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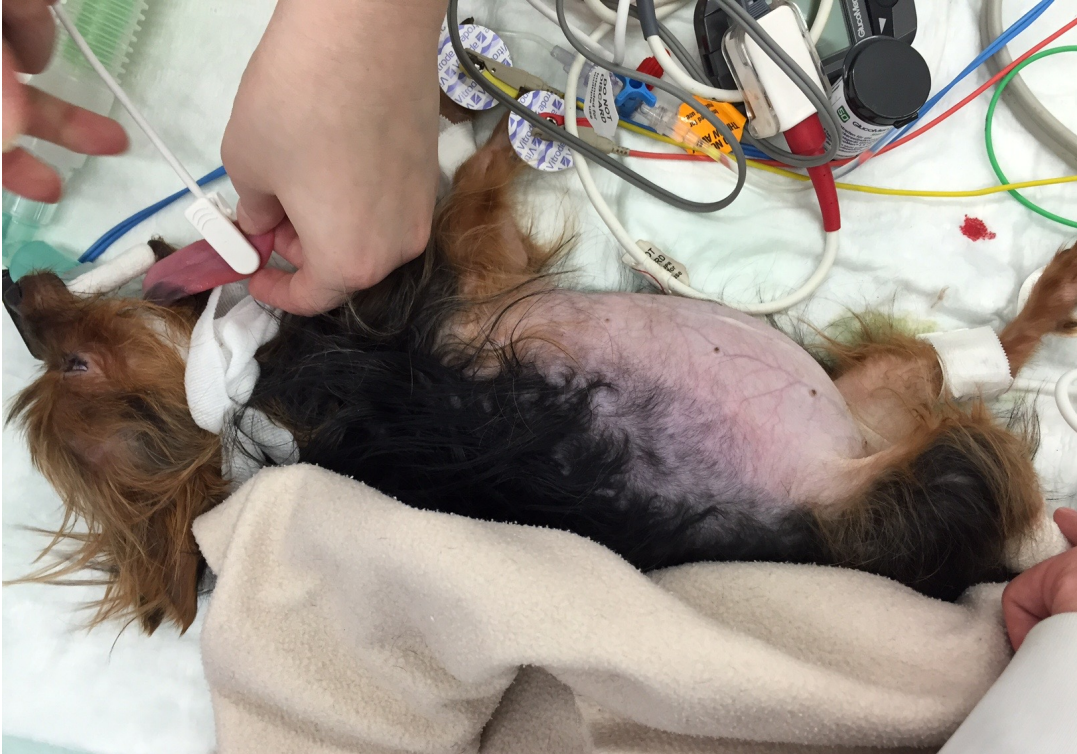
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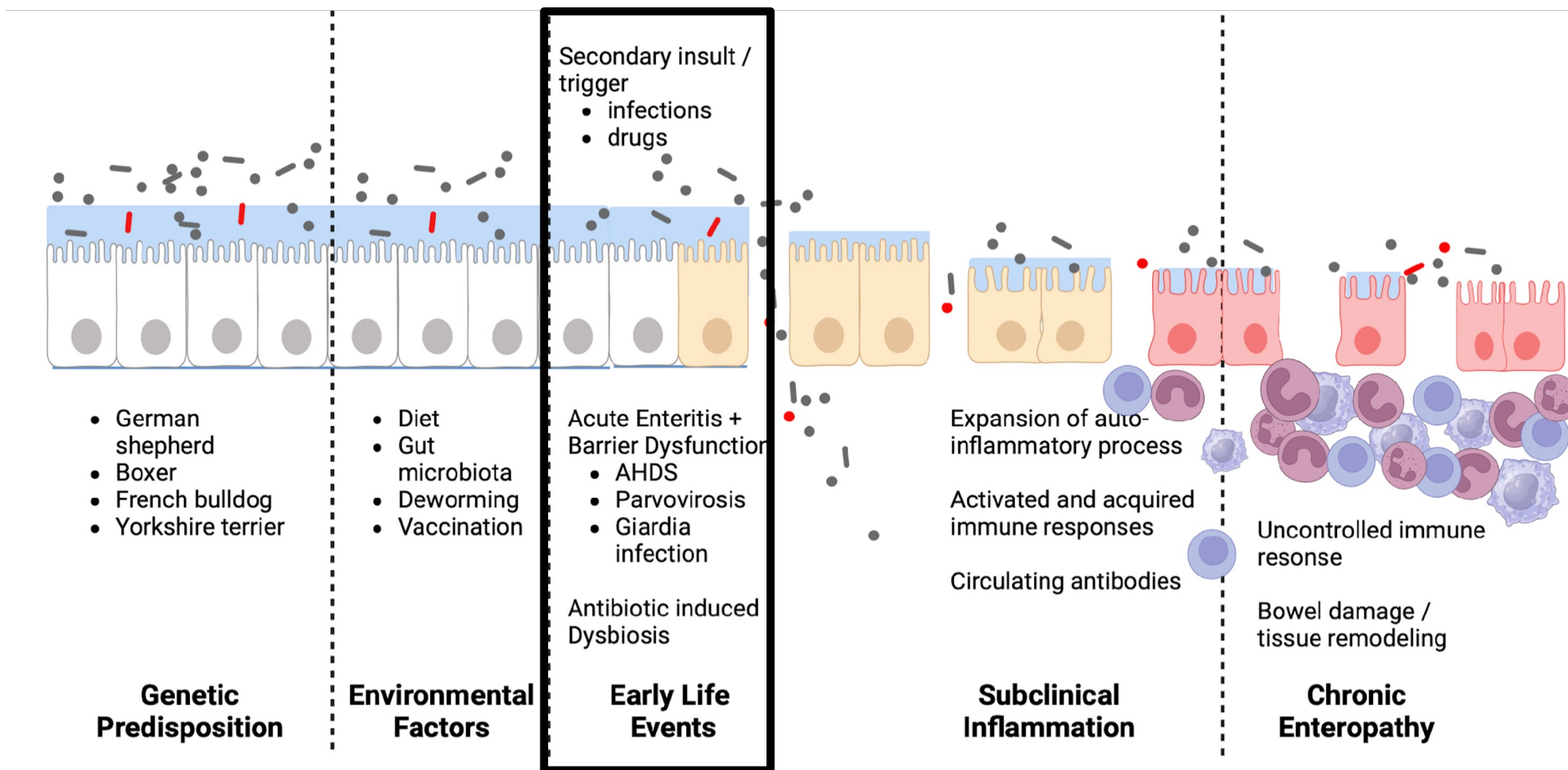
Growing Dog Project

Cohort study on the establishment of
life stage-oriented preventive strategies in dogs
Prof. Dr. Stefan Unterer, Dipl. ECVIM-CA

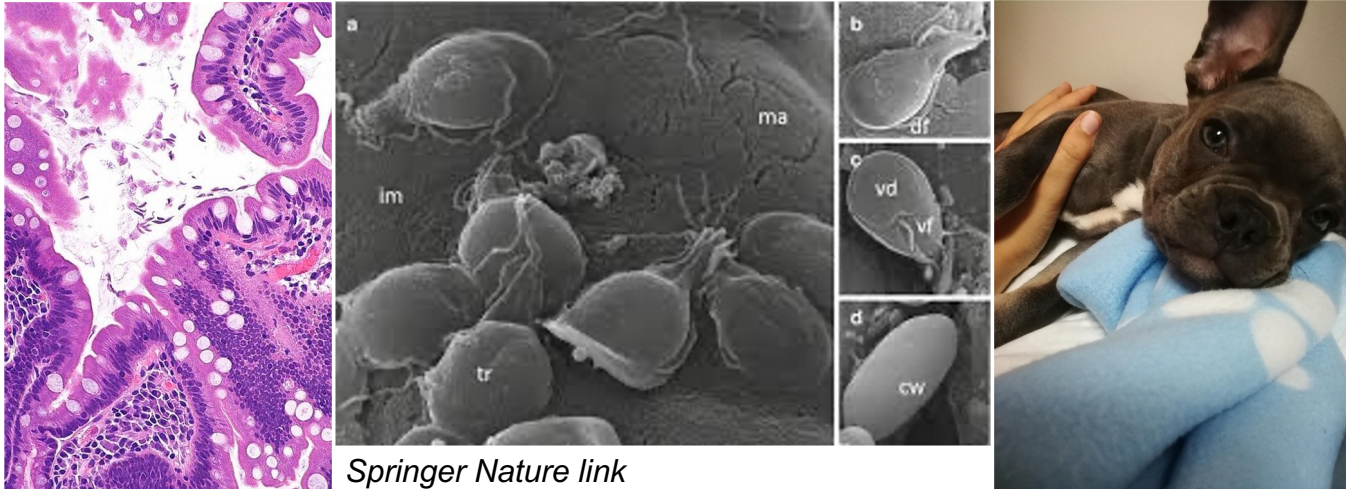
Background information



Pathogenesis of Chronic Enteropathy in Dogs



Dog Model for acute intestinal damage: canine *Giardia* enteritis



- **barrier dysfunction**
- **transient dysbiosis**
- **timing**

(tight junction)
(metronidazole)
(young dogs)

Gastroenterology 2022;162:844–858

Dissection of Barrier Dysfunction in Organoid-Derived Human Intestinal Epithelia Induced by *Giardia duodenalis*

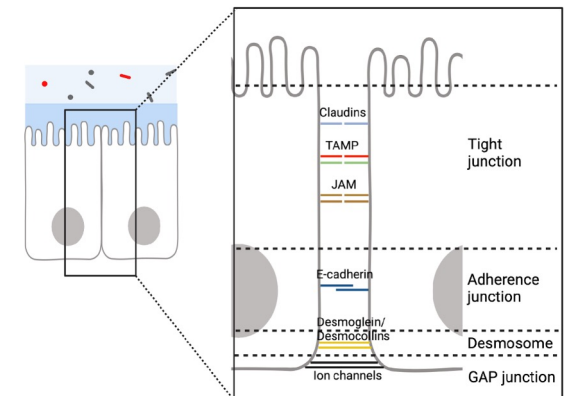
David Holthaus,^{1,*} Martin R. Kraft,^{1,*} Susanne M. Krug,² Silver Wolf,³ Antonia Müller,¹ Estefania Delgado Betancourt,¹ Madeleine Schorr,⁴ Gudrun Holland,⁵ Felix Knauf,⁴ Joerg-Dieter Schulzke,² Toni Aebischer,^{1,6} and Christian Klotz^{1,6}

GASTROENTEROLOGY 2022;123:1179–1190

Intestinal Infection With *Giardia* spp. Reduces Epithelial Barrier Function in a Myosin Light Chain Kinase-Dependent Fashion

KEVIN G.-E. SCOTT,* JONATHAN B. MEDDINGS,* DAVID R. KIRK,* SUSAN P. LEES-MILLER,* and ANDRÉ G. BURET,*

¹Department of Biological Sciences, ²Mucosal Inflammation Research Group, ³Gastrointestinal Research Group, ⁴Cancer Biology Research Group and Department of Biochemistry & Molecular Biology, University of Calgary, Alberta, Canada



STANDARD ARTICLE OPEN ACCESS

Small Animal Internal Medicine Gastroenterology

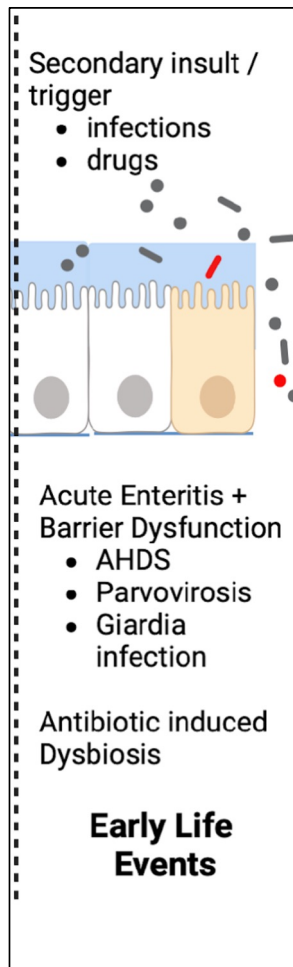
Long-Term Follow-Up After Acute Gastroenteritis Caused by *Giardia* Infection in Juvenile Dogs

Karla C. Walz¹  | Jan S. Suchodolski²  | Melanie Werner¹  | Felix Grimm³ | Manuela Schnyder³ | Yury Zablotski⁴ | Stefan Unterer¹

¹Clinic for Small Animal Medicine, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland | ²Gastrointestinal Laboratory, Department of Small Animal Clinical Sciences, Texas A&M University, TAMU, Texas, USA | ³Institute of Parasitology, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland | ⁴Clinic of Small Animal Medicine, Centre for Clinical Veterinary Medicine, LMU Munich, Munich, Germany

Correspondence: Karla C. Walz (karla.walz@uzh.ch)

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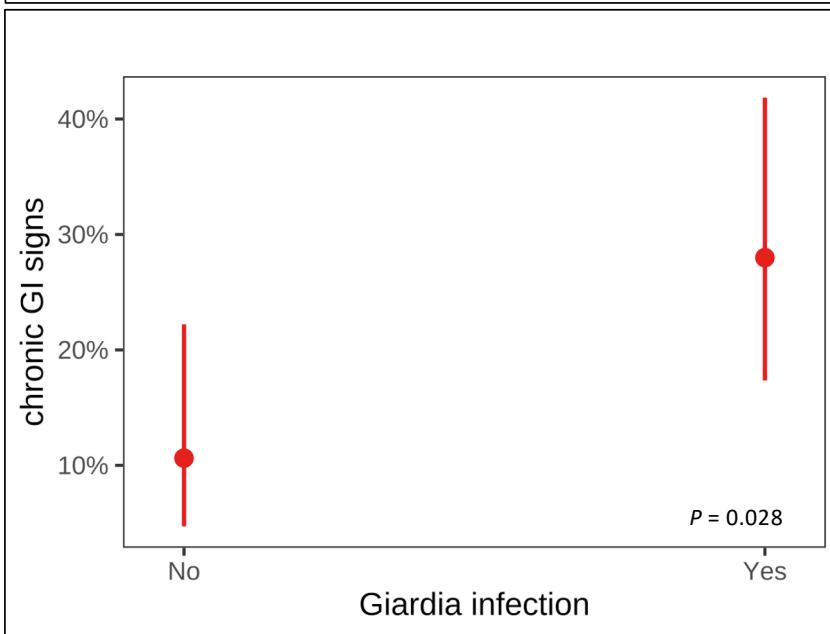


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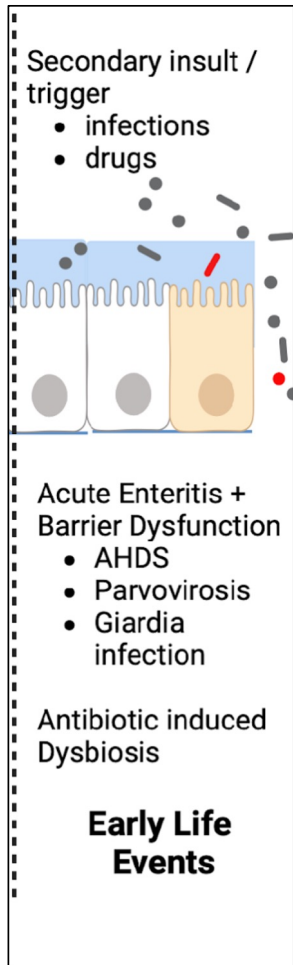
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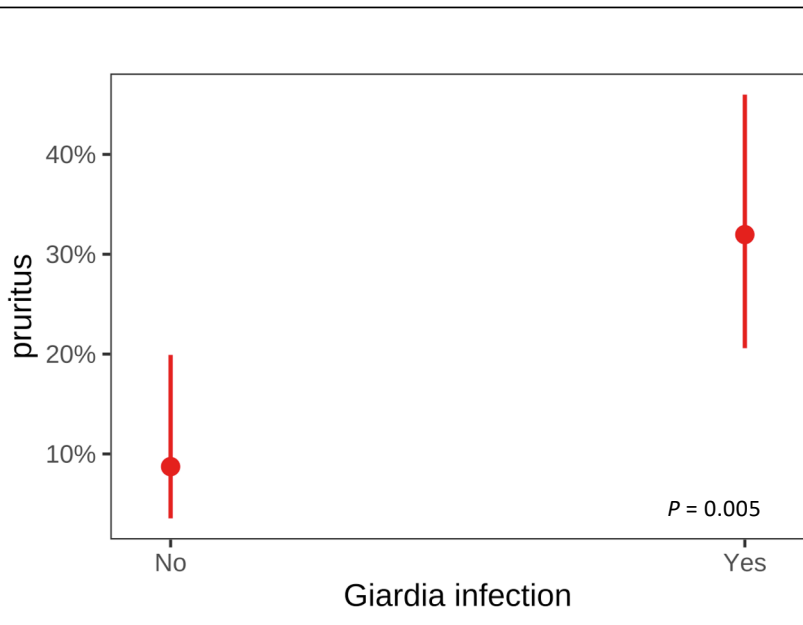
Giardia enteritis is a significant **risk factor** for **chronic GI signs** later in life



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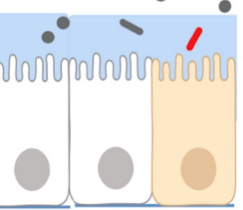
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Giardia enteritis is a significant risk factor for chronic pruritus later in life

Secondary insult / trigger

- infections
- drugs



Acute Enteritis + Barrier Dysfunction

- AHDS
- Parvovirus
- Giardia infection

Antibiotic induced Dysbiosis

Early Life Events

Journal of Veterinary Internal Medicine

Journal of Veterinary Internal Medicine

ACVIM

Open Access

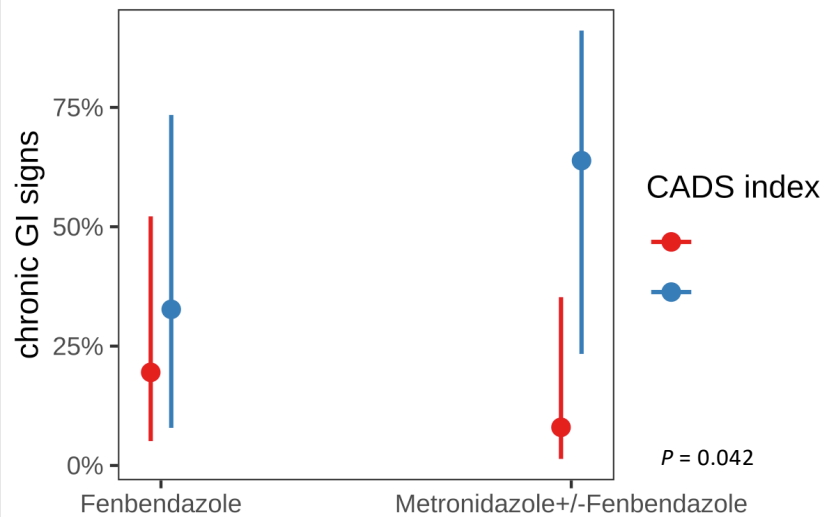
American College of Veterinary Internal Medicine

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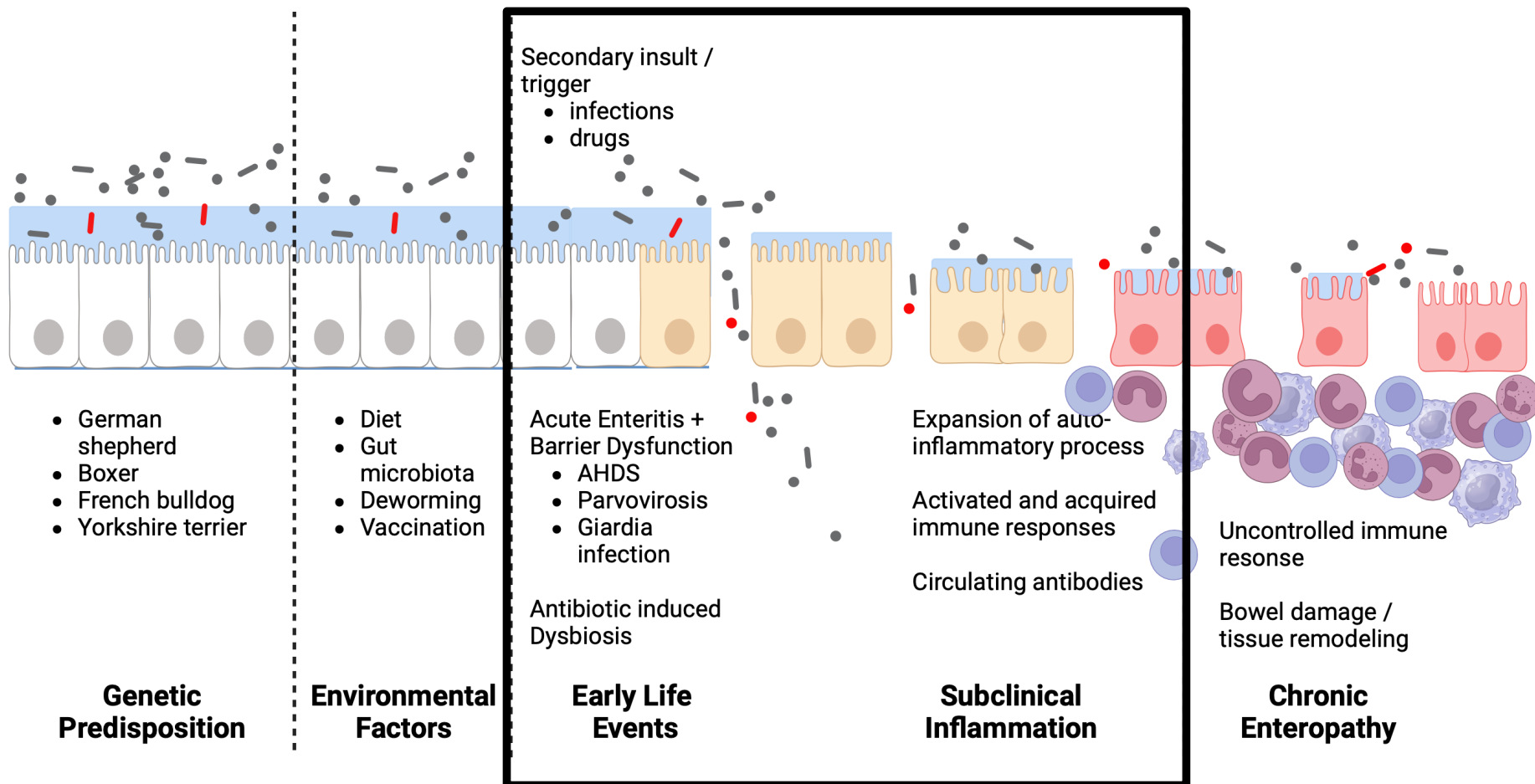
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high CADS index during acute enteritis combined with **metronidazole** significant **risk factor** for **chronic GI signs** later in life



Identification of early markers for the development of chronic diseases
Implementation of early treatment strategies to prevent/delay progression

Background information

Please cite this article in press as: Vestergaard et al., Characterizing the pre-clinical phase of inflammatory bowel disease, Cell Reports Medicine (2023), <https://doi.org/10.1016/j.xcrm.2023.101263>

Cell Reports Medicine

CellPress
OPEN ACCESS



Article

Characterizing the pre-clinical phase of inflammatory bowel disease

Marie Vibeke Vestergaard,¹ Kristine H. Allin,^{1,2} Gry J. Poulsen,¹ James C. Lee,^{3,4,5} and Tine Jess^{1,2,5,6,*}

¹Center for Molecular Prediction of Inflammatory Bowel Disease, PREDICT, Department of Clinical Medicine, Aalborg University, Copenhagen, Denmark

²Department of Gastroenterology & Hepatology, Aalborg University Hospital, Aalborg, Denmark

³Genetic Mechanisms of Disease Laboratory, The Francis Crick Institute, London, UK

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<https://doi.org/10.1016/j.xcrm.2023.101263>

Up to **8 years before the diagnosis of Crohn's disease** (CD) and up to 3 years before the diagnosis of ulcerative colitis (UC), significant hematological and biochemical changes can already be detected in the blood.

RESEARCH ARTICLE

A mapping review of worldwide current and previous cohort research programmes in cats and dogs

Jessica Irene Landolt¹, Dan G. O'Neill², Stefan Unterer¹, Sonja Hartnack³, Malwina Ewa Kowalska^{3,4*}

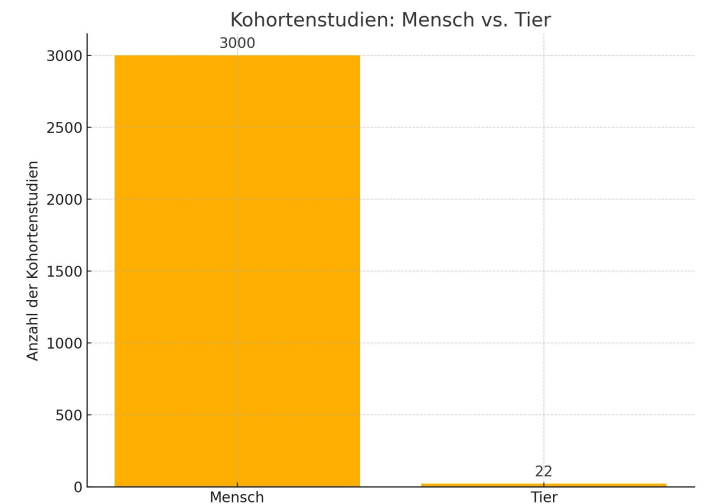
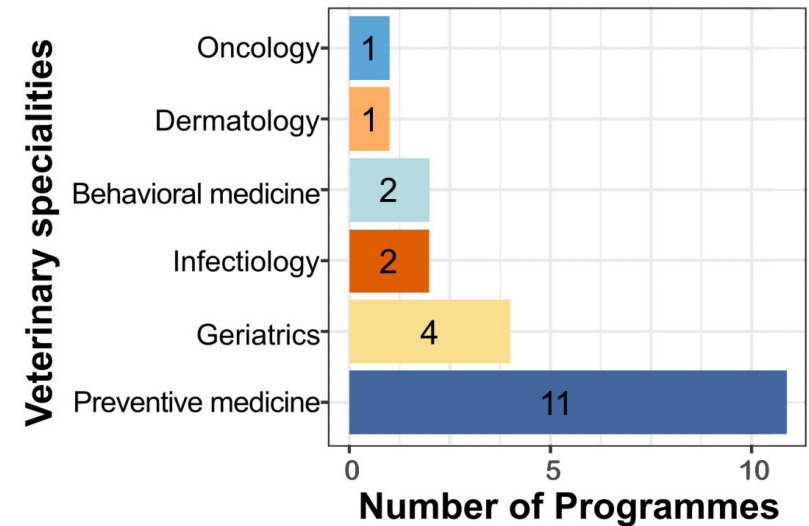
¹ Clinic for Small Animal Internal Medicine, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland, ² Pathobiology and Population Sciences, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts, United Kingdom, ³ Section of Veterinary Epidemiology, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland, ⁴ Section of Ophthalmology, Vetsuisse Faculty, University of Zurich, Zurich, Switzerland

A **cohort program** or **cohort study** is a scientific research approach in which a group of individuals (the so-called cohort) is observed over a defined period of time.

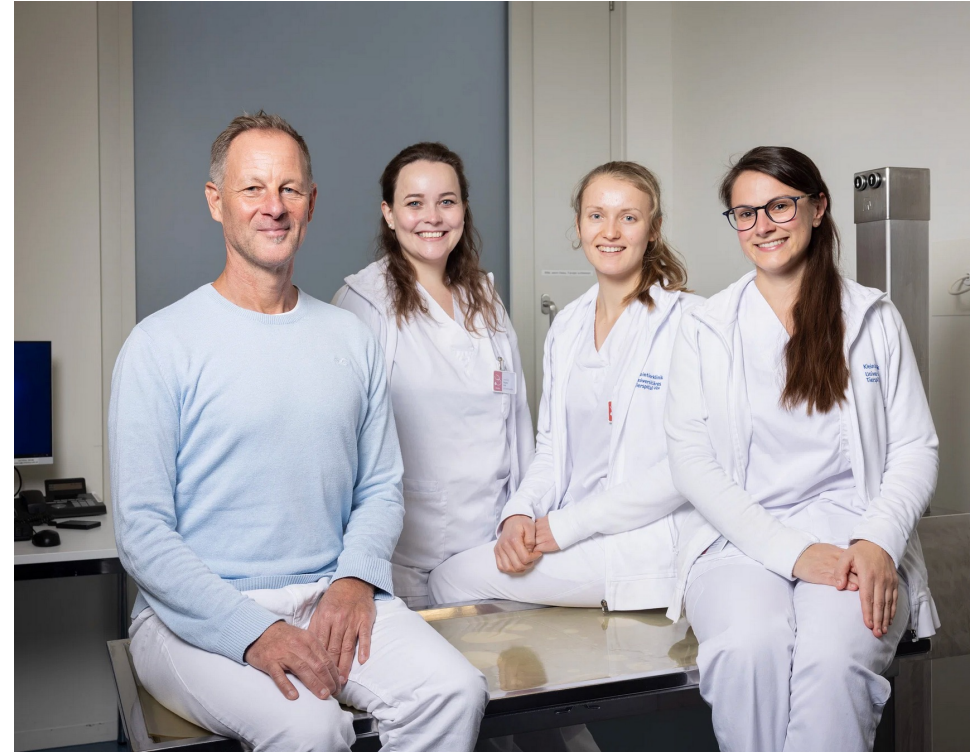
The aim is to identify changes and associations between various factors and health-related or other specific outcomes.

International overview of cohort studies with companion animals

- **22 cohort programs worldwide identified (cats & dogs)**
- main countries: USA and UK
- majority focus on dogs
- aim: investigation of environmental and genetic influences on animal health
- **few veterinary cohort studies compared to human medicine**
- **high potential for further cohort research in the veterinary field**



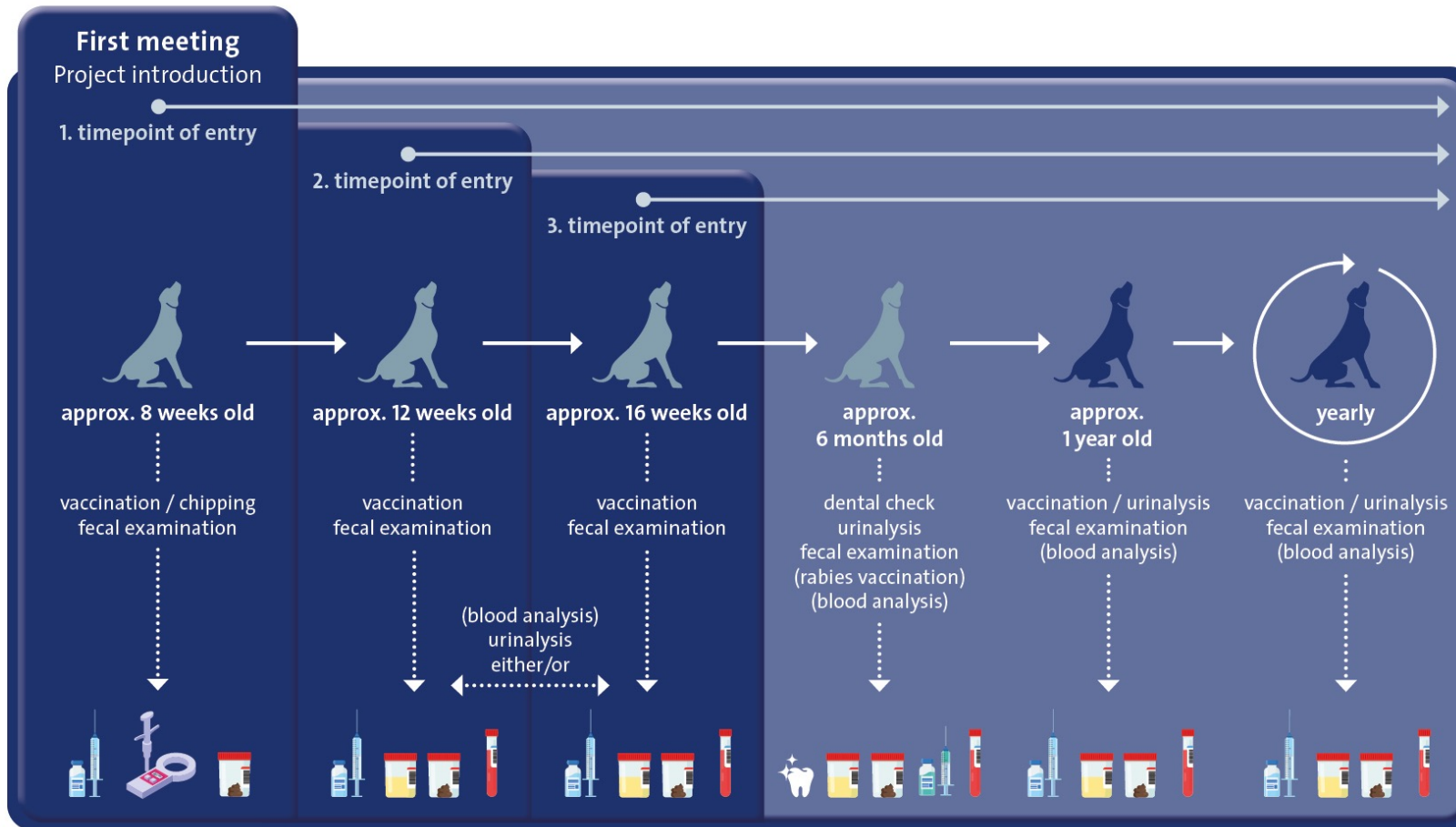
The Growing Dog Project started in August 2023



Aims of the Growing Dog Project

- prospective digital collection of **patient data**
- establishment of a **biobank**
- establishment of **reference values** for different life stages (e.g., development of the intestinal microbiome)
- identification of **risk factors for the development of** (immune-mediated) **chronic diseases**, particularly chronic enteropathies
- expansion of the project (additional research centers)
- **development of preventive health strategies**

TIMEPOINTS OF CONSULTATION AT TIERSPITAL UZH



Growing Dog Project – study design

mandatory procedures

- clinical examination
- free catch urine sample collection
- hair sample collection
- skin bacterial samples

nonmandatory procedures

- blood collection

Study design – Questionnaire: Links and QR codes

General questionnaire

<https://www.uzh.ch/zi/cl/surveys/index.php/432463?lang=de>



Health update

<https://www.uzh.ch/zi/cl/surveys/index.php/963314?lang=de>



The early life stage of the puppy – version

<https://www.uzh.ch/zi/cl/surveys/index.php/627449?lang=de>



Report form in case of illness, surgery, or dental treatments

<https://www.uzh.ch/zi/cl/surveys/index.php/611756?lang=de>



Current status of the Project – September 2025

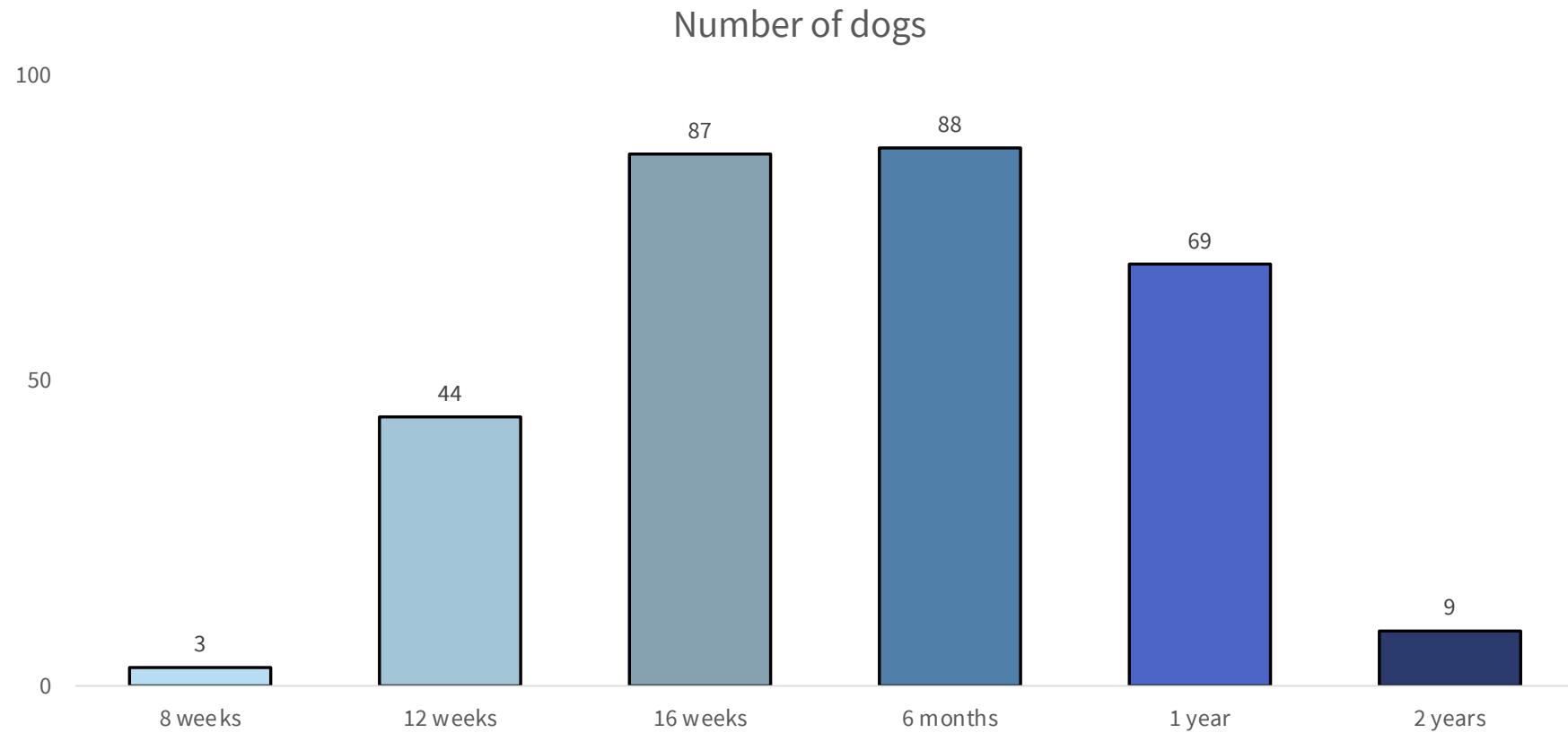
- Project start: August 2023
- Participant recruitment: 103 puppies (plan: 50 puppies/year)
- Drop Out: 11 (various reasons)
- Current animal experimentation license valid until 05 June 2026



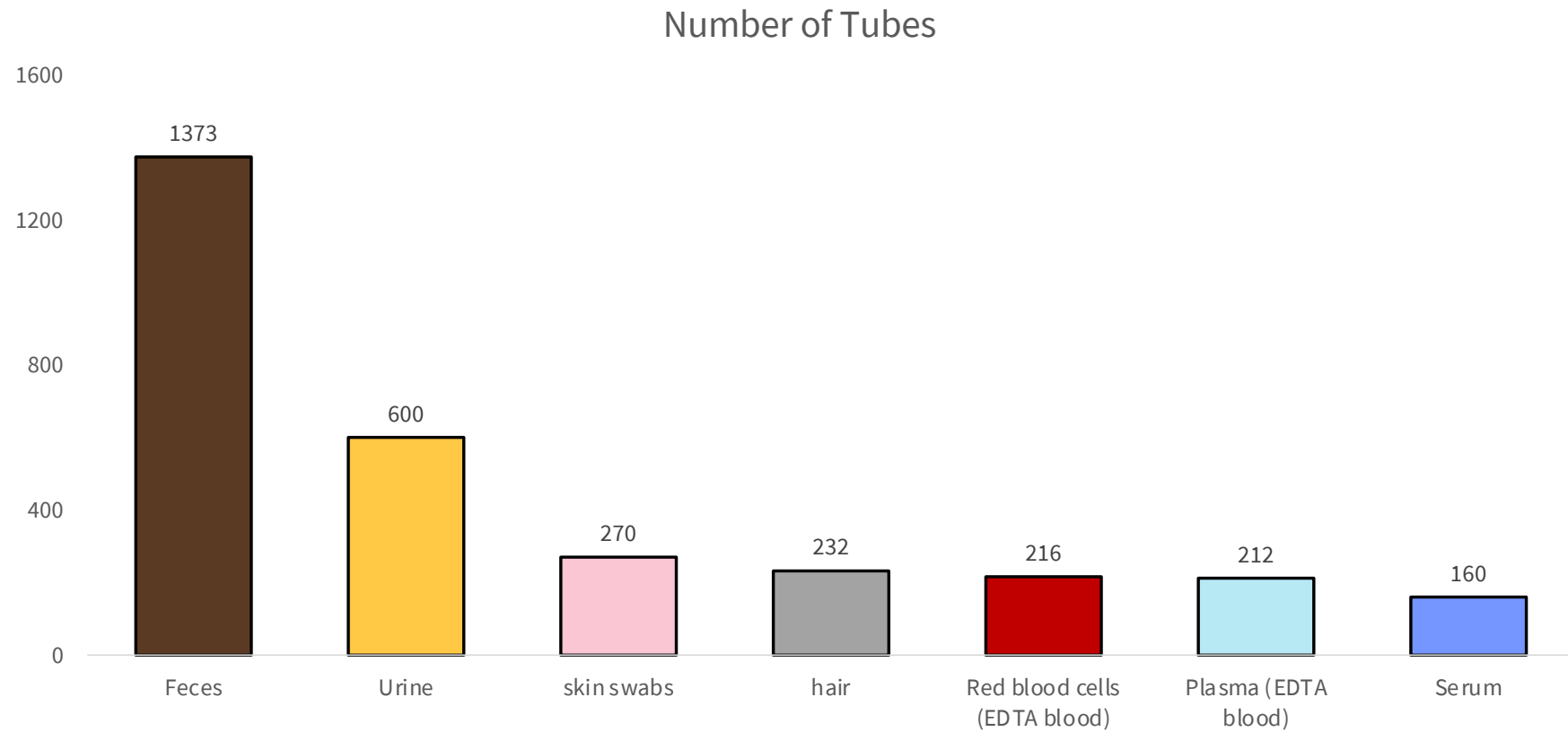
Selection of participating dogs: >100 puppies enrolled



Number of visits at predefined time points



Number of collected samples



Growing Dog Project – cooperations

- Clinic for Small Animal Internal Medicine UZH
 - Gastroenterology Service
 - Service for Health and Medical Prevention
 - Mikrobiome Metabolome FMT Unit
- Section of epidemiology
- Departement of reproductive medicine (Sebastian Arlt, PD Dr.med.vet.)

Growing Dog Project – cooperations

- Institute for Animal Nutrition and Dietetics Animal Hospital
- Institute for Parasitology
- Section of Veterinary Bacteriology, Institute for Food Safety and Hygiene
- Research partner Jan Suchodolski (Texas A&M University)
 Kathrin Busch (LMU Munich)

Some First Results



Case „Lucia“

History

- since last night: restlessness and rapid breathing
- owners suspect abdominal pain
- temperature measured at home: 40.3 ° C
- travel abroad: no
- vaccination: not up to date
- deworming: up to date



Case „Lucia“

Thoracic radiographs

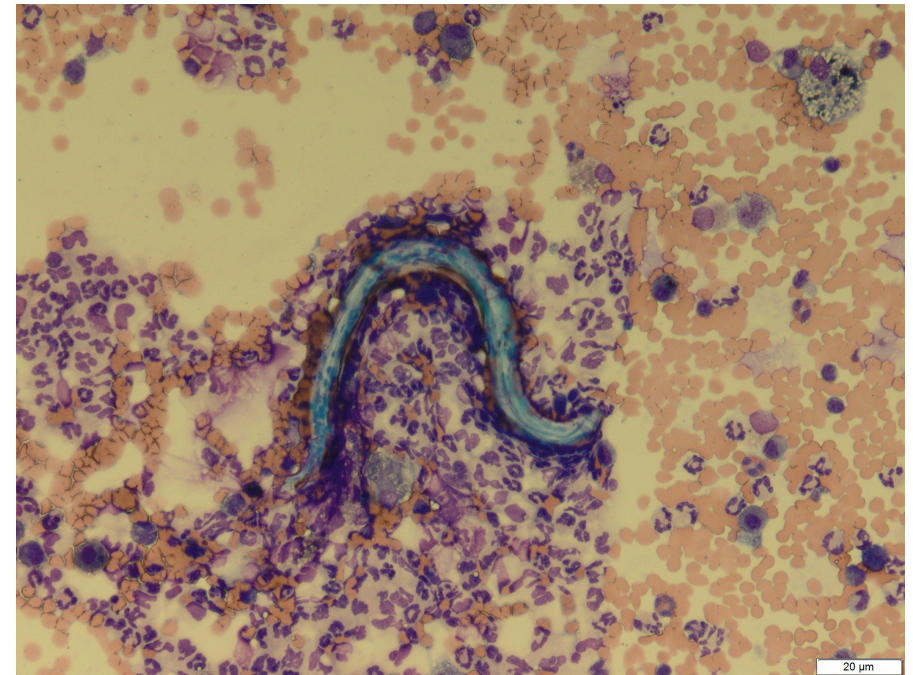


Case „Lucia“

Further Diagnostics

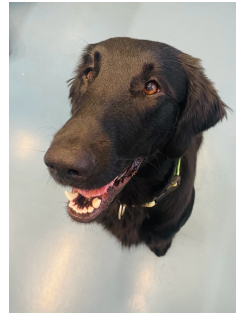
Bronchoscopy, bronchoalveolar lavage Cytology

- increased number of macrophages
- eosinophilic and neutrophilic inflammation
- hemorrhages
- ***Angiostrongylus vasorum* larvae**



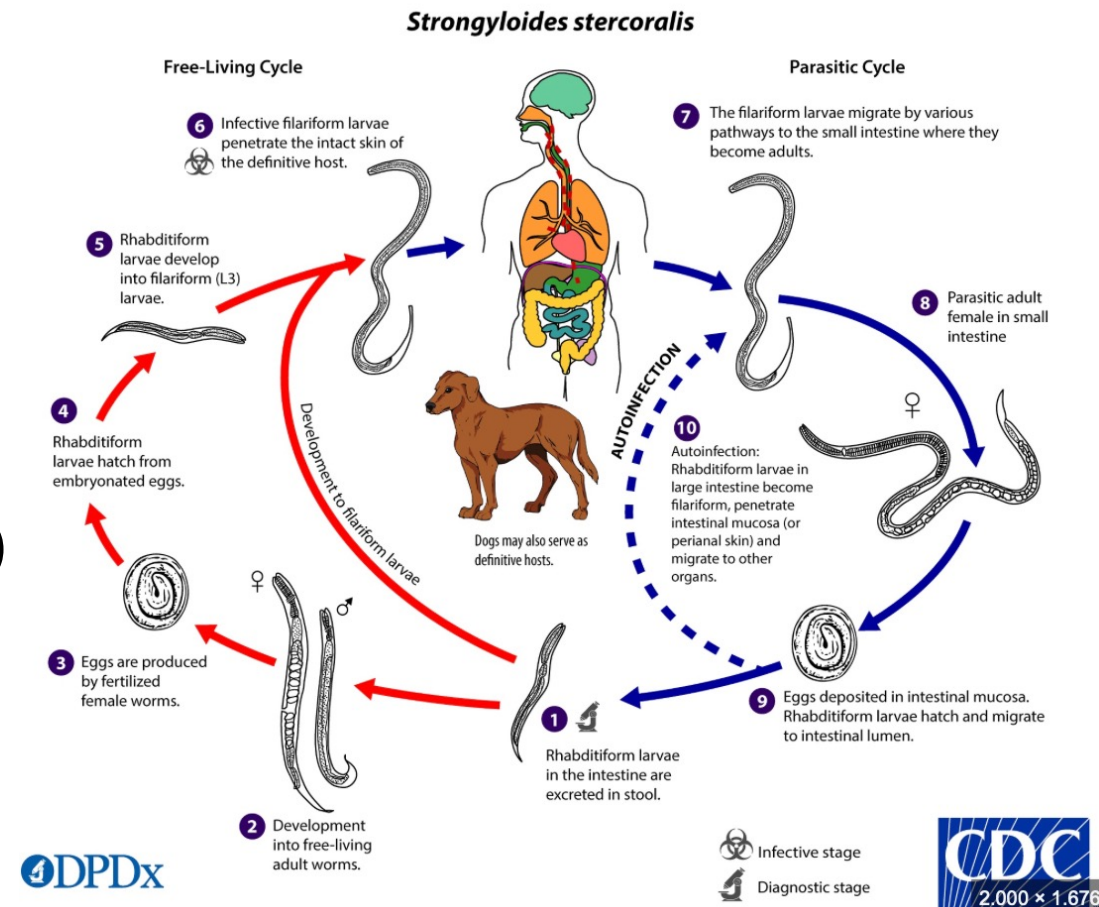
Detection of cardiorespiratory nematoda – *Angiostrongylus vasorum*

- all 5 dogs originate from Switzerland, living in Kanton Zurich
- no stays abroad before detection
- no clinical signs
- all initially diagnosed using Baermann technique



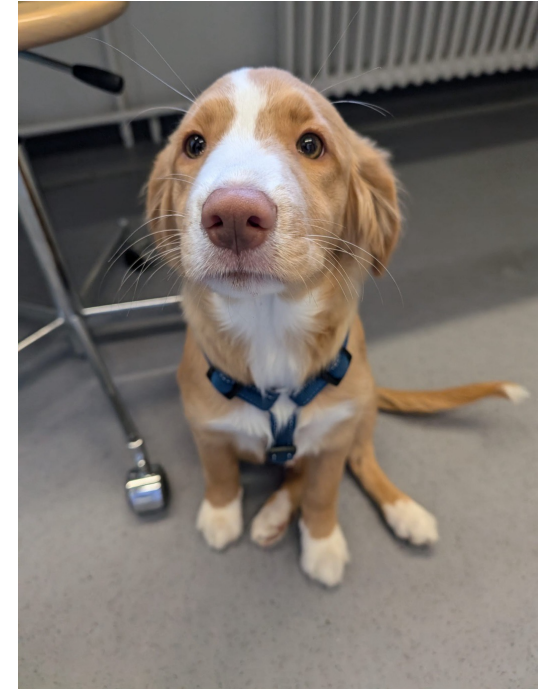
Strongyloides stercoralis

- nematode
- **zoonosis**
- occurrence: worldwide, especially in Southeast Europe
- infection: oral and percutaneous
- gastrointestinal signs (especially diarrhea) and respiratory signs (especially coughing)
- detection: Baermann test, cytological/histological examination via direct mucosal swabs/biopsies



Detection of gastrointestinal nematoda –*Strongyloides stercoralis*

- Originates from Switzerland, lives in Kanton Zurich
- No stays abroad before detection
- Detection at age of 16 weeks
- No clinical signs
- Treatment with 0,3 mg/kg Ivermectin at an interval of two weeks
- Retesting at 6 months: negative

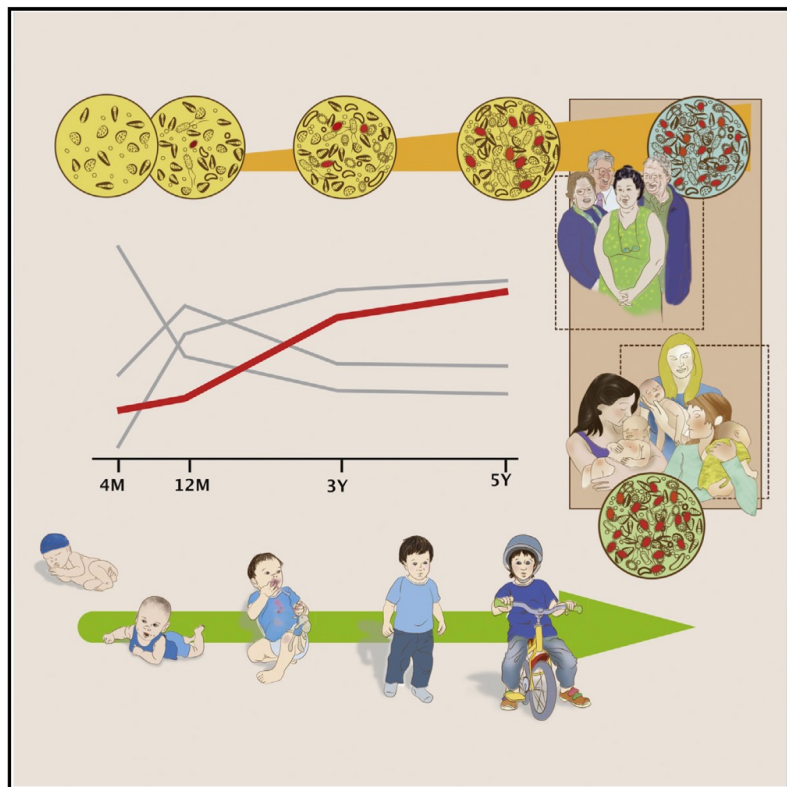


„Chico“

Cell Host & Microbe

Developmental trajectory of the healthy human gut microbiota during the first 5 years of life

Graphical abstract



Authors

Josefine Roswall, Lisa M. Olsson,
Petia Kovatcheva-Datchary, ...,
Karsten Kristiansen,
Jovanna Dahlgren, Fredrik Bäckhed

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In brief

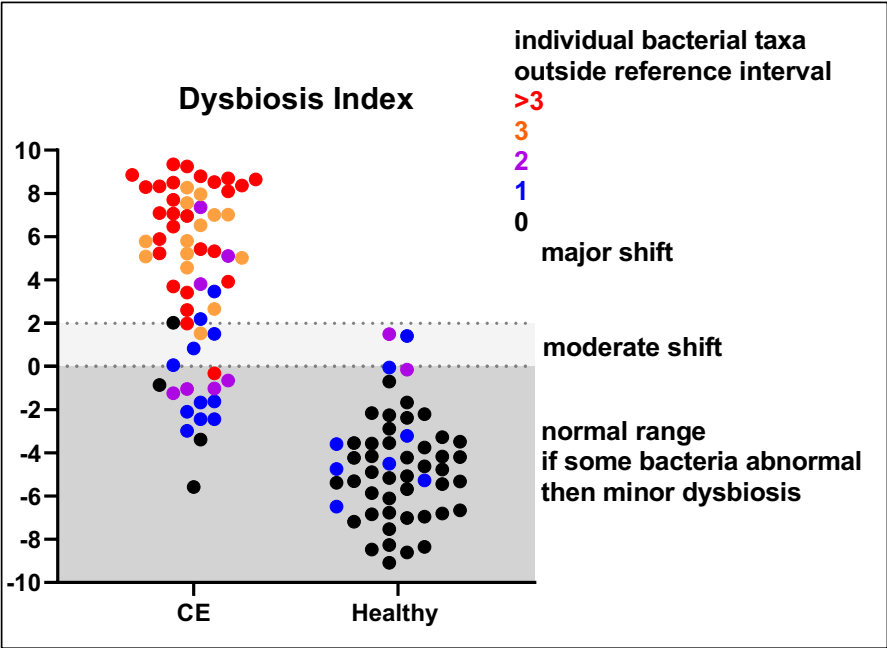
Roswall et al. show in a longitudinal birth cohort with 471 children that the gut microbiota is still developing at 5 years, when microbes associated with high community richness are acquired. The individual dynamics of the gut microbiota may indicate sensitive points for gut microbiota development early in life.

Several studies show that an adult-like profile is typically reached between 2 and 3 years of age.

A dysbiosis index to assess microbial changes in fecal samples of dogs with chronic inflammatory enteropathy

MK AlShawaqfeh^{1,2}, B Wajid^{1,3}, Y Minamoto¹, M Markel¹, JA Lidbury¹, JM Steiner¹, E Serpedin² and JS Suchodolski^{1,*}

	Change in dysbiosis	Properties
beneficial		
Faecalibacterium	↓	anti-inflammatory
Turicibacter	↓	short-chain fatty acids
Blautia	↓	short-chain fatty acids
Fusobacterium	↓	short-chain fatty acids
Clostridium hiranonis	↓	bile acid converter
harmful		
Streptococcus	↑	overgrowth in maldigestion
E. coli	↑	pro-inflammatory



STANDARD ARTICLE

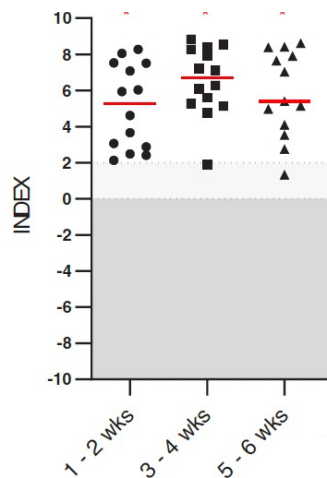
Developmental stages in microbiota, bile acids, and clostridial species in healthy puppies

Amanda B. Blake¹  | Annalis Cigarroa¹ | Hannah L. Klein¹ |
 Mohammad R. Khattab¹ | Theresa Keating² | Patti Van De Coevering² |
 Jonathan A. Lidbury¹  | Jörg M. Steiner¹  | Jan S. Suchodolski¹ 

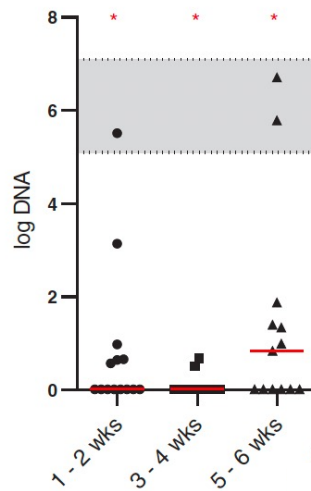
Clostridium hiranonis: conversion of primary to secondary bile acids

Secondary bile acids: inhibit the growth of other bacterial groups

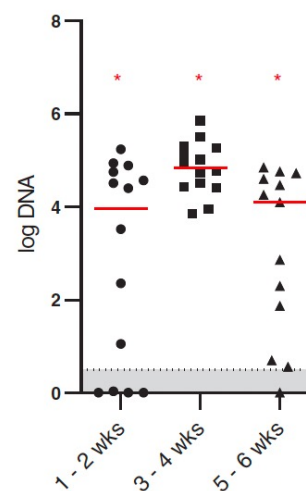
Dysbiosis Index



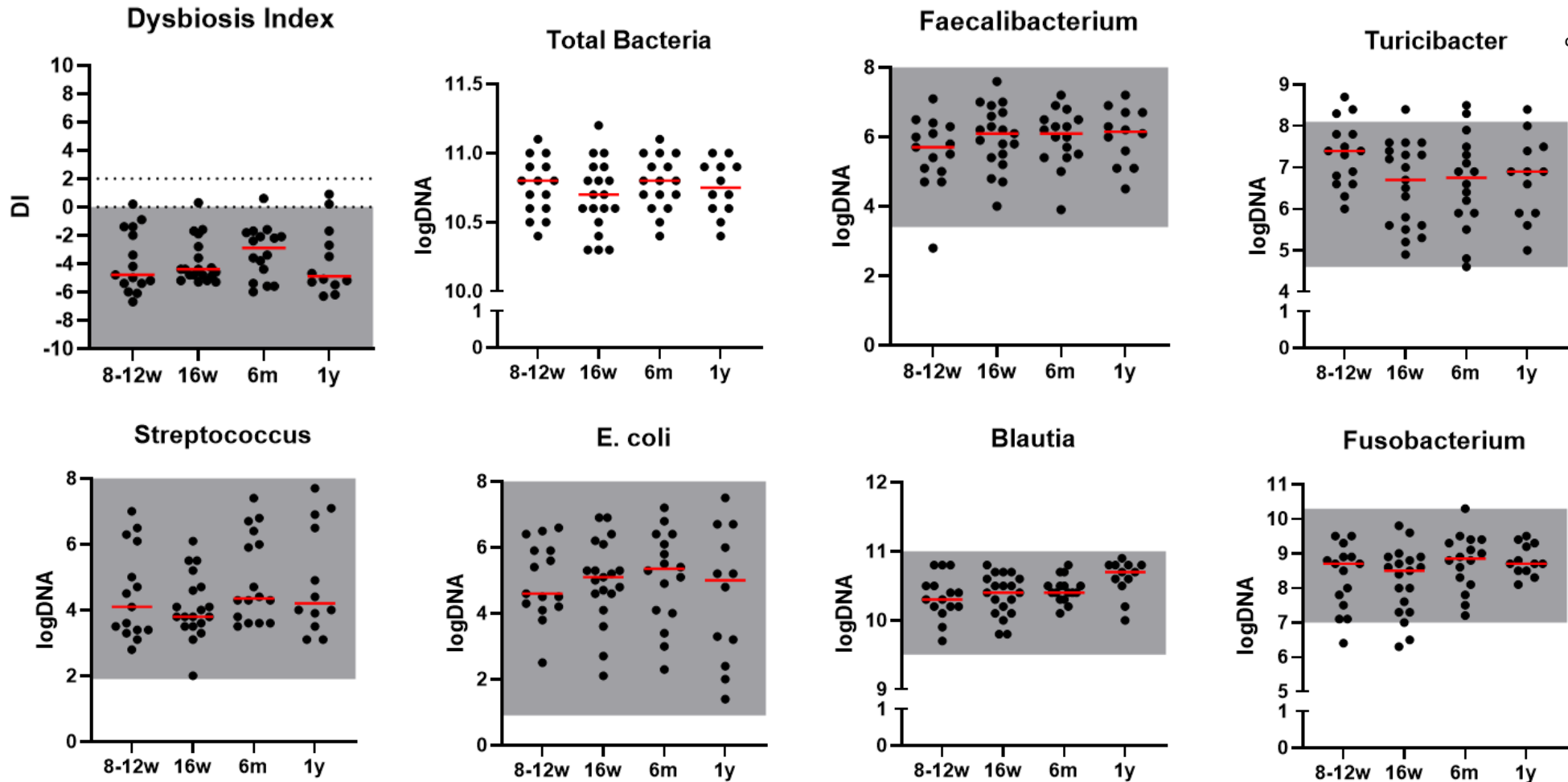
Clostridium hiranonis



Clostridium difficile



Early development and stability of gut microbiome



Thank you for your attention!

ACKNOWLEDGMENTS

- Team health prevention, gastroenterology, internal medicine – Vetsuisse Faculty, University Zurich
- Kathrin Busch – Gastroenterology Service, LMU Munich
- Jan Suchodolski – GI Lab Texas A&M University

