

IHU HealthAge 1st SAB September 5-7, 2024

Update and future use of the INSPIRE mouse cohort

Pr. Angelo PARINI

IHU HealthAge

Institute of Metabolic and Cardiovascular Diseases-I2MC

Toulouse

INSPIRE MIRROR COHORTS TO EXPLORE BIOLOGICAL AGE

INSPIRE Mouse cohort



6 to 24 months old

1576 SWISS mice
Social environment
Models of accelerated or slowed aging

Santin et al., JFA, 2021

Heterogenous genetic background

Males and females

Matched for chronological ages

Various functional statuses

Similar functional assessment

Biological, functional, imaging and digital data

INSPIRE Human T cohort



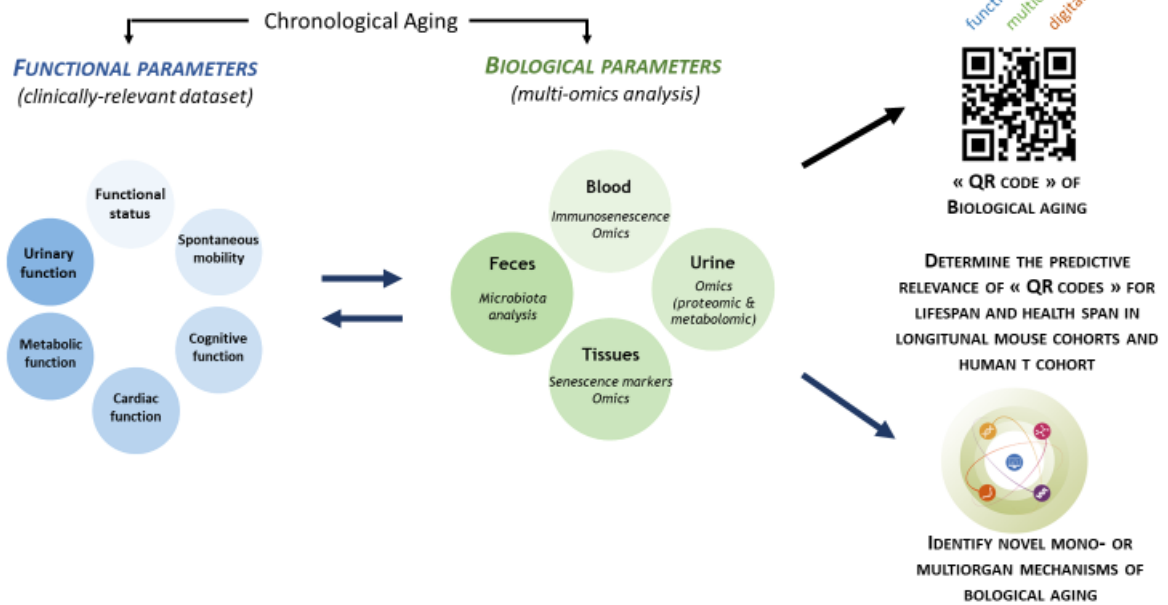
20 to 100 years old

1 100 individuals
Affiliated to a social security scheme
No severe disease compromising life expectancy at 5 years

Guyonnet et al., JFA, 2021

To facilitate cross-talks between experimental models and clinical routine and speed up discovery process

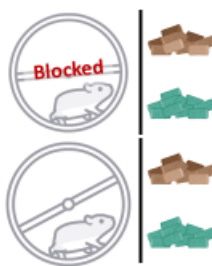
GENERAL STRATEGY AND SPECIFIC GOALS



DESIGN OF THE INSPIRE MOUSE COHORT



1,576 outbred mice (852M/724F)



Study design	Cross-sectional study				Longitudinal study
	6 months	12 months	18 months	24 months	
Conditions					
Human age	≈ 30 years	≈ 44 years	≈ 60years	≈ 80 years	
Control	80 mice (40M/40F)	80 mice (40M/40F)	100 mice (52M/48F)	136 mice (68M/68F)	120 mice (60M/60F)
HFHS diet	--	80 mice (40M/40F)	112 mice (64M/48F)	180 mice (112M/68F)	
Voluntary Activity (VA)	--	80 mice (40M/40F)	100 mice (52M/48F)	136 mice (68M/68F)	
HFHS diet + VA	--	80 mice (40M/40F)	112 mice (64M/48F)	180 mice (112M/68F)	
TOTAL	80 mice	320 mice	424 mice	632 mice	120 mice



CT	10% kcal	5,8% compo
HFHS	40% kcal	25,3% compo

Functional phenotyping: 106,000 data point (spontaneous and voluntary motor activity, 300M data points)
Biobanking: 60,000 samples (biological fluids, feces, tissues)

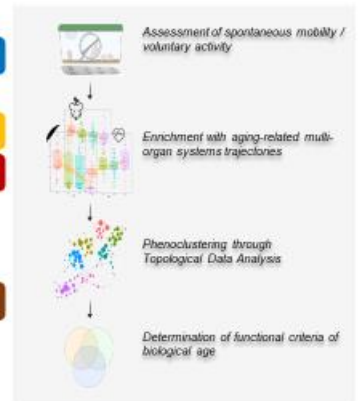
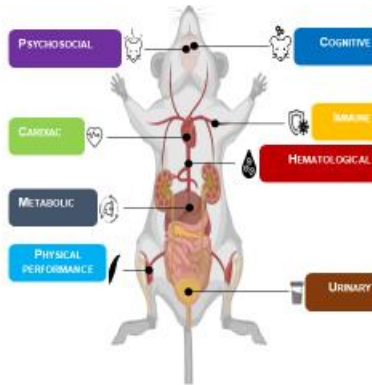
INSPIRE MOUSE COHORT: FUNCTIONAL PHENOTYPING



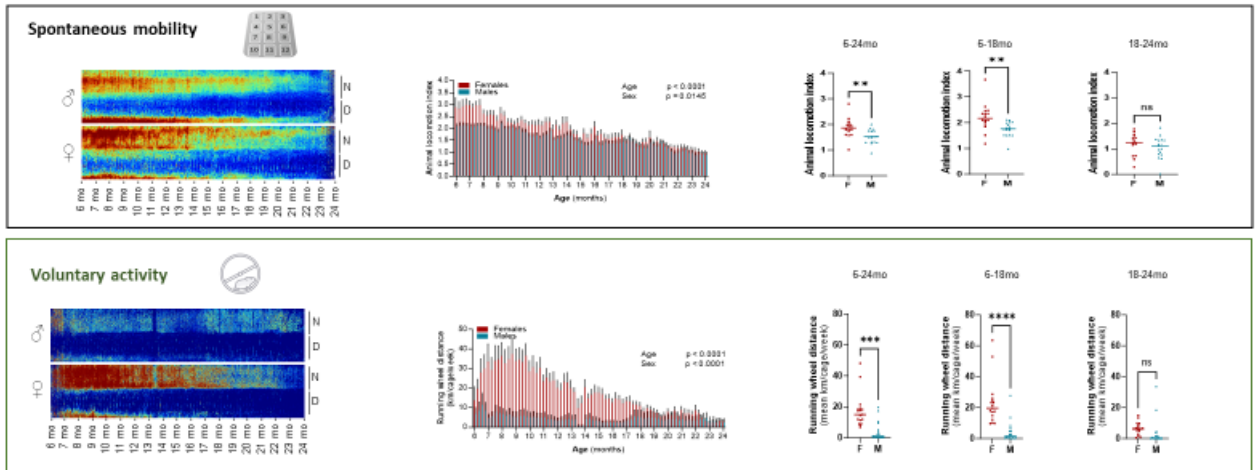
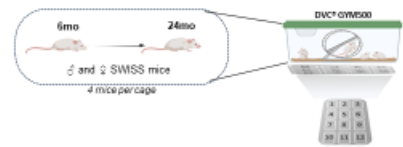
INSPIRE Mouse cohort allows to have **around 150 variables per mouse**
(w/o spontaneous and voluntary activity)



- Mean data for each experimental group
- Individual data for each mouse to define which function is impaired at a given time
- to correlate the loss of functions between them
- to correlate the loss of functions with biological data

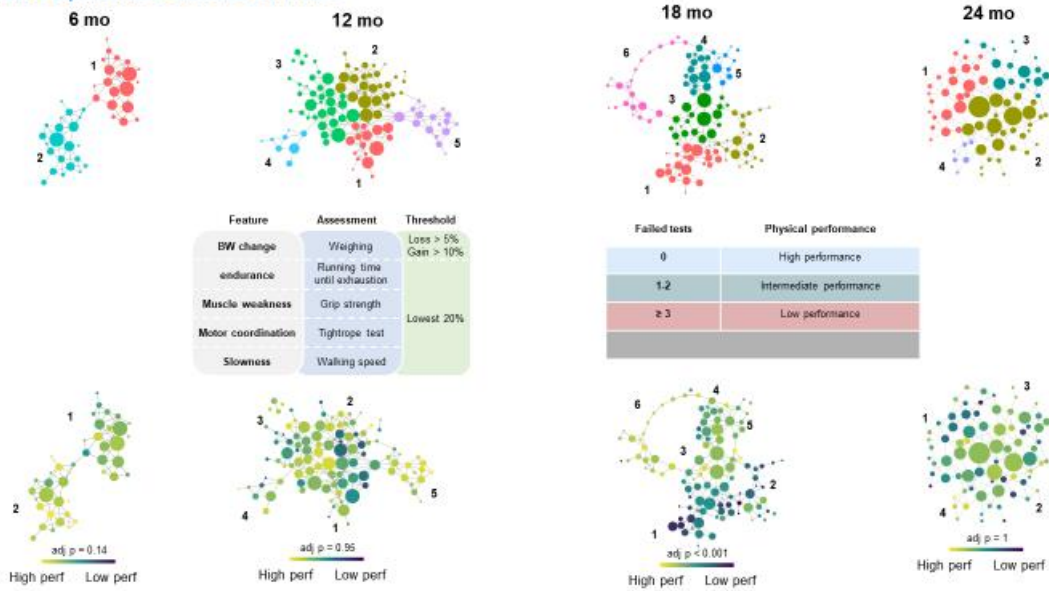


LONGITUDINAL SPONTANEOUS AND VOLUNTARY MOTOR ACTIVITIES

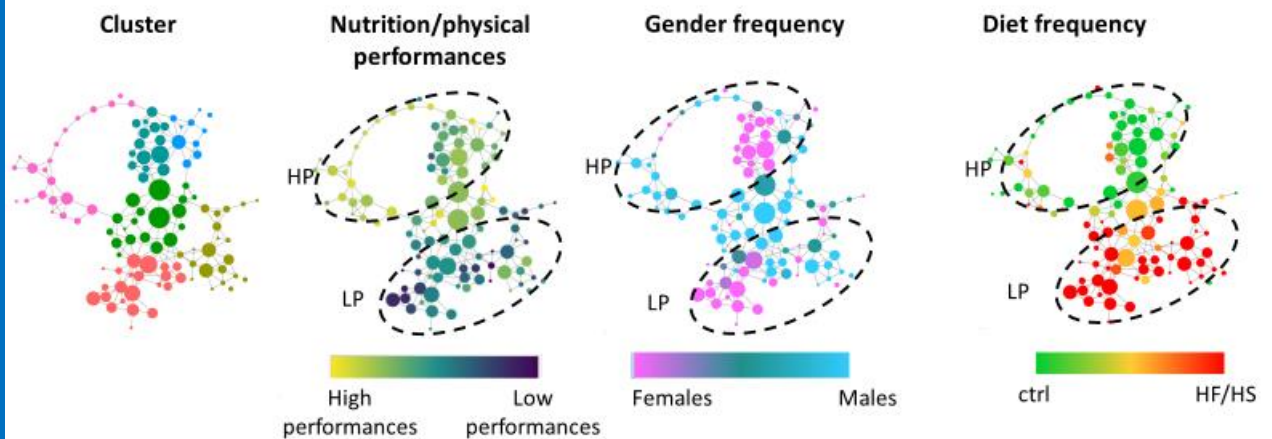


- Male and female SWISS mice exhibit an age-dependent decrease in spontaneous and voluntary motor activities
- As compared to males, females display higher spontaneous and voluntary motor activities up to 18 months of age.

Topological Data Analysis of multi-organs/systems parameters identifies distinct phenoclusters of mice

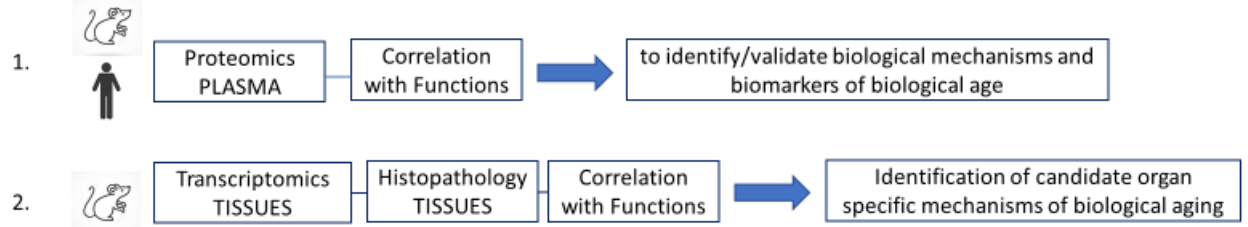


NUTRITION/PHYSICAL PERFORMANCES, GENDER AND DIET FREQUENCIES IN 18 MONTHS OLD MICE



NEXT STEPS: BIOLOGY OF THE INSPIRE MOUSE COHORT

Unbiased approach



Biased approach

1. The functional data bank (106,000 datapoints), the biobank (60,000 samples) and the digital/technological tools are available to test hypothesis driven studies (for example, 6 projects have been granted in the framework of the Internal IHU Call)
2. Design age specific sub-cohorts and longitudinal cohorts to validate the role of specific factors in biological age, health span and lifespan.