, 2011.

Gascoyne TC, Petrak M, Bohm ER, Turgeon TR, Van der Put R, Burger A. Comparison of a CR and DR Imaging System for Radiostereometric Analysis – A Precision Phantom Study using a Novel Spine Pedicle Screw. Presented at Canadian Orthopaedic Association Annual Meeting, St. John's, NL: July 7, 2011

Turgeon TR, Bohm E, Loucks L. Comparison of Registry Satisfaction Data for Primary and Revision Knee Arthroplasty. Poster Presented at Canadian Orthopaedic Association Annual Meeting, St. John's, NL: July 7, 2011

Turgeon TR, Hedden DR, Bohm ER, Burnell C. Success of Revision Knee Arthroplasty for Stiffness. American Academy of Orthopaedic Surgeons, San Diego: Feb 16, 2011

Turgeon TR, Bohm ER, Burnell C, Hedden DR. Functional Outcome of Revision Total Knee Replacement: Is it as Poor as We Think it is? American Academy of Orthopaedic Surgeons, San Diego: Feb 16, 2011

Petrak M, Bohm E, Turgeon TR, Van der Put R, Burger A. Precision Phantom Study of a CR and DR Imaging System for Radiostereometric Analysis (RSA) using a Novel Spine Pedicle Screw. Presented at the International Society for Technology in Arthroplasty Annual Meeting, Dubai, UAE: October 8, 2010

Petrak M, Slobodian I, Turgeon TR, Bohm E. Patient Satisfaction When Completing Self- Administered Questionnaires on a Touch Screen Data Entry System in an Orthopaedic Clinic. International Society for Technology in Arthroplasty Annual Meeting, Dubai, UAE: October 8, 2010

Turgeon TR, Bohm E, Petrak M, Sinaisky M. Functional Outcome of Revision Total Knee Replacement – Is it as Poor as We Think it is?. Presented at Canadian Orthopaedic Association Annual Meeting, Edmonton, AB: June 20, 2010.

Turgeon TR. Cementless Fixation in TKA, Trends and Updates in Total Knee Arthroplasty Symposium. Presented at Canadian Orthopaedic Association Annual Meeting, Edmonton, AB: June 19, 2010.

Turgeon TR, Bohm E, Kesler N, Petrak M, Burnell C, Hedden D. Femoral Head Penetration in X3 Cross-linked Acetabular Liners: A Three Year Study. Presented at Canadian Orthopaedic Association Annual Meeting, Edmonton, AB: June 18, 2010.

Turgeon TR, Bohm E, Kesler N, Petrak M, Burnell C, Hedden D. The Effect of Tobramycin on Femoral Stem Migration: A Three-Year RSA Study. Presented at Canadian Orthopaedic Association Annual Meeting, Edmonton, AB: June 18, 2010.

Turgeon TR. New Technology in Knee Arthroplasty: What should I add to my practice?, Total Knee Replacement Instructional Course Lecture. Canadian Orthopaedics Association Annual Meeting, Whistler, BC: July 5, 2009.

Turgeon TR, Hedden D, Burnell C, Bohm E. Success of Knee Arthroplasty Revision for Knee Stiffness. Poster Presented at the Canadian Orthopaedic Association, Whistler, BC: July 3-5, 2009.

Turgeon TR. Orthopaedic Surgical Navigation. Presented at the Canadian Medical and Biological Engineering Society Annual Meeting, Calgary, AB: May 21, 2009.

Turgeon TR, Hiscox C, Bohm E, Hedden D, Burnell C. Randomized Trial of Computer Assisted Knee Replacement: Impact on Clinical and Radiographic Outcomes. Presented at the American Academy of Orthopaedic Surgeons, Las Vegas: Feb 26, 2009.

Bohm E, Turgeon TR, Hedden D, Burnell C. Serum Tobramycin Levels in a Randomized Study of Hybrid Fixation of Primary Hip Arthroplasty: Does Tobramycin in the Cement have a Significant Effect? Poster Presented at the Canadian Orthopaedic Association, Halifax, NS: Jun 2, 2007.

Turgeon TR, Santore RF, Coutts RD. Influence of Obesity on Outcome Following Primary Hip Replacement Surgery. Poster Presented at the Canadian Orthopaedic Association, Toronto, ON: Jun 3, 2006.

Crosby J, Bohm E, Turgeon TR, Hedden D, Burnell C. Comparison of Ceramic on Ceramic to Metal on Polyethylene Total Hip Arthroplasty in Patients Under Age 65. Poster Presented at the Canadian Orthopaedic Association, Toronto, ON: Jun 3, 2006.

Turgeon TR, Santore RF, Coutts RD. Influence of Obesity on Outcome Following Primary Hip Replacement Surgery. Presented at the American Academy of Orthopaedic Surgeons, Chicago, IL: Mar 22, 2006.

Coutts RD. Turgeon TR, Elington M,: Patient Education to Promote Success. Presented at the Open Meeting of the Hip Society, Washington, DC: Feb 26, 2005.

Coutts RD. Turgeon TR, Elington M,: Patient Education to Promote Success. Presented at the American Association of Hip and Knee Surgeons, Dallas, TX: Nov 6, 2004.

Coutts R, Turgeon TR. Recurrent dislocation after THA: Treatment with an Achilles tendon. Presented at the Canadian Orthopaedic Association Annual Meeting, Calgary, AB: June 20, 2004.

Coutts R, Turgeon TR. Elington M. Results of Blood Management Methods in Total Knee and Hip Replacement. Presented at the Canadian Orthopaedic Association Annual Meeting, Calgary, AB: June 19, 2004.

Turgeon TR, Dust W, Sanche S, Mochoruk K: Effectiveness of Bulb versus Pulse Irrigation for the Removal of Bacteria from Prosthetic Surfaces. Presented at the Canadian Orthopaedic Association Annual Meeting, Winnipeg, MB: Oct 3, 2003.

Turgeon TR, Dust W, Sanche S, Mochoruk K: Effectiveness of Bulb versus Pulse Irrigation for the Removal of Bacteria from Prosthetic Surfaces. Presented at the Canadian Orthopaedic Resident's Association Annual Meeting, Winnipeg, MB: Sept 21, 2002.

Meeting Attendance

Canadian Orthopaedic Association Annual Meeting, St John's, NL	July 7-9, 2011
American Association of Orthopaedic Surgeons, San Diego, CA	Feb 16-19, 2011
Canadian Orthopaedic Association Annual Meeting, Edmonton, AB	June 17-20, 2010
American Association of Orthopaedic Surgeons,New Orleans, LA	Mar 10-13, 2010
Canadian Orthopaedic Association Annual Meeting, Whistler, BC	July 3-5, 2009
Canadian Medical and Biological Engineering Society Annual Meeting, Calgary, AB	May 21, 2009
American Association of Orthopaedic Surgeons, Los Vegas, NV	Feb 25-28, 2009
American Association of Hip and Knee Surgeons, Dallas, TX	Nov 7-9, 2008
Manitoba Orthopaedic Symposium, Winnipeg, MB	Oct30-31, 2008
Canadian Orthopaedic Association Annual Meeting, Quebec, QC	June 4-7, 2008
American Association of Hip and Knee Surgeons, Dallas, TX	Nov 2-4, 2007
Canadian Orthopaedic Association Annual Meeting, Halifax, NS	June 7-9, 2007
American Association of Orthopaedic Surgeons, San Diego, CA	Feb 14-18, 2007
American Association of Hip and Knee Surgeons, Dallas, TX	Nov 3-5, 2006
Canadian Orthopaedic Association Annual Meeting, Toronto, ON	June 2-4, 2006
American Association of Orthopaedic Surgeons, Chicago, Il	Mar 22-26, 2006
Hip Surgery in the Young Adult II, Banff, AB	Jan 18-22, 2006
American Association of Hip and Knee Surgeons, Dallas, TX	Nov 2-4, 2005
American Association of Orthopaedic Surgeons, Washington, DC	Feb 23-27, 2005
American Association of Hip and Knee Surgeons, Dallas, TX	Nov 2-4, 2004

Advances in Hip and Knee Arthroplasty, San Diego, CA	Oct 22-23, 2004
Canadian Orthopaedic Association Annual Meeting, Calgary, AB	June 18-20, 2004
American Association of Orthopaedic Surgeons, San Fancisco, CA	Feb , 2004
American Association of Orthopaedic Surgeons, New Orleans, LA	Feb 5-9, 2003

Committee Participation

Concordia Foundation, Chair	2008-present
Concordia Hospital, Ethics Review Committee	2008-present
Concordia Hospital, Infection Control Committee, Chair	2007-present
Department of Surgery, Research Committee	2007-present
Bone and Joint Canada, Steering Committee	2008-present
Canadian Orthopedic Association, Ethics Committee	2008-present
Concordia Foundation, Member-at-Large	2006-2008
American Association of Hip and Knee Surgeons, Research Committee	2006-present