



# AN INNOVATIVE AND INTERDISCIPLINARY "ONE HEALTH" PROJECT!

**Authors:** Gabrielle Cadotte MSc, Marie-Hélène Normand BSc, Mélanie Dieudé PhD, Michel Carrier DMV, Hélène Tessier DMV, Christopher Fernandez Prada PhD, Francis Lévesque PhD, Stéphanie Larivière-Beaudoin, Michel Pepin DMV, Sylvain Bédard, Victoria Wagner PhD, Aida Minguez Menendez PhD, Nathalie Bedrossian BSc, Isabelle Doré PhD.

## WHERE DOES PROJET LAURENT COME FROM?

At 10 years old, Laurent Tessier received a liver transplant. As a consequence of receiving chronic immunosuppressive therapy to prevent transplant rejection, Laurent and his family are warned about owning pets due to the risk of disease transmission. His mother, Hélène Tessier, a veterinarian, is aware of the deep attachment and support that their dog Sushi brings to Laurent. She wonders about the **real relationship between the risks and benefits** of keeping their dog Sushi. Noting the lack of information in the literature, Hélène contacted the Faculty of Veterinary Medicine at the Université de Montréal. Following some discussions, an interdisciplinary research team

bringing together specialists in zoonosis, immunology, physical activity, mental health, anthropology and epidemiology, met to start a project to demystify the risks and benefits associated with pet ownership among immunosuppressed people... the **Projet Laurent** was born!



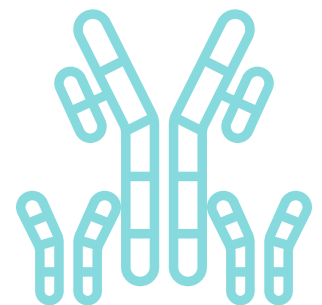
*Hélène Tessier*



*Laurent Tessier*

## WHAT IS IMMUNOSUPPRESSION?

The immune system stores all of the body's defenses that allow us to protect ourselves against bacteria, viruses or other invaders. Over the course of life, the activity of the immune system varies. Infants under one year of age, pregnant women as well as the elderly have a weakened immune system, also defined as immunosuppression, which makes them more vulnerable to infections (Basha et al., 2014; Montecino -Rodriguez et al., 2013). Immunosuppression can also be caused by certain medical conditions and diseases, such as AIDS, cancer, diabetes, malnutrition and certain genetic disorders. It can also be caused by certain drugs and treatments such as in the context of cancer, autoimmune diseases (e.g. lupus, multiple sclerosis) as well as stem cell or organ transplants (Bourke et al., 2016; Helmetiro et al., 2012; Holt, 2017; Noor et al., 2017; Weiner, 2004). That said, immunosuppressed people can have several medical complications such as a predisposition to zoonoses i.e. a higher risk of contracting diseases transmitted from animals to humans and an increased risk of severe complications in cases of infection.



# PETS: WHAT ARE THE RISKS FOR IMMUNOSUPPRESSED PEOPLE?

The rare scientific studies on immunosuppressed populations focus on the risks of owning pets because pets can be important vectors of disease transmission (CDC, 2021). In fact, pets can host parasites such as cryptosporidium, dermatophytes, giardia, toxocara and toxoplasma or bacteria such as campylobacter, leptospira and salmonella (Baneth et al., 2015; Ghasemzadeh & Namazi, 2015; Conboy et al., 2019). Diseases can be transmitted from animals to humans either fecally-orally via stool or urine or through direct contact through bite or scratch (Lipkin, 2020). There are therefore several recommendations for immunosuppressed patients in order to prevent these diseases transmitted by animals (Steele, 2008; Elad, 2013). First, it is important to have rigorous hygiene: it is advisable to clean and disinfect areas frequented by animals as well as to wash your hands frequently (Lipkin, 2020). Secondly, it is suggested to do a regular follow-up with a veterinarian: the annual examinations and vaccines of the animal should be up to date and when the animal has health problems, it is necessary to consult a veterinarian promptly (Conboy et al. al., 2019). Despite these recommendations, the actual impact of immunosuppression on zoonotic risk remains unknown as there are no studies examining the effects of diseases or infections transmitted from animals to humans in immunosuppressed patients. The challenge of developing complex and interdisciplinary research programs targeting the pathogen-animal-human interaction is one of the reasons that may explain the small number of studies carried out in this field. Indeed, the risks of zoonosis vary depending on the drugs, treatments and diet of immunosuppressed patients (Stull & Stevenson, 2015). It is nevertheless necessary to study the subject in greater depth in order to provide adequate recommendations for immunosuppressed populations.

## RESEARCH QUESTION:

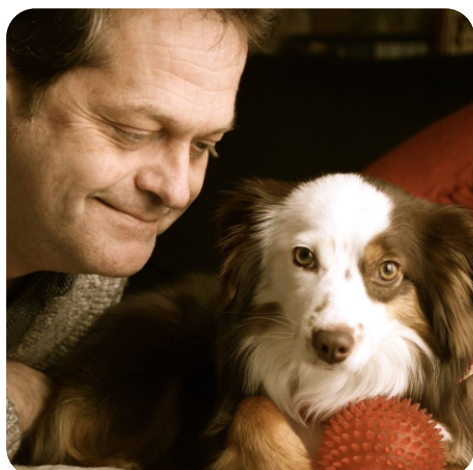
**How do different types of immunosuppression influence the vulnerability of immunosuppressed patients to contract zoonoses?**

In light of the findings from the scientific literature, the Projet Laurent team proposes to examine this important question by setting up biomedical studies that take into account the different types of immunosuppression (different immunosuppressive treatments for example) and the different types of zoonoses transmitted (different pathogens: parasites, viruses and bacteria) by different vectors (dogs, cats and others). To start, the team of immunologists, doctors, and veterinary researchers will prioritize the zoonoses most common in dogs and cats. In the light of their results, the researchers will also assess the impact of prevention measures to minimize the transmission of zoonoses in immunosuppressed populations in order to offer solutions adapted to the needs of these patients.



# PETS: WHAT ARE THE **BENEFITS** FOR PEOPLE WITH IMMUNOSUPPRESSION?

In exploring the scientific literature on the subject, we came to two main findings. First, studies on the psychosocial benefits of owning pets are very limited and limited to people with cancer or living with HIV. The results of studies carried out to date suggest significant benefits associated with owning a pet in these populations. Indeed, one study suggests that pets help patients cope with the stress associated with a cancer diagnosis (Larson et al., 2010). In addition, two studies show that pets can decrease the risk of depression in people living with HIV (Siegel et al., 1999; Muldoon et al., 2017). Finally, a study also shows that pets increase the feeling of attachment, the feeling of usefulness as well as social support in people living with HIV (Castelli et al., 2001). As part of the Projet Laurent, anecdotally, our patient partners tell us about the importance of supporting their pets. Our second finding is as follows: no study has looked at the benefits of owning pets on lifestyle habits such as physical activity, sedentary behavior or sleep in immunosuppressed people. As is the case in the general population and in clinical populations such as people with cancer, we hypothesize that immunosuppressed patients will benefit from the presence of pets by contributing to the development of healthy lifestyles, that is, to increase the level of physical activity, decrease sedentary time and improve sleep. There is therefore a crying need for rigorous studies.



“

*“Charlie, my dog, was and remains an incredible moral support and an essential part of my rehabilitation during my second heart transplant”.*

- Sylvain Bédard, patient partner co-researcher

”

## RESEARCH QUESTION:

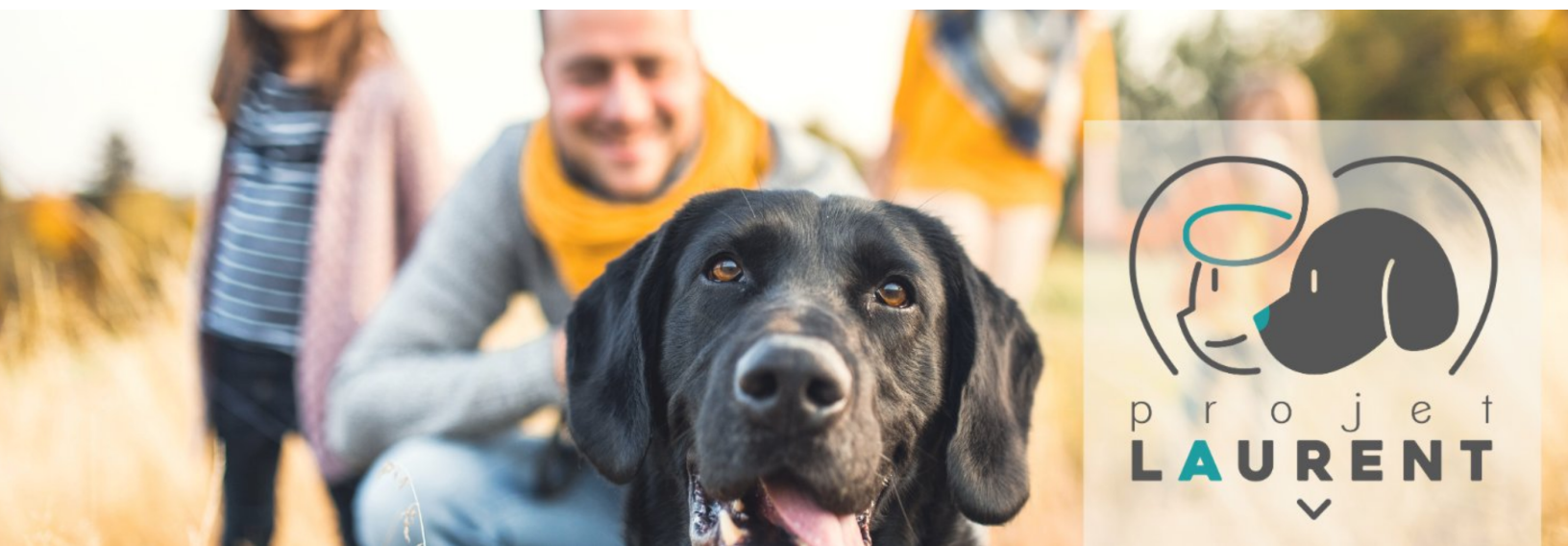
**What are the **psychosocial** and **healthy lifestyle benefits** associated with owning pets for immunosuppressed patients?**

More or less consciously, we all take the risk / benefit balance into account in most of the decisions we make on a daily basis. In immunosuppressed patients, their families and their healthcare team, the assessment of the risk-benefit balance is omnipresent. Thus, it is essential for the Laurent Project team to examine the benefits associated with pet ownership for these patients. The multidisciplinary team of the Laurent Project is therefore setting up studies on the impacts of animal possession taking into account not only psychosocial aspects, but also lifestyle habits such as the practice of physical activity, sedentary behaviors as well as sleep in immunosuppressed populations.



# ANTICIPATED IMPACTS

Through its interdisciplinary and integrated research program, the Projet Laurent aims to produce evidence-based recommendations that will be transmitted in real time to patients, healthcare communities and veterinarians so that immunosuppressed patients and their relatives can make an informed decision, whether it is to keep or dispose of a pet already present in the household or for the adoption of a new animal.



**[PROJETLAURENT.ORG](https://projetlaurent.org)**



**[PROJETLAURENT2020@GMAIL.COM](mailto:PROJETLAURENT2020@GMAIL.COM)**



# REFERENCES

- Baneth G, Thamsborg SM, Otranto D, Guillot J, Blaga R, Deplazes P, Solano-Gallego L. (2015) Major Parasitic Zoonoses Associated with Dogs and Cats in Europe. *J Comp Pathol*, 155(1 Suppl 1):S54-74.
- Basha, S., Surendran, N., & Pichichero, M. (2001). Immune responses in neonates. *Expert review of clinical immunology*, 10(9):1171-84. Epub 2014/08/05.
- Bourke, C.D., Berkley, J.A., & Prendergast, A.J. (2016). Immune Dysfunction as a Cause and Consequence of Malnutrition. *Trends Immunol*, 37(6):386-98.
- Castelli, P., Hart, L. A., & Zasloff, R. L. (2001). Companion cats and the social support systems of men with AIDS. *Psychological reports*, 89(1), 177-187. <https://doi.org/10.2466/pr0.2001.89.1.177>
- Casqueiro, J. & Alves, C. (2012). Infections in patients with diabetes mellitus: A review of pathogenesis. *Indian J Endocrinol Metab*, 16, Suppl 1(Suppl1):S27-S36.
- Centers for Disease Control and Prevention website. Healthy pets, healthy people. [www.cdc.gov/healthypets/](http://www.cdc.gov/healthypets/). Updated April 15, 2021. Accessed April 23, 2021.
- Elad D. (2013) Immunocompromised patients and their pets: still best friends? *Vet J*. 197(3):662-9. doi: 10.1016/j.tvjl.2013.05.042.
- Conboy G, Fernandez-Prada C, Gilleard J, Jenkins E, Peregrine A, Wagner B, Lee A. (2019) Canadian Guidelines for the Management of Parasites in Dogs and Cats by the Canadian Parasitology Expert Panel (CPEP). <https://research-groups.usask.ca/cpep/index.php?fbclid=IwAR1-rC5QHPXYOm42FFYqqj2veFfdYDQBOUMvy-0MjJgNHJe5nKv3JbVcnsQ>.
- Ghasemzadeh, I., & Namazi, S. H. (2015). Review of bacterial and viral zoonotic infections transmitted by dogs. *Journal of medicine and life*, 8 (Spec Iss 4), 1-5.
- Holt, C.D. (2017). Overview of immunosuppressive therapy in solid organ transplantation. *Anesthesiology clinics*, 35(3), 365-80.
- Larson, B. R., Looker, S., Herrera, D. M., Creagan, E. T., Hayman, S. R., Kaur, J. S., & Jatoi, A. (2010). Cancer patients and their companion animals: results from a 309-patient survey on pet-related concerns and anxieties during chemotherapy. *Journal of cancer education : the official journal of the American Association for Cancer Education*, 25(3), 396-400. <https://doi.org/10.1007/s13187-010-0062-5>
- Lipkin WI. (2020) Zoonoses. In: Bennett JE, Dolin R, Blaser MJ, eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 9th ed. Philadelphia, PA: Elsevier; 2020:chap 317.
- Montecino-Rodriguez, E., Berent-Maoz, B., & Dorshkind, K. (2013). Causes, consequences, and reversal of immune system aging. *The Journal of clinical investigation*, 123(3):958-65. Epub 2013/03/01.
- Muldoon AL, Kuhns LM, Supple J, Jacobson KC, Garofalo R. (2017). A Web-Based Study of Dog Ownership and Depression Among People Living With HIV. *JMIR Mental Health*, 4(4):e53. doi: 10.2196/mental.8180
- Noor, M.T. & Manoria, P. (2017). Immune Dysfunction in Cirrhosis. *J Clin Transl Hepatol*, 5(1):50-8. Epub 2017/03/10. *Projet Laurent*. (2020). <https://www.projetlaurent.org/>
- Siegel, J. M., Angulo, F. J., Detels, R., Wesch, J., & Mullen, A. (1999). AIDS diagnosis and depression in the Multicenter AIDS Cohort Study: the ameliorating impact of pet ownership. *AIDS care*, 11(2), 157-170. <https://doi.org/10.1080/09540129948054>
- Steele R. W. (2008). Should immunocompromised patients have pets? *The Ochsner journal*, 8(3), 134-139.
- Stull JW, Stevenson KB. (2015) Zoonotic disease risks for immunocompromised and other high-risk clients and staff: promoting safe pet ownership and contact. *Vet Clin North Am Small Anim Pract*. 45 (2):377-92, vii. doi: 10.1016/j.cvsm.2014.11.007.
- Weiner, H.L. (2004). Immunosuppressive treatment in multiple sclerosis. *Journal of the neurological sciences*, 223(1):1-11. Epub 2004/07/21