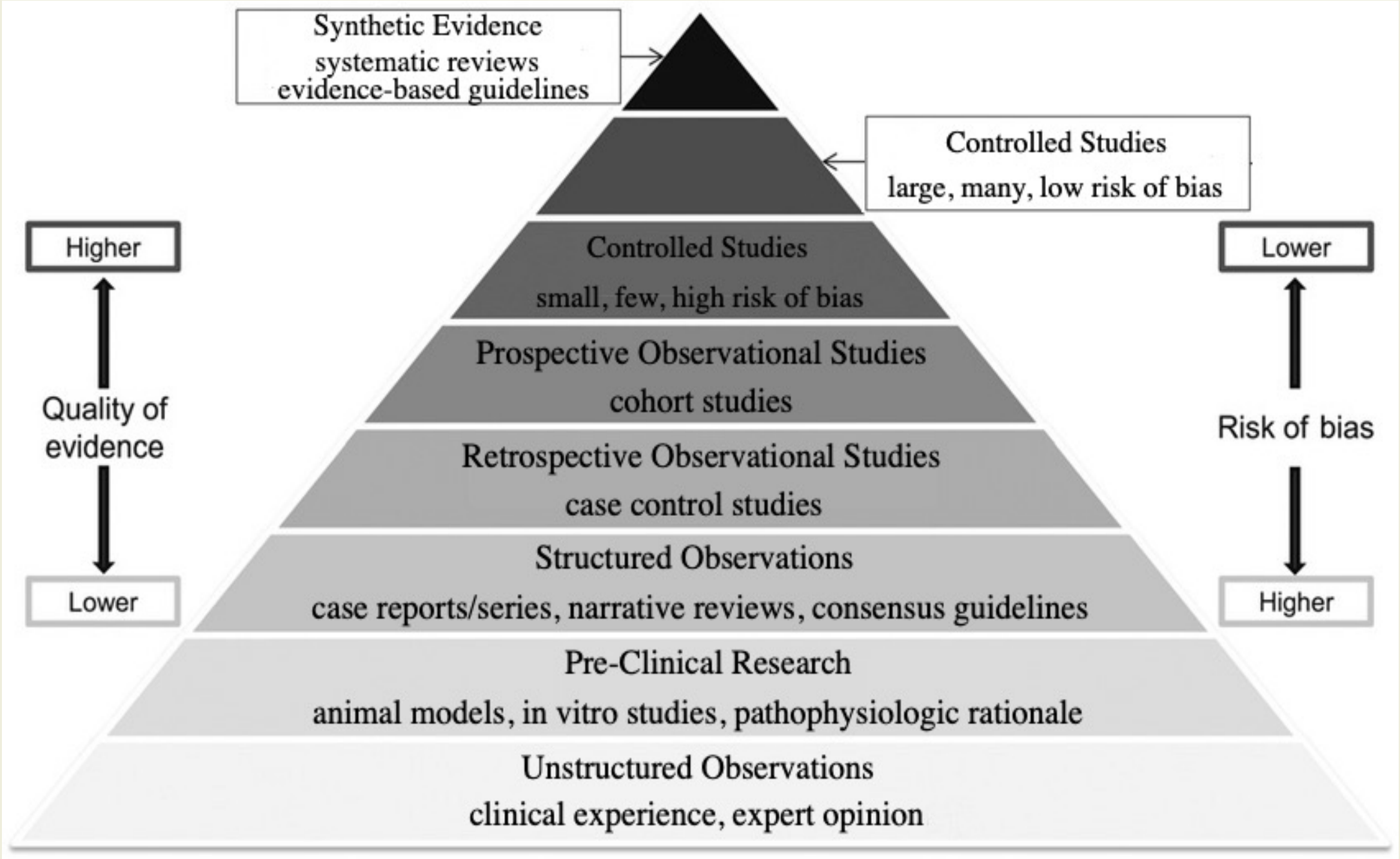
Evidence-based Geriatric Small Animal Medicine

Cats

What is EBVM?

Scientific
Evidence
EBVM
Clinical
Expertise
Client Goals
& Values


Synthetic Evidence
systematic reviews
evidence-based guidelines
Controlled Studies
large, many, low risk of bias
Controlled Studies
small, few, high risk of bias
Prospective Observational Studies
cohort studies
Retrospective Observational Studies
case control studies
Structured Observations
case reports/series, narrative reviews, consensus guidelines
Pre-Clinical Research
animal models, in vitro studies, pathophysiologic rationale
Unstructured Observations
clinical experience, expert opinion
Higher
Quality of evidence
Lower
Lower
Risk of bias
Higher

What Is Aging?

What Is Aging?

→ Oxford English Dictionary

- to grow old
- not young
- to become or appear aged
- having lived a relatively long time
- at an advanced stage of life

→ Scientific Literature

- The progressive **accumulation of changes** with time associated with or responsible for the **ever-increasing susceptibility to disease and death**
- A persistent decline in the age-specific fitness components of an organism due to **internal physiological degeneration**
- A process of the **progressive functional decline with time**, leading to **disability, dependence, morbidity, and mortality**

What Is Aging?

- Time Passing
- Physical & Functional Changes
- Increase Risk of Three Ds
  - Disability
  - Disease
  - Death

Is Aging a Disease?

Is Aging a Disease?

- Yes
  - Causes most health problems
  - Mechanisms can be understood and targeted
  - Can’t succeed if we don’t try

Is Aging a Disease?

- → **No**
  - Natural
  - Normal
  - Inevitable
  - Stigma

  - FDA says No

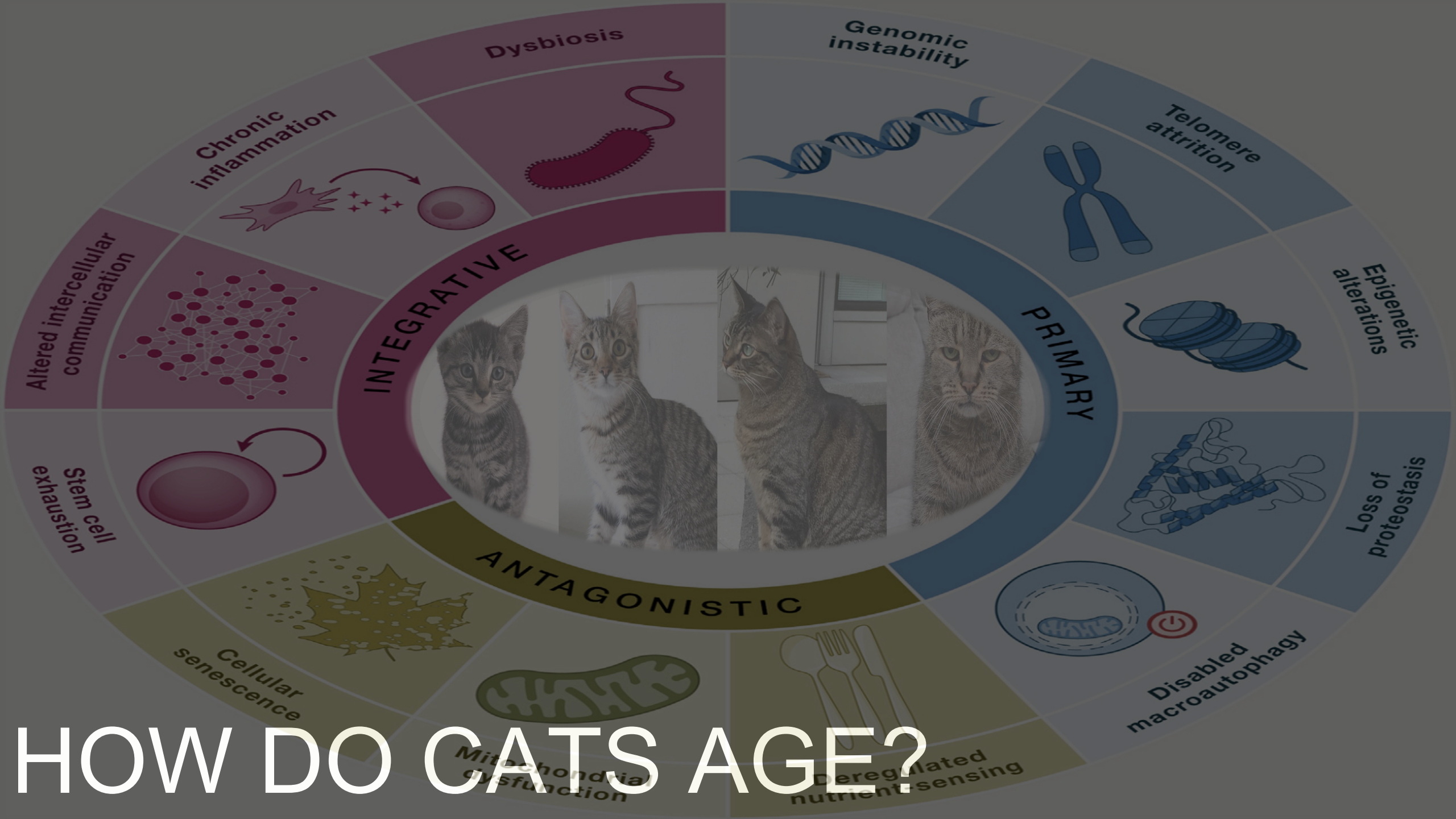
“Such natural states as…menopause, aging, and pregnancy are not themselves diseases”

  - NIA says No

“Aging itself isn’t a disease”

Is Aging a Disease?

- Pragmatic
  - **Modifiable risk factor** for most disease in adult cats
  - Not inevitable nor immutable
  - It’s just biology!



HOW DO CATS AGE?

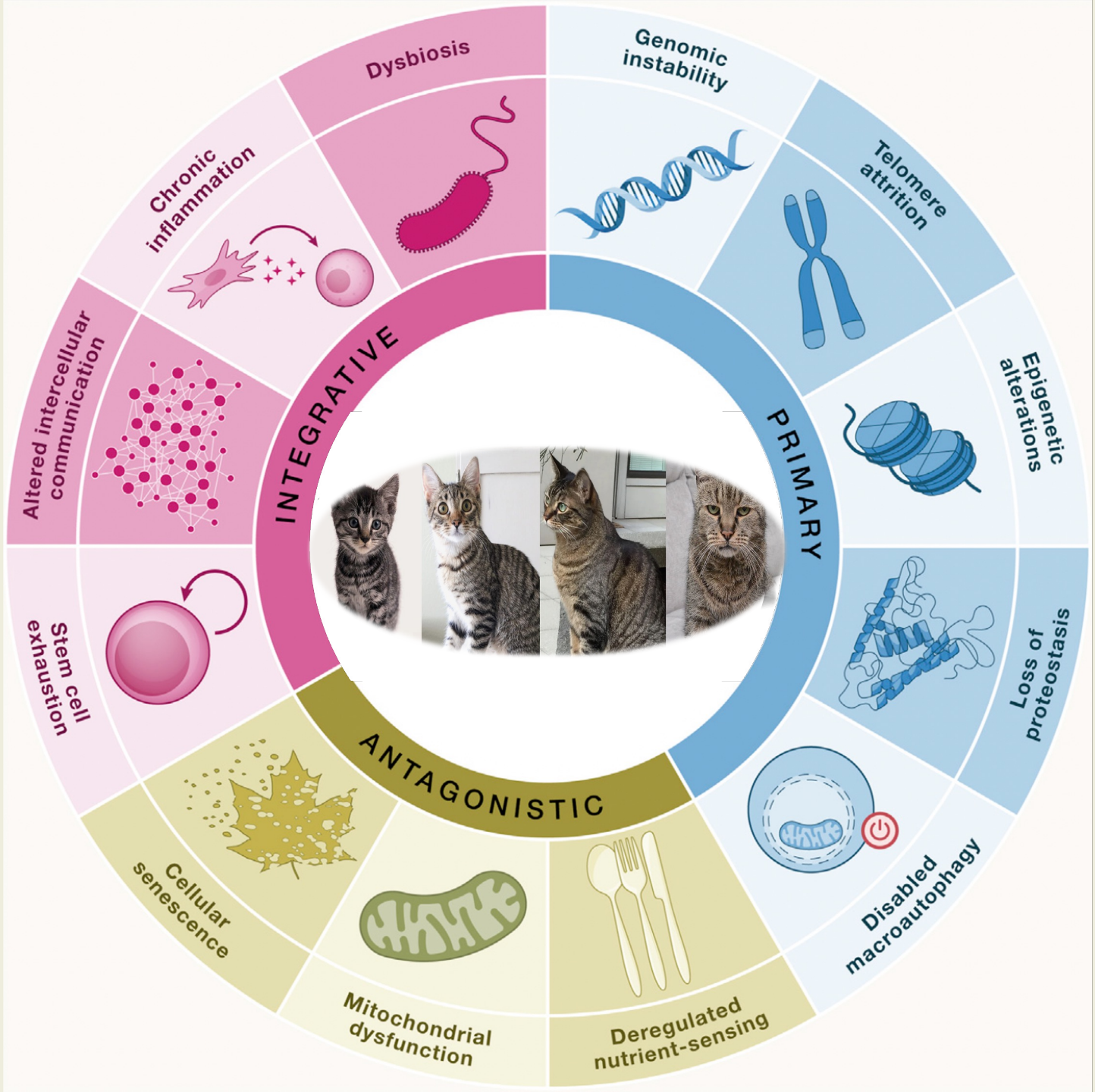
How Do Cats Age?

- It’s Just Biology!

- Cellular & Molecular Mechanisms

- Tissue Aging

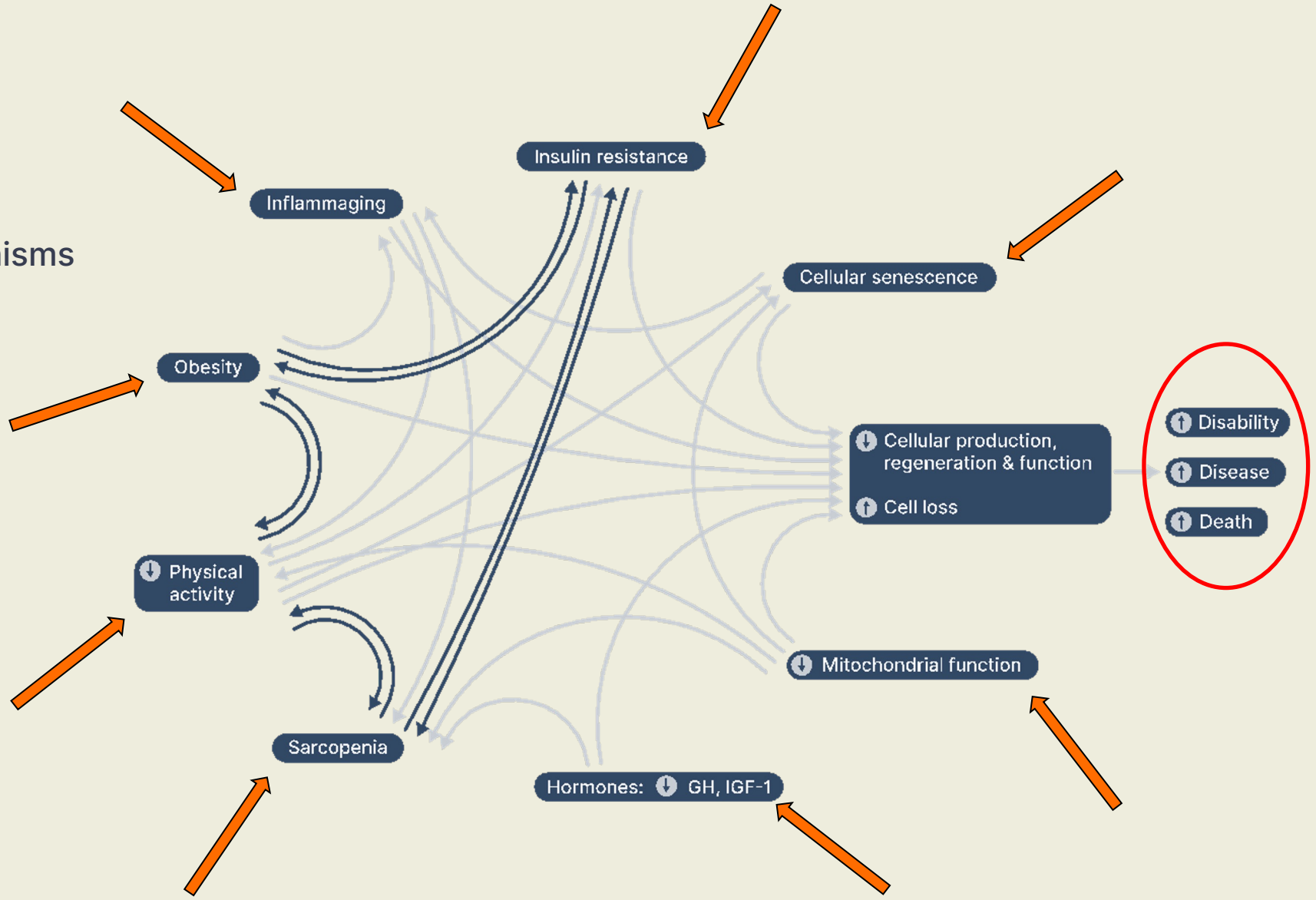
- Organismal Aging
  - Phenotype



How Do Cats Age?

Web of Aging

- Cellular & Molecular Mechanisms
- Environment
- Chance



WHEN IS A CAT “OLD”?

When Is a Cat Old?

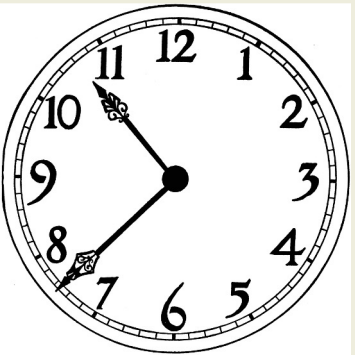
- Chronological Age
- Biological Age

When Is a Cat Old?

Not yet reliably measurable

Chronological Age

- Just time
- Easy to Measure
- Universal
- Moderately predictive of Three Ds

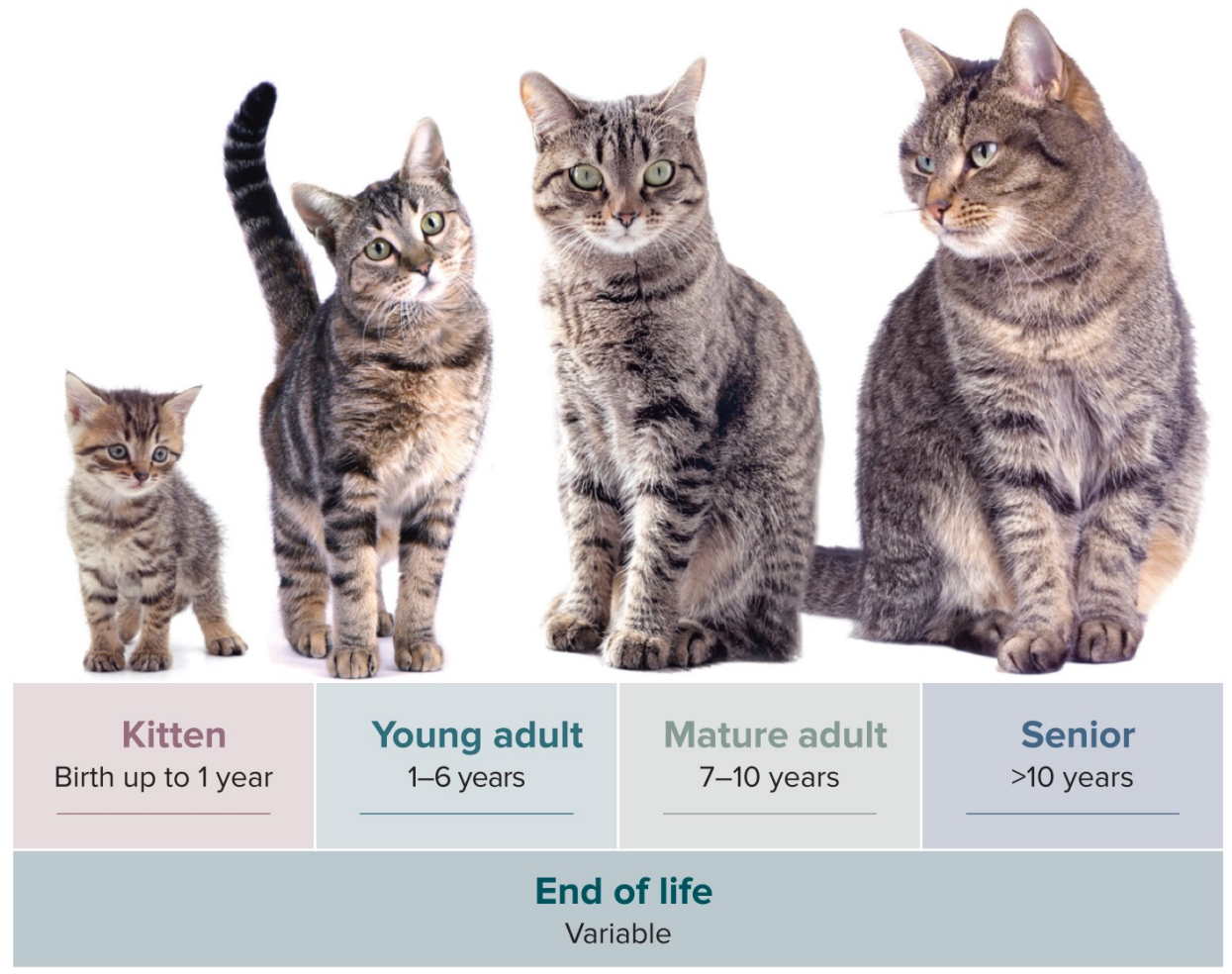


Biological Age

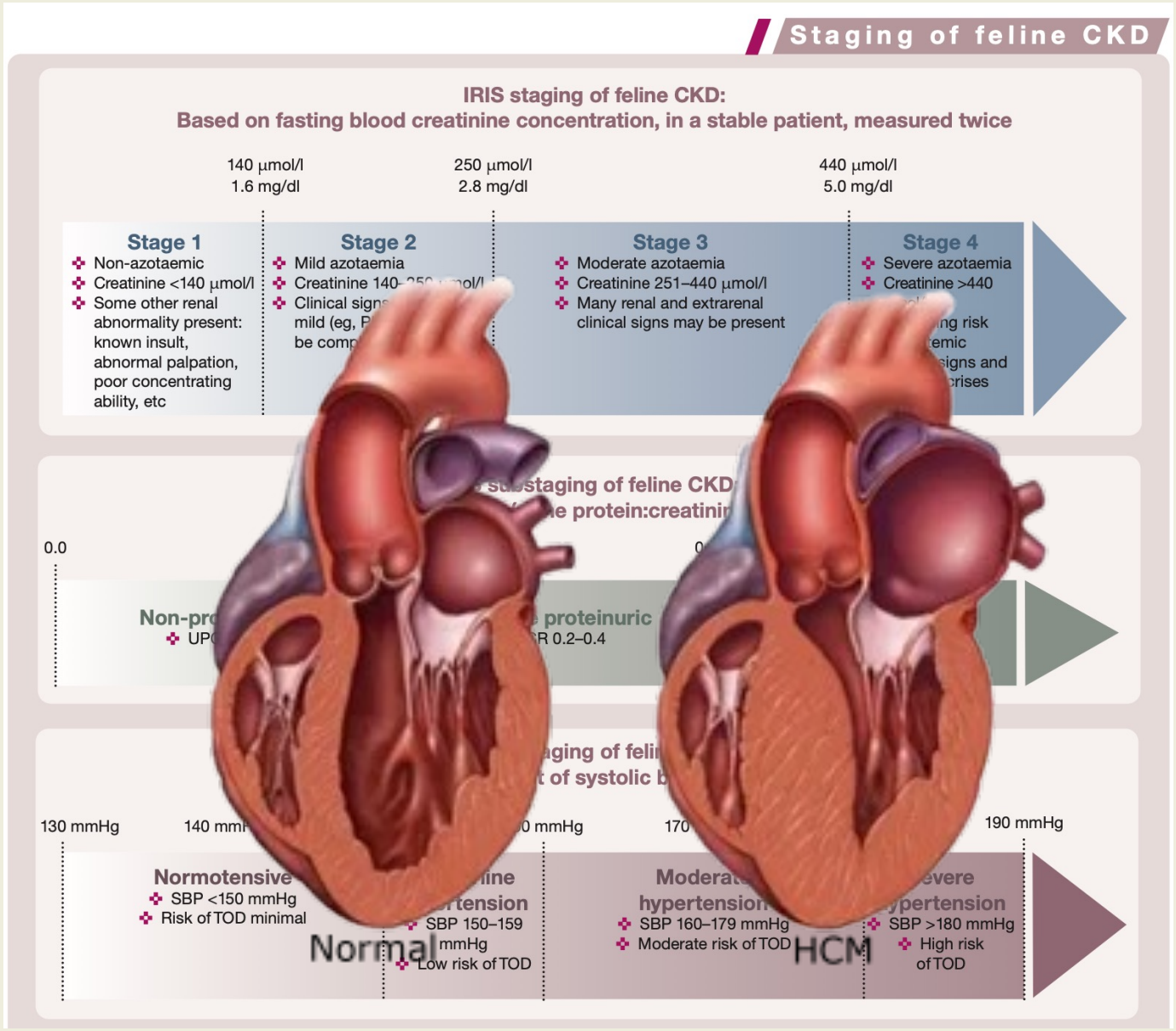
- Physical state
  - Robustness
  - Resilience
  - Three Ds
- Individual
- Modifiable
- Highly predictive of Three Ds

When Is a Cat Old?

- AVMA
  - Senior ~ 7 years
- AAHA/AAFP 2021
  - Mature Adult 7-10 years
  - Senior > 10 years
- AAFP 2010
  - Mature/Middle-Aged 7-10 years
  - Senior 11-15 years
  - Geriatric > 15 years



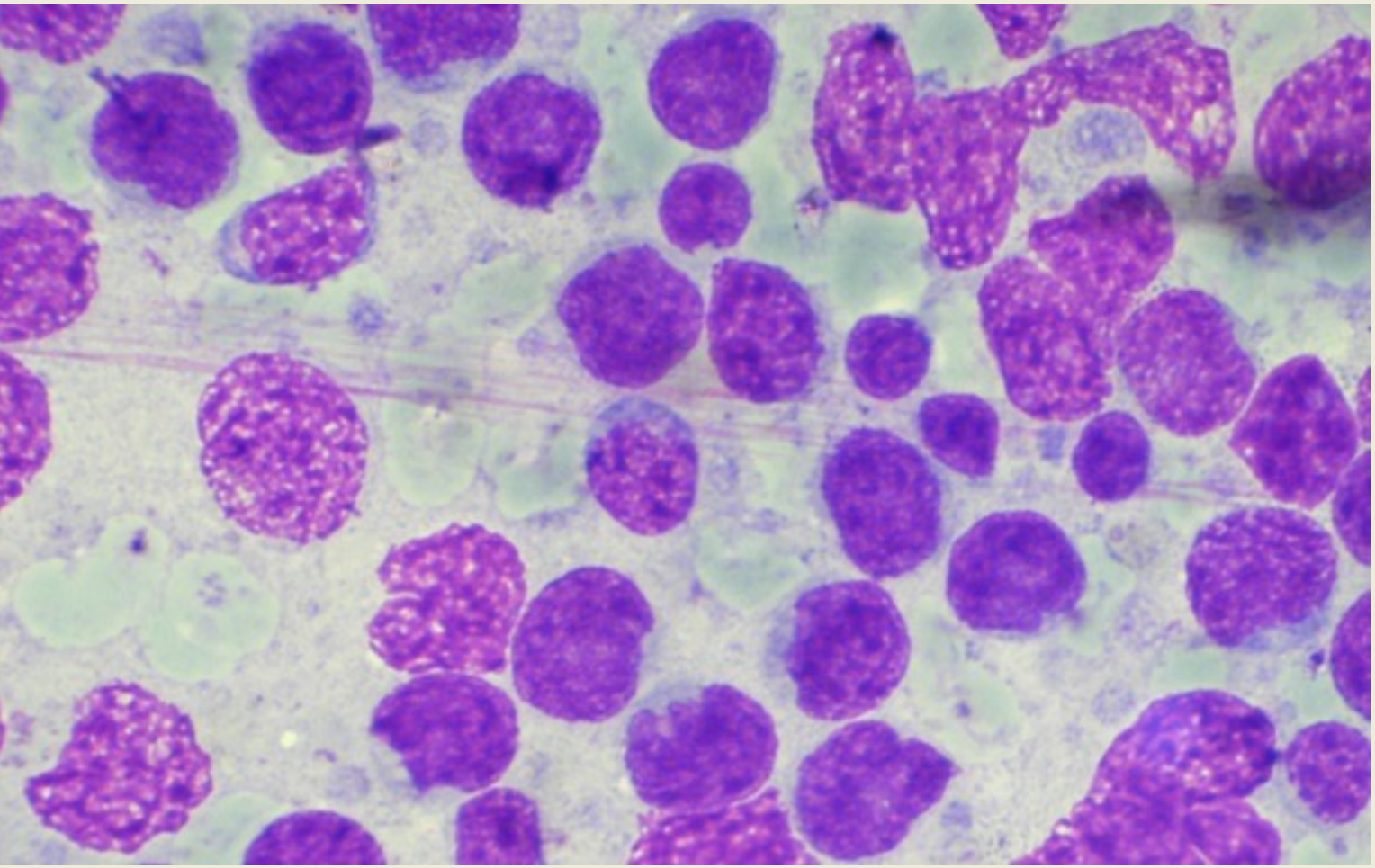
WHAT DOES AGING DO TO CATS?



Aging-Associated Disease

Top 5 Causes of Death

→ Chronic Kidney Disease

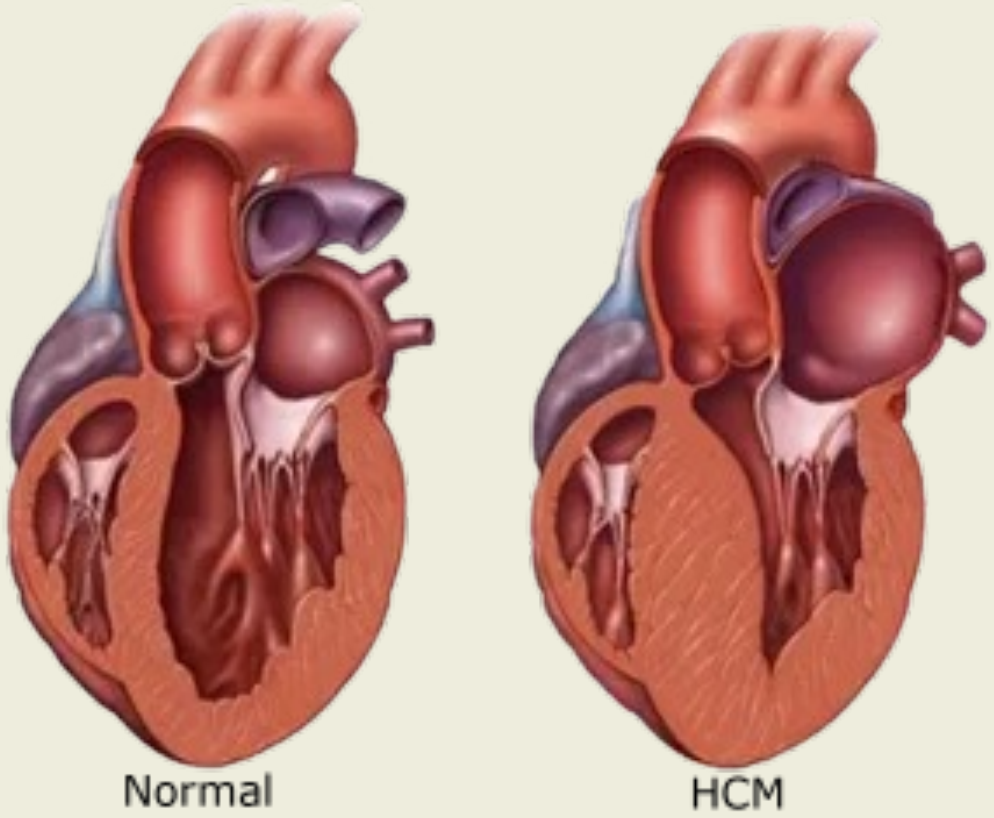


Aging-Associated Disease

Top 5 Causes of Death

- Chronic Kidney Disease
- Neoplasia

Aging-Associated Disease



Top 5 Causes of Death

- Chronic Kidney Disease
- Neoplasia
- Cardiac Disease

TABLE 1: Reasons for euthanasia in dogs and cats in England

	Cat	
	n	%
Old age/senility	196	50·9
Terminal illness	141	36·6
Trauma	39	10·1
Behavioural problems	4	1·0
Healthy animal	5	1·3
Total	385	

Aging-Associated Disease

Top 5 Causes of Death

- Chronic Kidney Disease
- Neoplasia
- Cardiac Disease
- Other

Other Aging-associated Conditions

- Hyperthyroidism

Other Aging-associated Conditions

- Hyperthyroidism
- Diabetes mellitus

Other Aging-associated Conditions

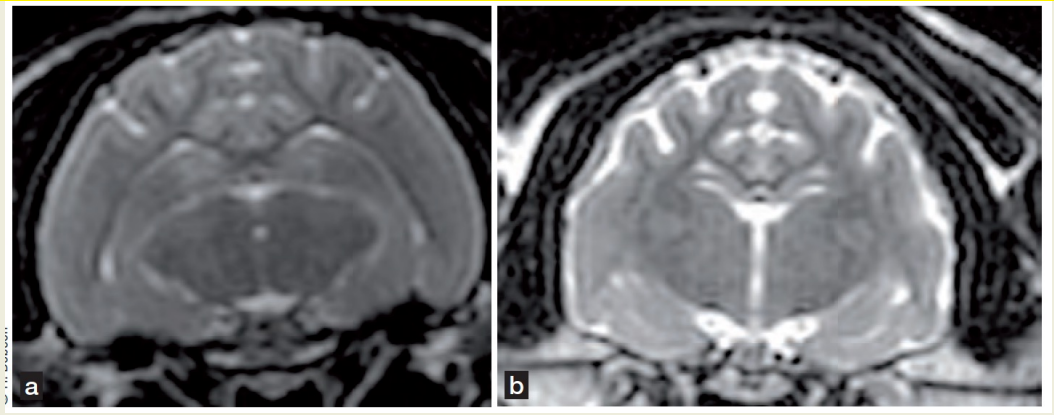
- Hyperthyroidism
- Diabetes mellitus
- Hypertension

Other Aging-associated Conditions

- Hyperthyroidism
- Diabetes mellitus
- Hypertension
- Sarcopenia

Signs Of Dementia In Cats

- Spatial disorientation
- Wandering from home; getting lost
- Less interested in play
- Increase in sleep
- Altered sleep cycles and wakefulness
- Staring blankly into space or at walls for a long period of time
- Indifference to food and water
- Urinating and defecating outside of the litter box
- Heightened vocalization, often in the middle of the night



Other Aging-associated Conditions

- Hyperthyroidism
- Diabetes mellitus
- Hypertension
- Sarcopenia
- Cognitive dysfunction

Frailty is a syndrome, more common with advancing age, in which the patient has a decreased functional reserve that leads to a decline in physiologic and cognitive performance and a greater vulnerability to adverse medical outcomes.

Frailty scales

Phenotype frailty scale

	Medical conditions/problems present	Yes	No
1	Unintentional weight loss		
2	Weakness		
3	Poor endurance, early exhaustion		
4	Slowness and low activity		

Pre-frail: 'Yes' to 2 out of 4. **Frail:** 'Yes' to 3 or 4 out of 4

Adapted from Fried et al[34]

Index frailty scale

	Medical conditions/problems present	Yes	No
1	Physiologic deficits		
2	Psychological (emotional) deficits		
3	Cognitive (task-oriented) deficits		
4	Deficits in social function		

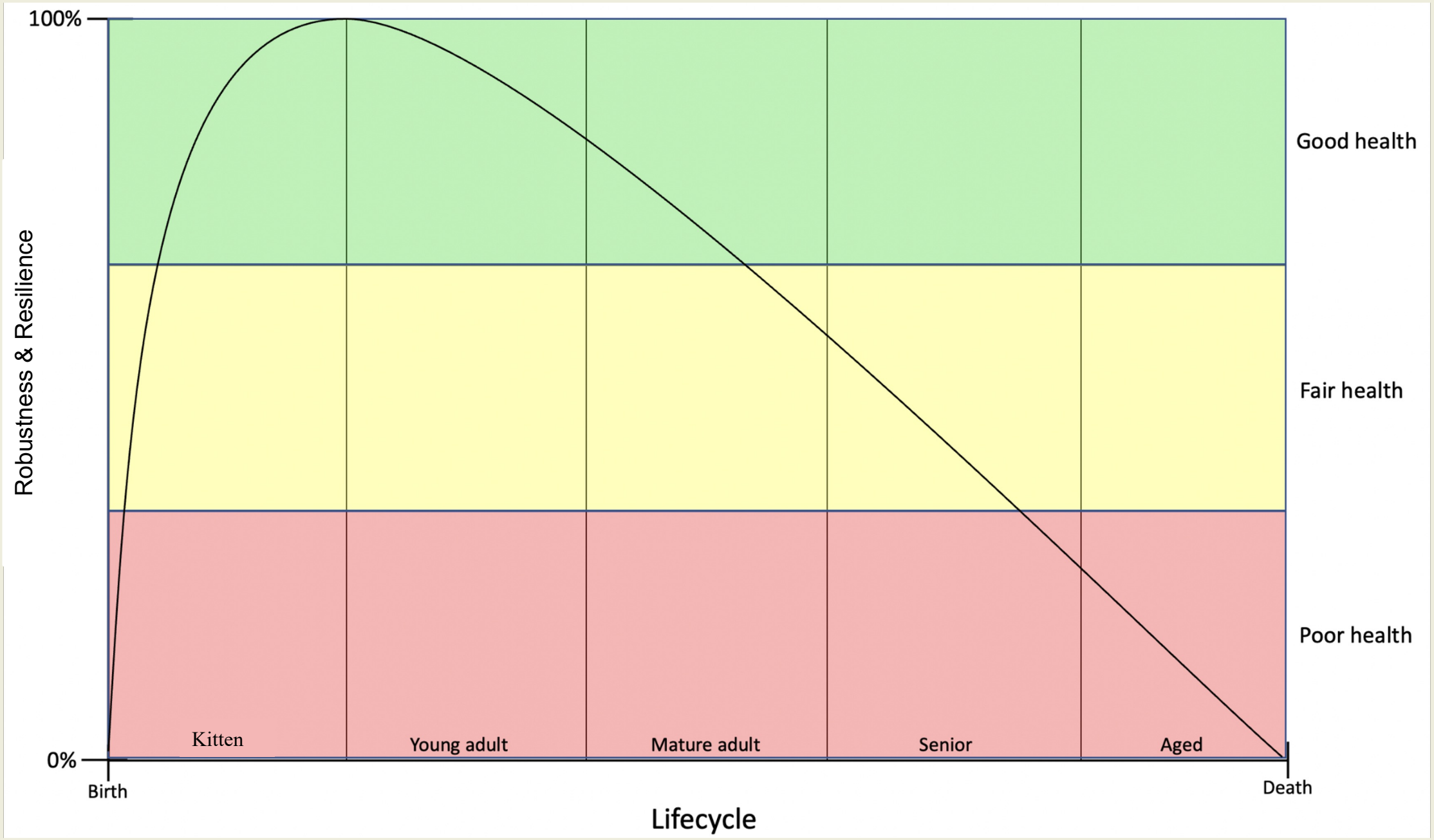
Pre-frail: 'Yes' to 2 out of 4. **Frail:** 'Yes' to 3 or 4 out of 4

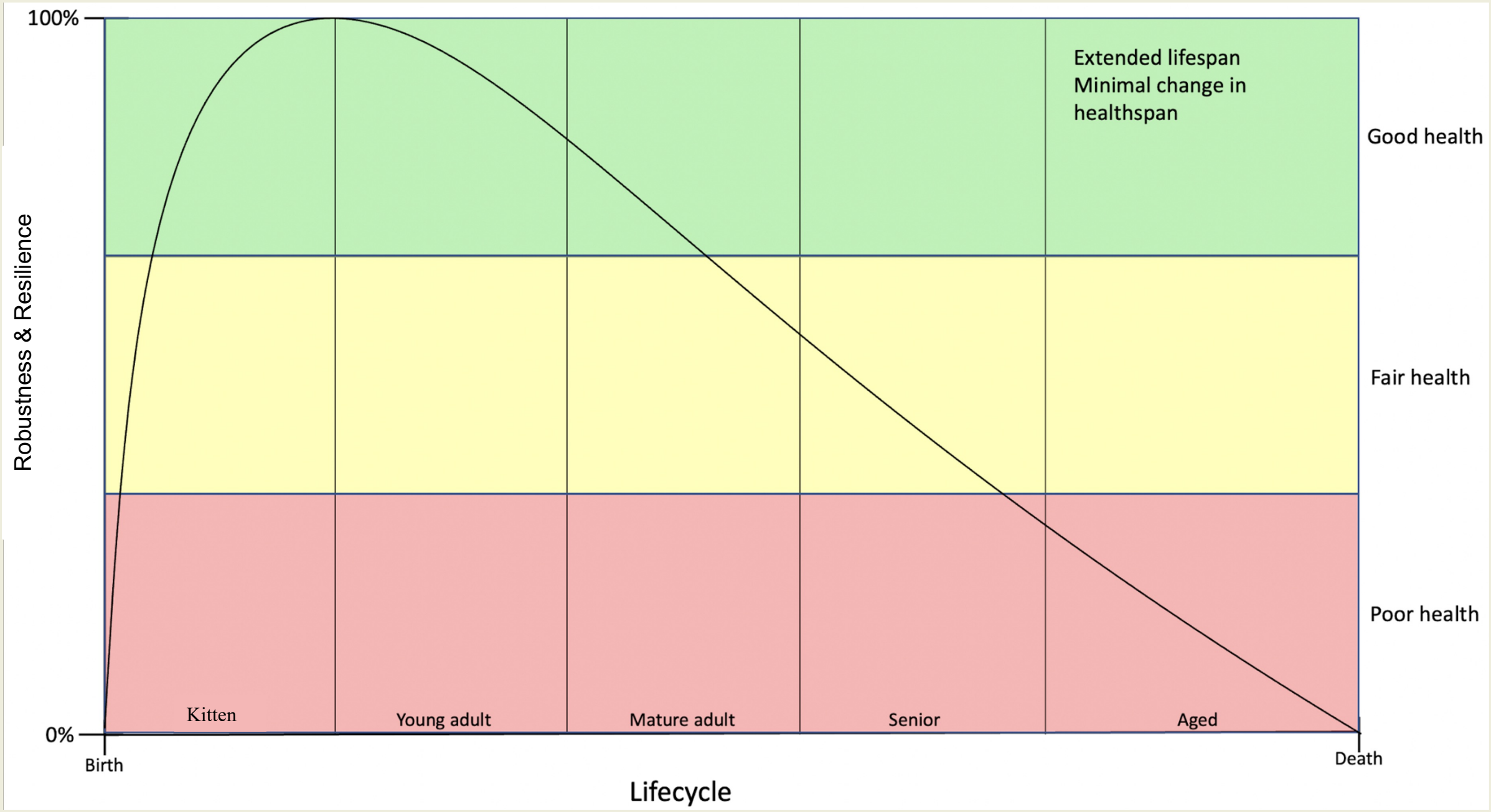
Adapted from Mitnitski et al[35]

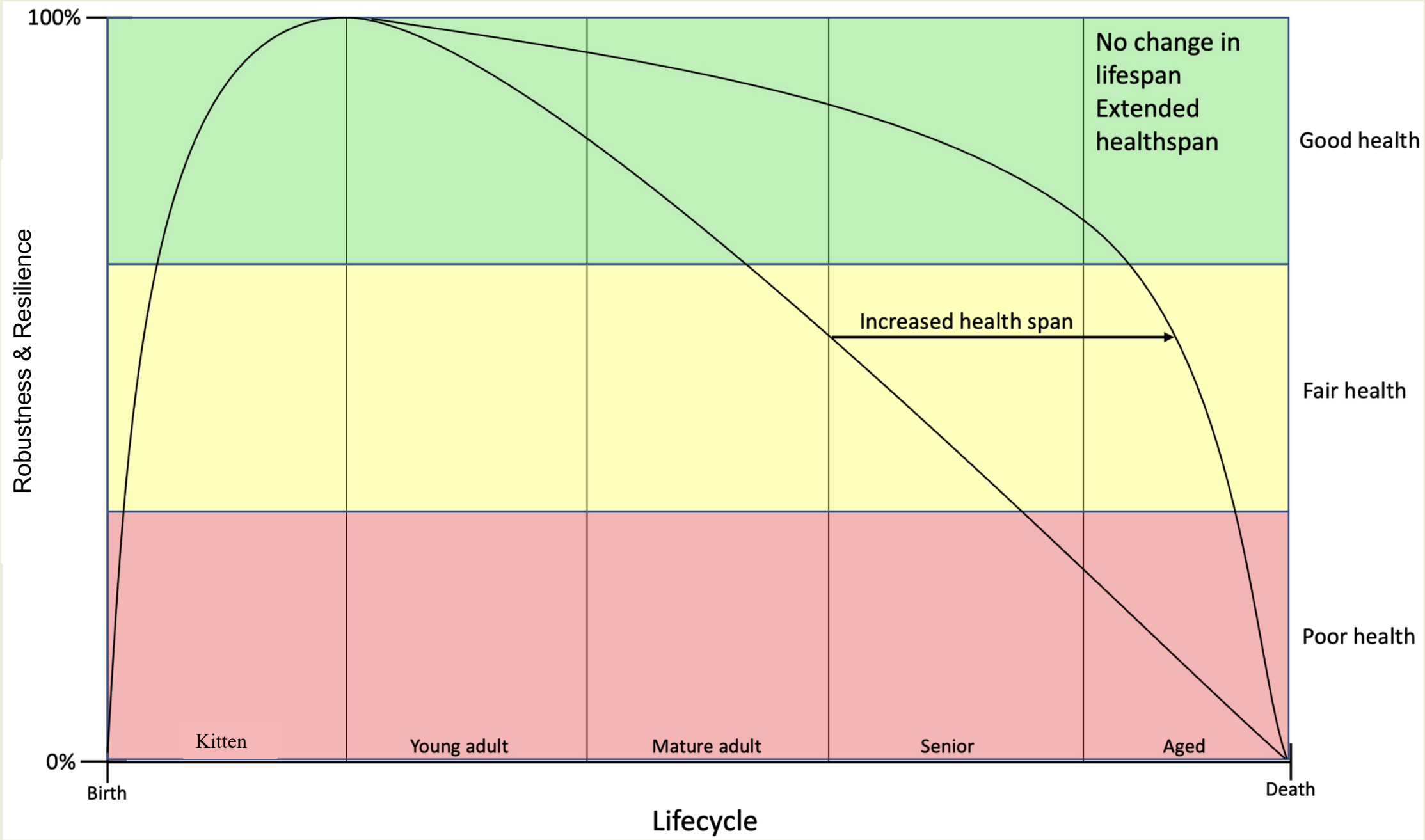
Other Aging-associated Conditions

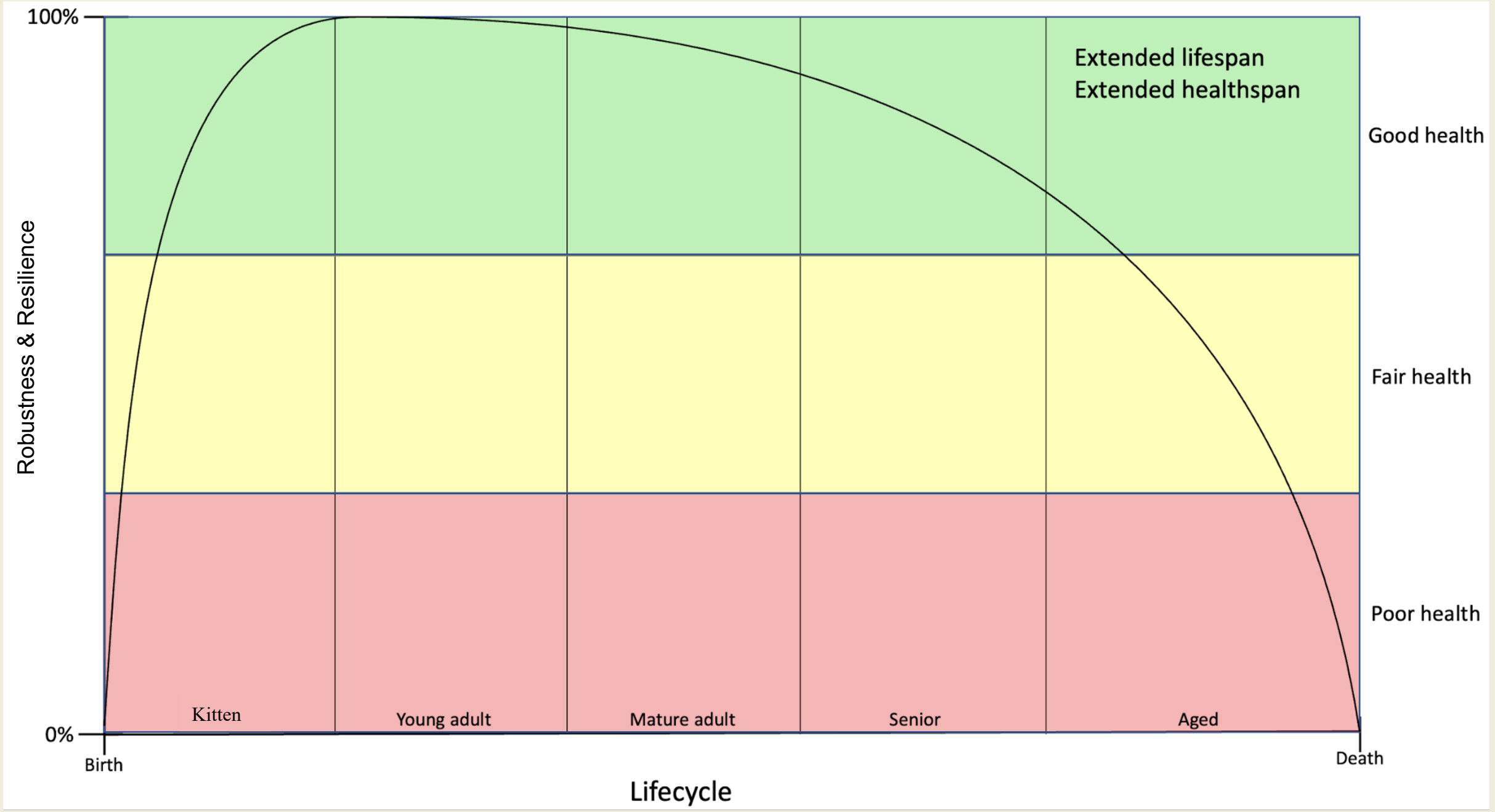
- Hyperthyroidism
- Diabetes mellitus
- Hypertension
- Sarcopenia
- Cognitive dysfunction
- Frailty

WHAT CAN WE DO ABOUT AGING?


100%
Robustness & Resilience
Good health
Fair health
Poor health
Kitten
Young adult
Mature adult
Senior
Aged
0%
Birth
Death
Lifecycle


100%
Extended lifespan
Minimal change in healthspan
Good health
Fair health
Poor health
Robustness & Resilience
Kitten
Young adult
Mature adult
Senior
Aged
0%
Birth
Death
Lifecycle

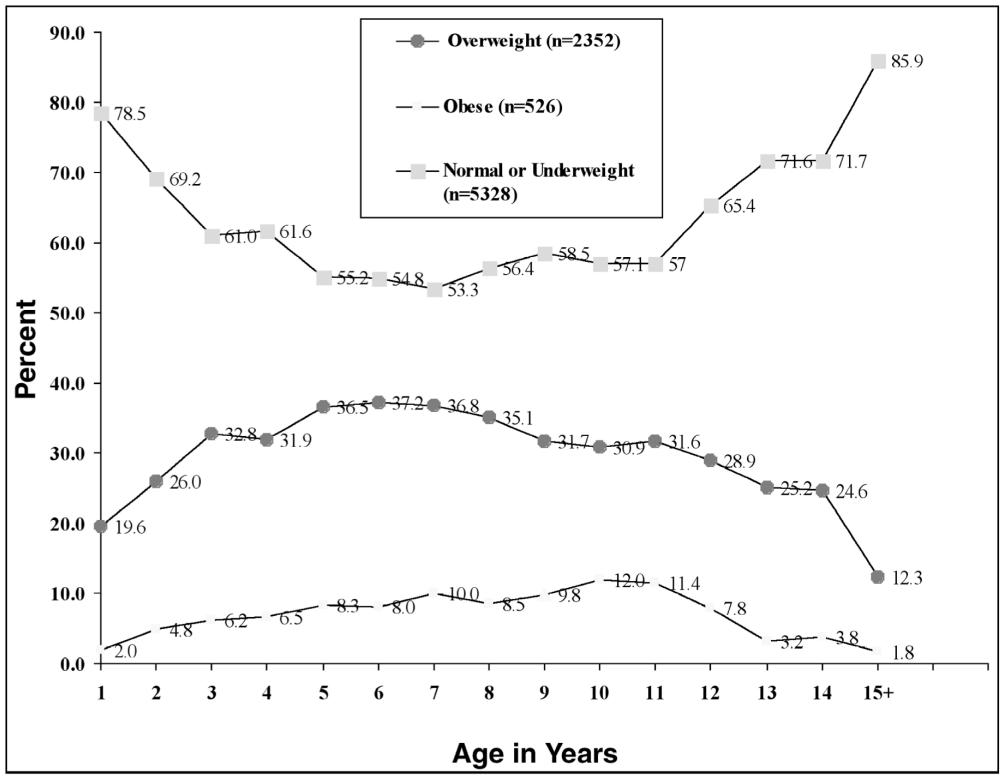

100%
No change in lifespan
Extended healthspan
Good health
Robustness & Resilience
Increased health span
Fair health
Poor health
Kitten
Young adult
Mature adult
Senior
Aged
0%
Birth
Death
Lifecycle

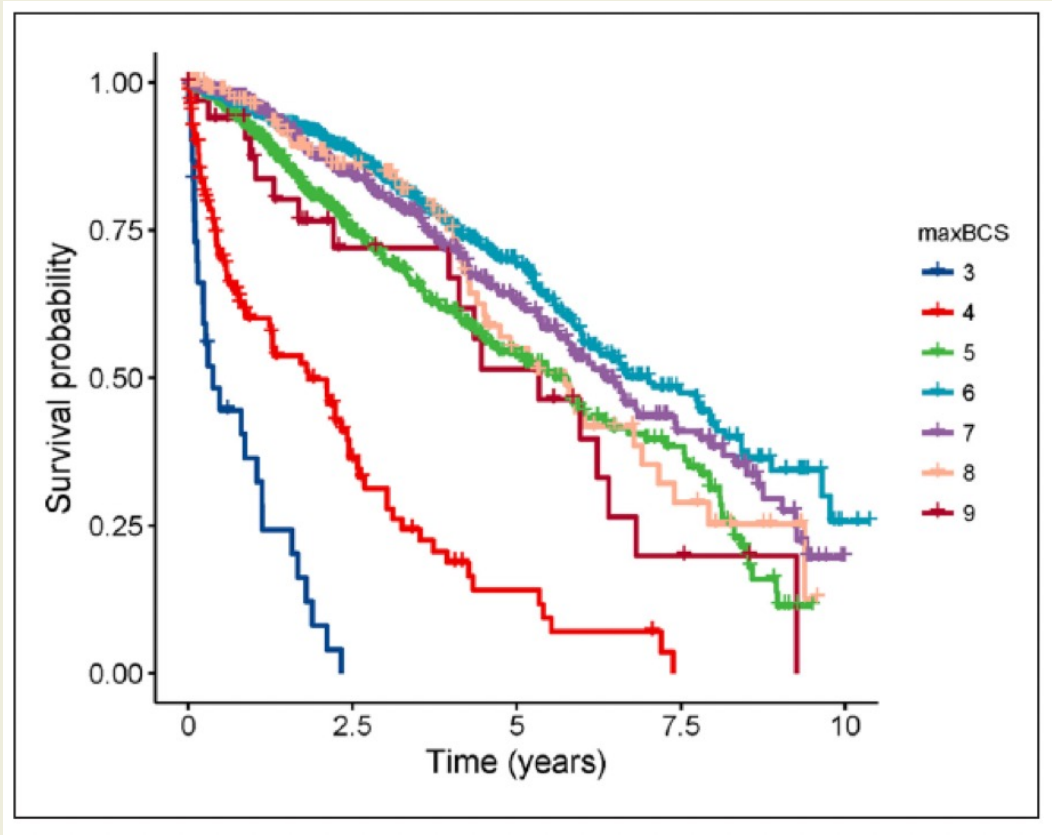

100%
Extended lifespan
Extended healthspan
Good health
Fair health
Poor health
Robustness & Resilience
Kitten
Young adult
Mature adult
Senior
Aged
0%
Birth
Death
Lifecycle

What Can We Do About Aging?

Extend Lifespan & Healthspan

→ Avoid Obesity/Underweight

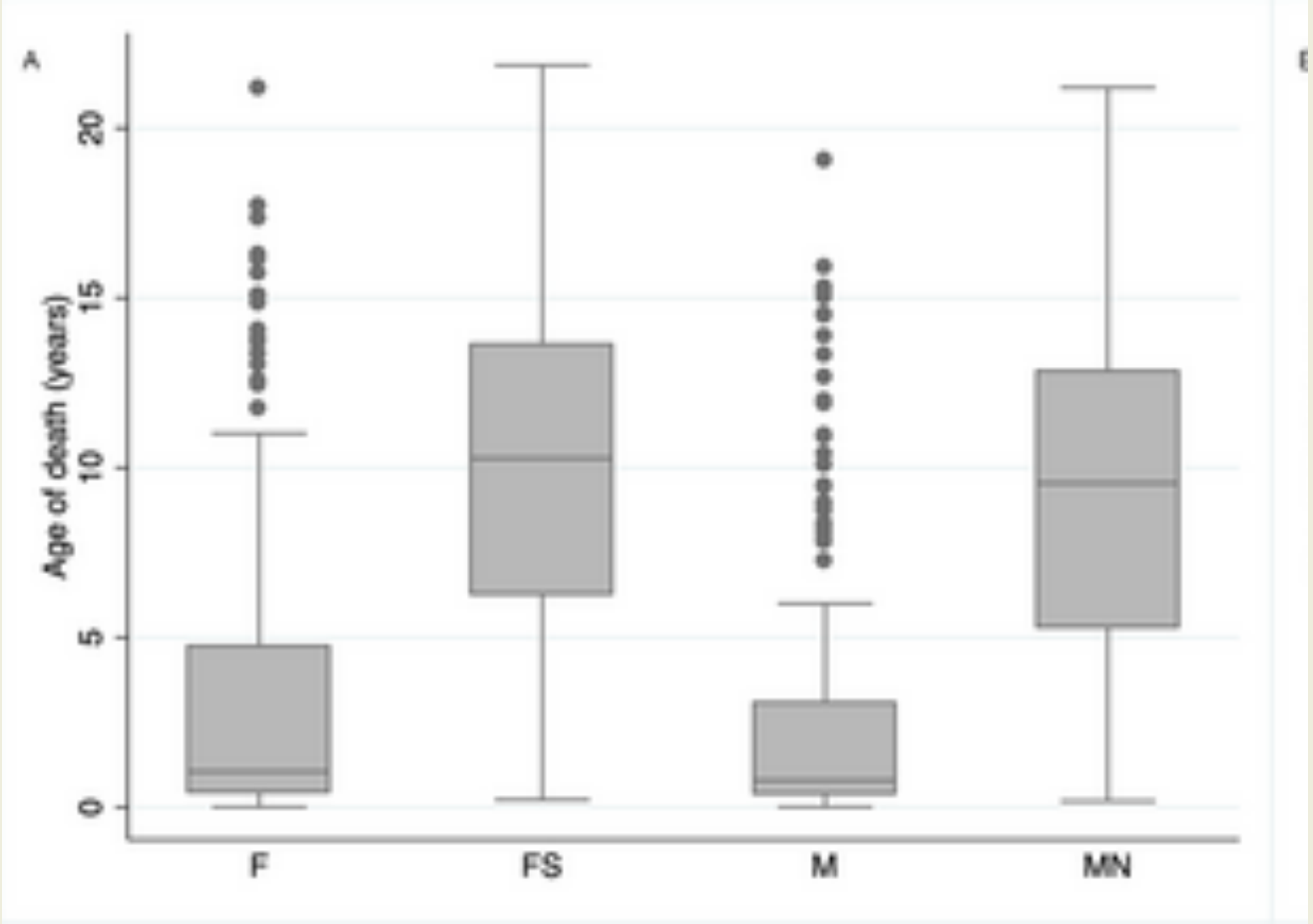




What Can We Do About Aging?

Extend Lifespan & Healthspan

- Avoid Obesity/Underweight
- Neutering



What Can We Do About Aging?

Extend Lifespan & Healthspan

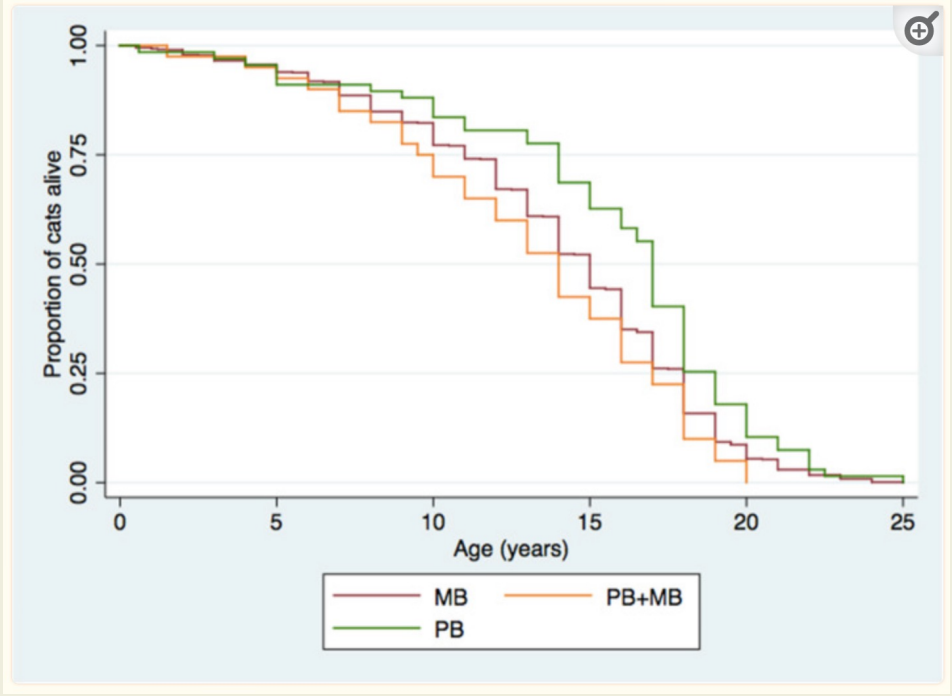
- Avoid Obesity/Underweight
- Neutering
- Housing

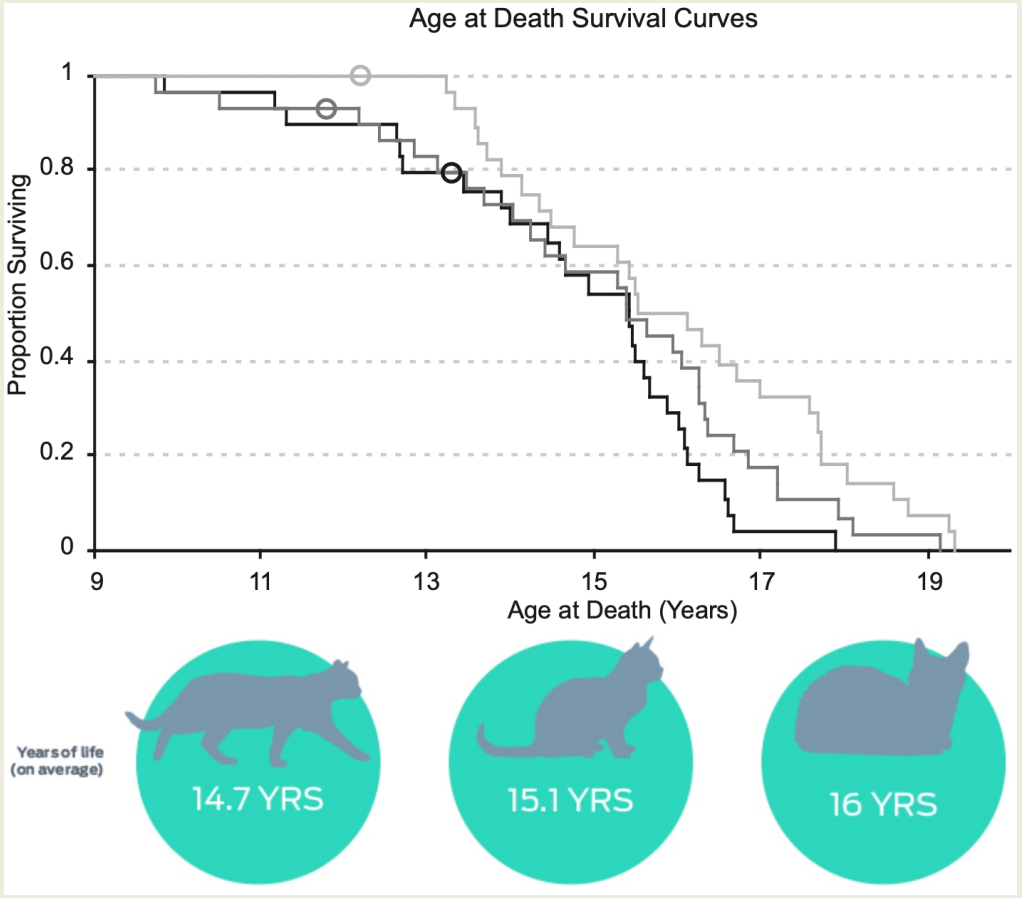
The median age at death for indoor only cats was 9.43 years while the median age at death for indoor outdoor cats was 9.82 years and the median age for outdoor cats was 7.25 years.

What Can We Do About Aging?

Extend Lifespan & Healthspan

- Avoid Obesity/Underweight
- Neutering
- Housing
- Nutrition





What Can We Do About Aging?

Extend Lifespan & Healthspan

- Avoid Obesity/Underweight
- Neutering
- Housing
- Nutrition
- Exercise

What Can We Do About Aging?

Extend Lifespan & Healthspan

- Avoid Obesity/Underweight
- Neutering
- Housing
- Nutrition
- Exercise
- Healthcare

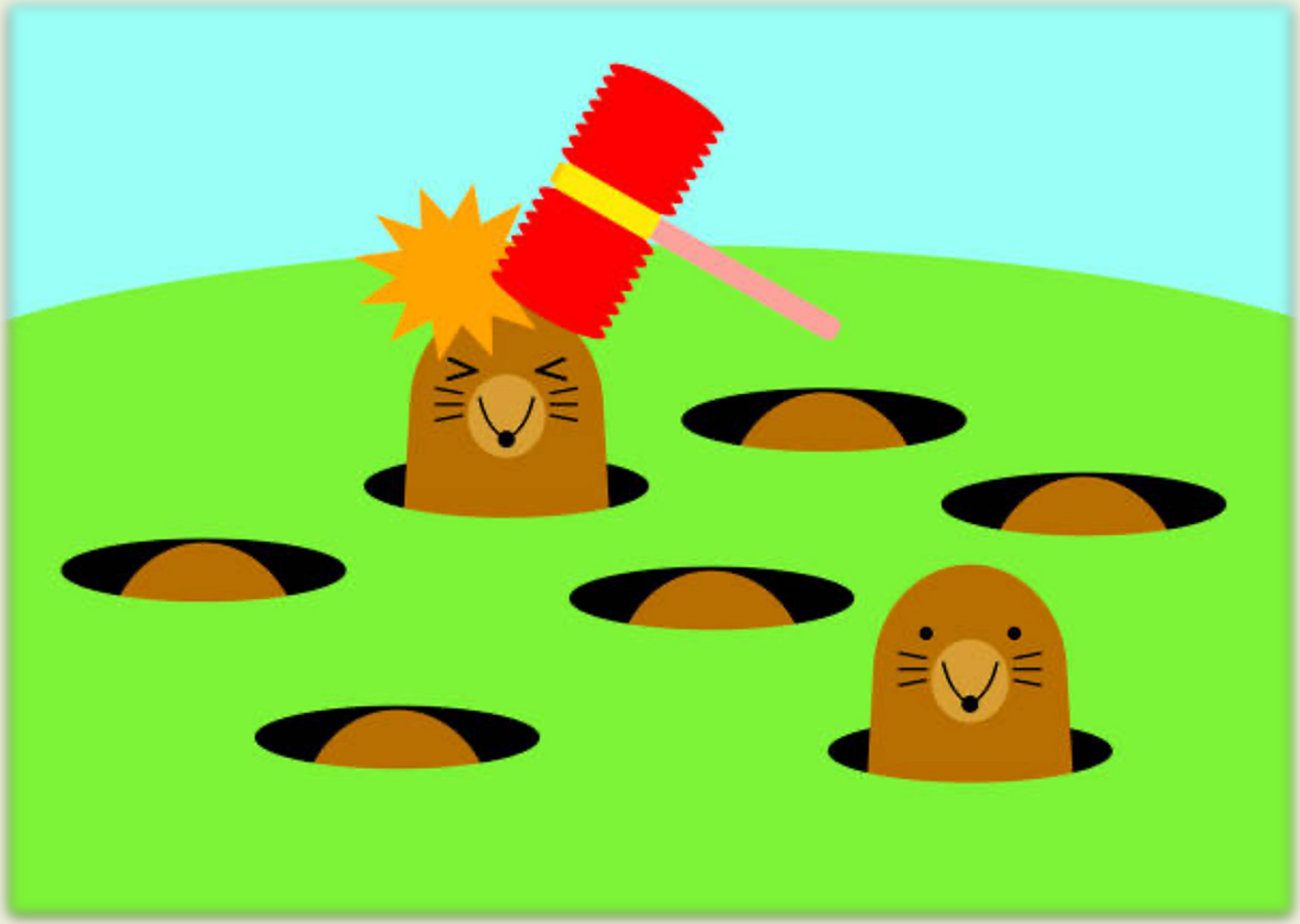
What Can We Do About Aging?

Extend Lifespan & Healthspan

- Avoid Obesity/Underweight
- Neutering
- Housing
- Nutrition
- Exercise
- Healthcare
- Pharmaceuticals

What *DO* We Do About Aging?

- Dx & Tx aging-associated diseases
- Dx & Tx aging-associated clinical problems
- Palliative/Hospice care
- Euthanasia



Assessment

- History

Assessment

- History
- Physical Exam

Diagnostic Test	Recommended Frequency	
	Canine	Feline
Fecal testing for parasites	1–4 times/yr, depending on use of preventive products and lifestyle.	1–2 times/yr, depending on health and lifestyle factors.
Tick-borne disease	Annually	N/A
Heartworm	Annually	Detailed information on heartworm testing is available in the American Heartworm Society guidelines.[1]
Comprehensive CBC (including cell morphology, differentials and pathologist review if necessary)	Every 6–12 mo.	
Chemistry (TP, albumin, ALT, glucose, BUN, creatinine, sodium, potassium, calcium, SDMA if available)	Every 6–12 mo.	
Urinalysis (USG, sediment, glucose, ketones, bilirubin, protein, occult blood)	Every 6–12 mo.	
Imaging	Imaging of a region of interest should be performed if clinically indicated. Breed-specific screening may be appropriate.	Imaging of a region of interest should be performed if clinically indicated.
Electrocardiogram	Perform an electrocardiogram annually in breeds with high risk of cardiac disease (e.g., boxers, Dobermans), or in other patients when clinically indicated or if an arrhythmic condition is suspected.	
Urine protein:creatinine ratio	If proteinuria is identified or persistent microalbuminuria is present.	
Thyroxine (T4)	Recommended annually.	Strongly recommended annually.
Blood pressure	Recommended annually.	Strongly recommended annually. Recommended every 6–12 mo in healthy geriatric cats.
Retroviral testing	N/A	Consider based on individual patient's risk.
NT-proBNP	Annually and to be strongly considered before an anesthetic event.	

Assessment

- History
- Physical Exam
- Clinical Lab Tests

Viewpoint

Overdiagnosis

Brennen A. McKenzie MA, MSc, VMD

JSAP JOURNAL OF SMALL ANIMAL PRACTICE

BSAVA BRITISH SMALL ANIMAL VETERINARY ASSOCIATION

VIEWPOINT PIECES, ESSAYS OR 'SPECIAL ARTICLES'

Rational use of diagnostic and screening tests

B. A. McKenzie

First published: 30 June 2021 | https://doi.org/10.1111/jsap.13393 | Citations: 1

Assessment

- History
- Physical Exam
- Clinical Lab Tests
- Imaging

NC STATE UNIVERSITY

Comparative Pain Research Laboratory

FMPI Questionnaire

What can your cat do compared to a normal cat?

Check the square that best describes how well your cat can:

1) Walk and/or move normally and easily

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

2) Run

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

3) Jump up

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

4) Jump up to kitchen-counter height in one try

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

5) Jump down (how well and how easily)

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

6) Climb up stairs or steps

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

7) Go down stairs or steps

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

8) Play with toys and/or chase objects

above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
☐	☐	☐	☐	☐	☐	☐

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Cat HEalth and Wellbeing (CHEW) Questionnaire

The purpose of this questionnaire is to assess the overall health and wellbeing of cats. You will be asked to think about a variety of factors that may have contributed to your cat's health and wellbeing during the past 7 days.

IN EACH SECTION BELOW, PLEASE CAREFULLY READ EACH STATEMENT BELOW AND MARK AN "X" IN THE BOX THAT BEST SHOWS HOW OFTEN, IF AT ALL, YOU NOTICED THE FOLLOWING ABOUT YOUR CAT IN THE PAST 7 DAYS.

Section 1

THINKING ABOUT JUST THE LAST 7 DAYS.....	Always	Very Often	Often	Sometimes	Seldom	Never	DOES NOT APPLY TO ME AND MY CAT
1. My cat got up slowly when he/she was lying down							
2. My cat had difficulty getting up when he/she was lying down							
3. My cat's movements were slow							
4. My cat's movements were stiff							

Section 2

THINKING ABOUT JUST THE LAST 7 DAYS.....	Always	Very Often	Often	Sometimes	Seldom	Never	DOES NOT APPLY TO ME AND MY CAT
5. My cat greeted me when I returned from being away							
6. My cat was curious about his/her surroundings							
7. My cat observed everything going on around him or her							

Section 3

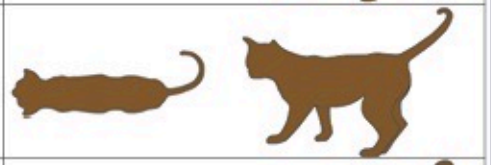
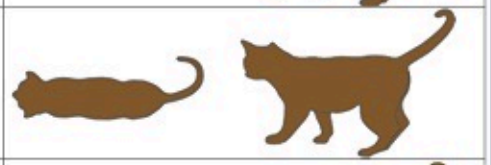
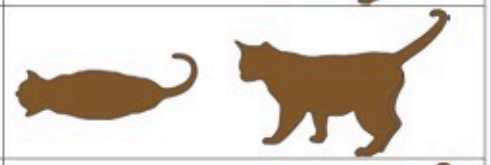
THINKING ABOUT JUST THE LAST 7 DAYS.....	Always	Very Often	Often	Sometimes	Seldom	Never	DOES NOT APPLY TO ME AND MY CAT
8. My cat was affectionate							
9. My cat was friendly							
10. My cat was irritable							
11. My cat was approachable							
12. My cat was relaxed							

Assessment

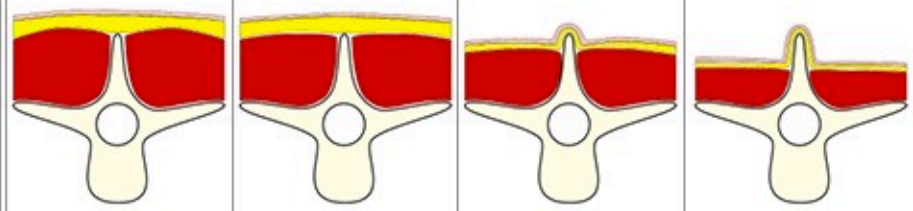
- History
- Physical Exam
- Clinical Lab Tests
- Imaging
- Validated CMIs

Body & Muscle Condition Scores

Body Condition Score (5 point scale, can use ½ points for 9 point scale):

1	Very thin	Ribs, spine, and pelvis: • Visible (especially shorthair cats) • Pronounced, very easy to palpate • No fat covering Marked abdominal tuck Loss of body muscle	
2	Thin	Ribs, spine and pelvis: • Easily palpated • Very little fat covering Tops of lumbar vertebrae visible Obvious waist behind ribs	
3	Normal	Ribs and spine: • Palpable but not visible • Slight (but not excess) fat covering Waist and abdominal tuck present Minimal abdominal fat pad	
4	Over-weight	Ribs and spine: • Not eay to palpate • Moderate fat covering Little or no waist present Rounding of abdomen	
5	Obese	Ribs and spine: • Hard to palpate • Marked fat cover Fat overother body areas No waist, marked abdominal fat Marked inguinal fat pad	

Muscle condition score (assessed over the head, scapulae and lumbar spine):

1 - Normal	2 - Mild Loss	3 - Moderate Loss	4 - Severe Loss
Determination of MCS is based on palpation and subjective assessment of the muscle mass over the lumbar spine, head and scapulae			
			

Assessment

- Tools
  - body/muscle condition

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Check the square that best describes how well your cat can:

	above normal	normal	not quite normal	somewhat worse than normal	barely, or with great effort	not at all	doesn't apply, or I don't know
1) Walk and/or move normally and easily	☐	☐	☐	☐	☐	☐	☐
2) Run	☐	☐	☐	☐	☐	☐	☐
3) Jump up	☐	☐	☐	☐	☐	☐	☐
4) Jump up to kitchen-counter height in one try	☐	☐	☐	☐	☐	☐	☐
5) Jump down (how well and how easily)	☐	☐	☐	☐	☐	☐	☐
6) Climb up stairs or steps	☐	☐	☐	☐	☐	☐	☐
7) Go down stairs or steps	☐	☐	☐	☐	☐	☐	☐
8) Play with toys and/or chase objects	☐	☐	☐	☐	☐	☐	☐

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Assessment

- Tools
  - body/muscle condition
  - pain scales

Cat HEalth and Wellbeing (CHEW) Questionnaire

The purpose of this questionnaire is to assess the overall health and wellbeing of cats. You will be asked to think about a variety of factors that may have contributed to your cat's health and wellbeing during the past 7 days.

IN EACH SECTION BELOW, PLEASE CAREFULLY READ EACH STATEMENT BELOW AND MARK AN "X" IN THE BOX THAT BEST SHOWS HOW OFTEN, IF AT ALL, YOU NOTICED THE FOLLOWING ABOUT YOUR CAT IN THE PAST 7 DAYS.

Section 1							
THINKING ABOUT JUST THE LAST 7 DAYS.....	**Always**	**Very Often**	**Often**	**Sometimes**	**Seldom**	**Never**	**DOES NOT APPLY TO ME AND MY CAT**
1. My cat got up slowly when he/she was lying down							
2. My cat had difficulty getting up when he/she was lying down							
3. My cat's movements were slow							
4. My cat's movements were stiff							

Section 2							
THINKING ABOUT JUST THE LAST 7 DAYS.....	**Always**	**Very Often**	**Often**	**Sometimes**	**Seldom**	**Never**	**DOES NOT APPLY TO ME AND MY CAT**
5. My cat greeted me when I returned from being away							
6. My cat was curious about his/her surroundings							
7. My cat observed everything going on around him or her							

Section 3							
THINKING ABOUT JUST THE LAST 7 DAYS.....	**Always**	**Very Often**	**Often**	**Sometimes**	**Seldom**	**Never**	**DOES NOT APPLY TO ME AND MY CAT**
8. My cat was affectionate							
9. My cat was friendly							
10. My cat was irritable							
11. My cat was approachable							
12. My cat was relaxed							

Assessment

- Tools
  - body/muscle condition
  - pain scales
  - quality of life scales

	Stage 1 No azotemia (Normal creatinine)	Stage 2 Mild azotemia (Normal or mildly elevated creatinine)	Stage 3 Moderate azotemia	Stage 4 Severe azotemia
Creatinine in mg/dL Stage based on stable creatinine — Canine	Less than 1.4 (125 µmol/L)	1.4–2.8 (125–250 µmol/L)	2.9–5.0 (251–440 µmol/L)	Greater than 5.0 (440 µmol/L)
Feline	Less than 1.6 (140 µmol/L)	1.6–2.8 (140–250 µmol/L)	2.9–5.0 (251–440 µmol/L)	Greater than 5.0 (440 µmol/L)
SDMA* in µg/dL Stage based on stable SDMA — Canine	Less than 18	18–35	36–54	Greater than 54
Feline	Less than 18	18–25	26–38	Greater than 38
UPC ratio Substage based on proteinuria — Canine	Nonproteinuric **<0.2**	Borderline proteinuric **0.2–0.5**	Proteinuric **>0.5**	
Feline	Nonproteinuric **<0.2**	Borderline proteinuric **0.2–0.4**	Proteinuric **>0.4**	
Systolic blood pressure in mm Hg Substage based on blood pressure	Normotensive **<140**	Prehypertensive **140–159**	Hypertensive **160–179**	Severely hypertensive **≥180**

Note: In the case of staging discrepancy between creatinine and SDMA, consider patient muscle mass and retesting both in 2–4 weeks. If values are persistently discordant, consider assigning the patient to the higher stage.

*SDMA = IDEXX SDMA® Test

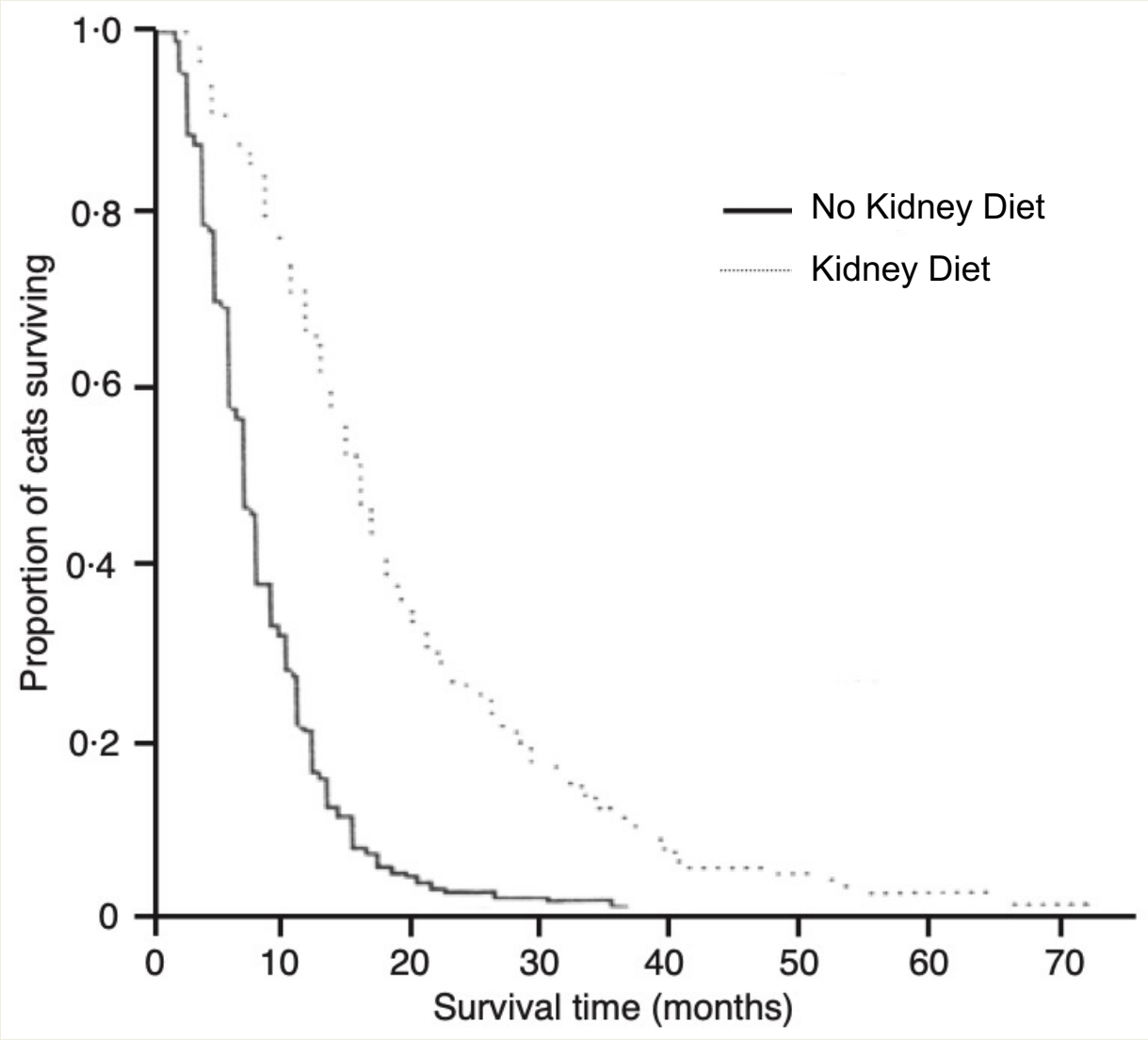
See www.iris-kidney.com for more detailed staging, therapeutic, and management guidelines.

Assessment

- Tools
  - body/muscle condition
  - pain scales
  - quality of life scales
  - disease staging

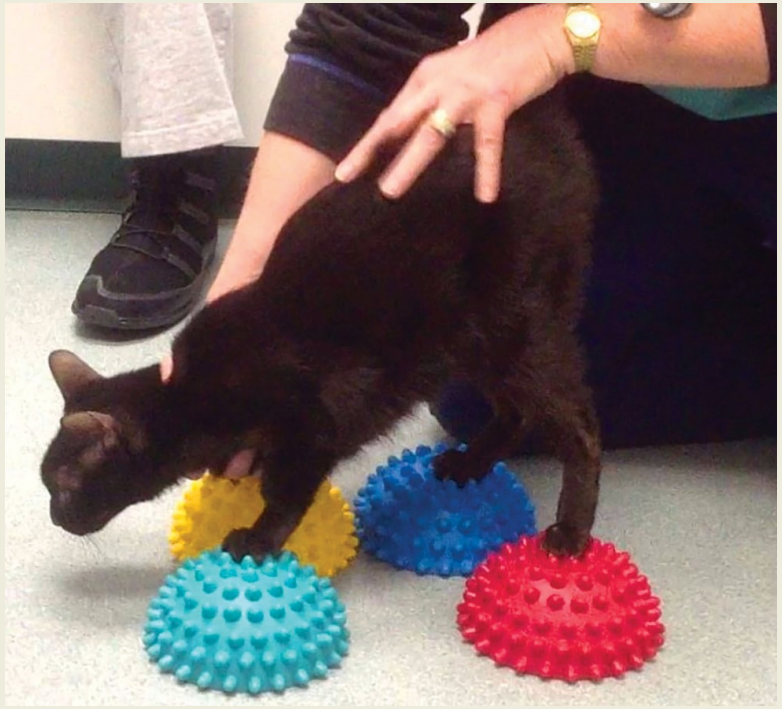
Management

- Medicine & Surgery



Management

- Medicine & Surgery
- Nutrition

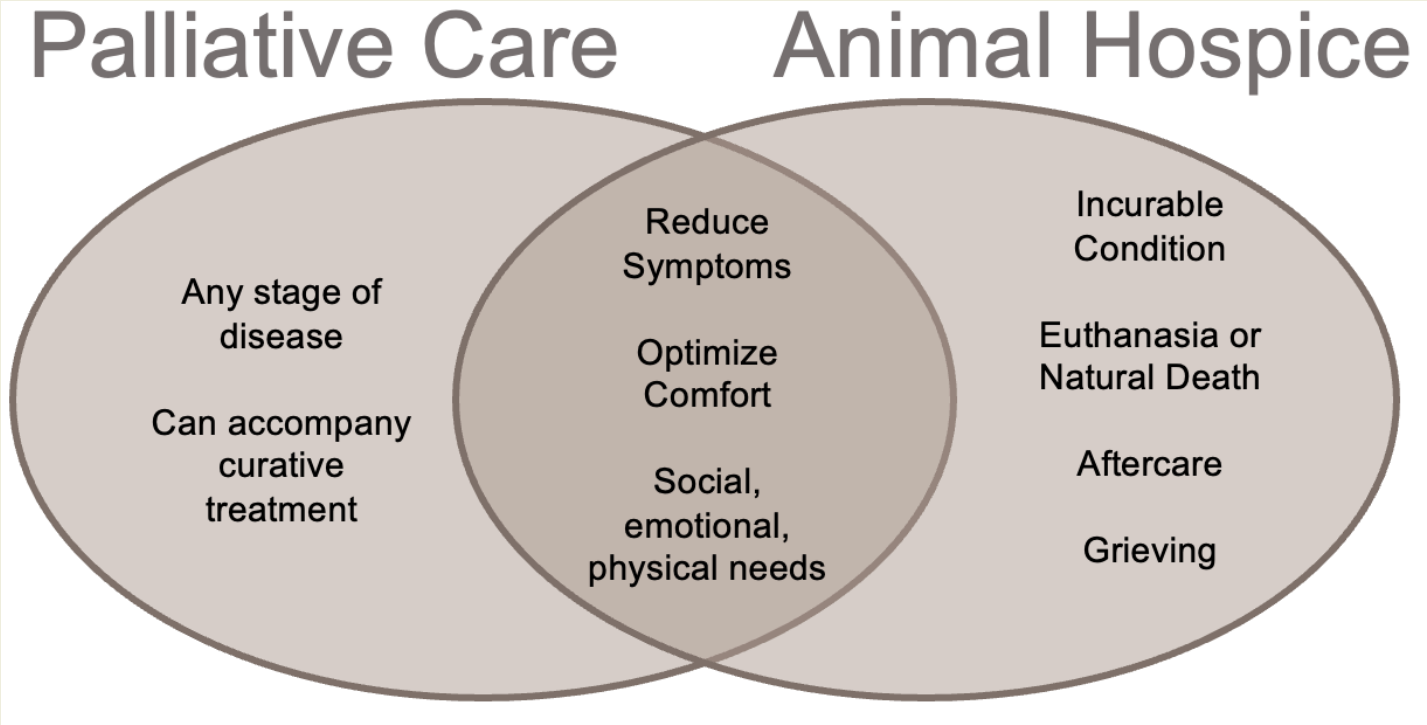


Management

- Medicine & Surgery
- Nutrition
- Rehabilitation

Management

- Medicine & Surgery
- Nutrition
- Rehabilitation
- Accommodation



Management

- Medicine & Surgery
- Nutrition
- Rehabilitation
- Accommodation

- Palliative & Hospice Care
- Euthanasia

Approach to Geriatric Patients

1. Identify diseases & clinical problems
2. Employ validated assessment tools
3. Develop individual management and follow-up plan
4. Implement plan
5. Adjust as needed

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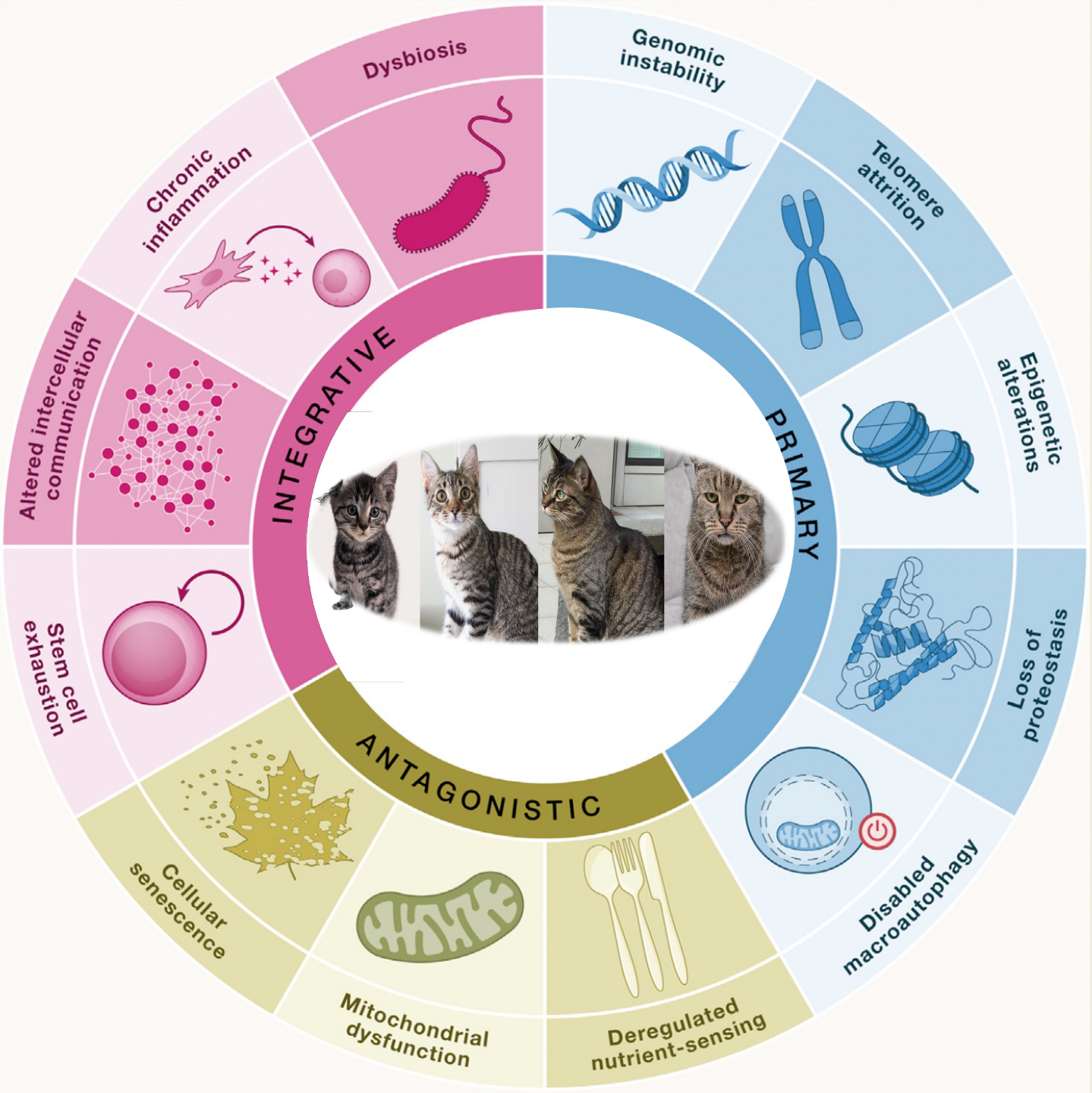
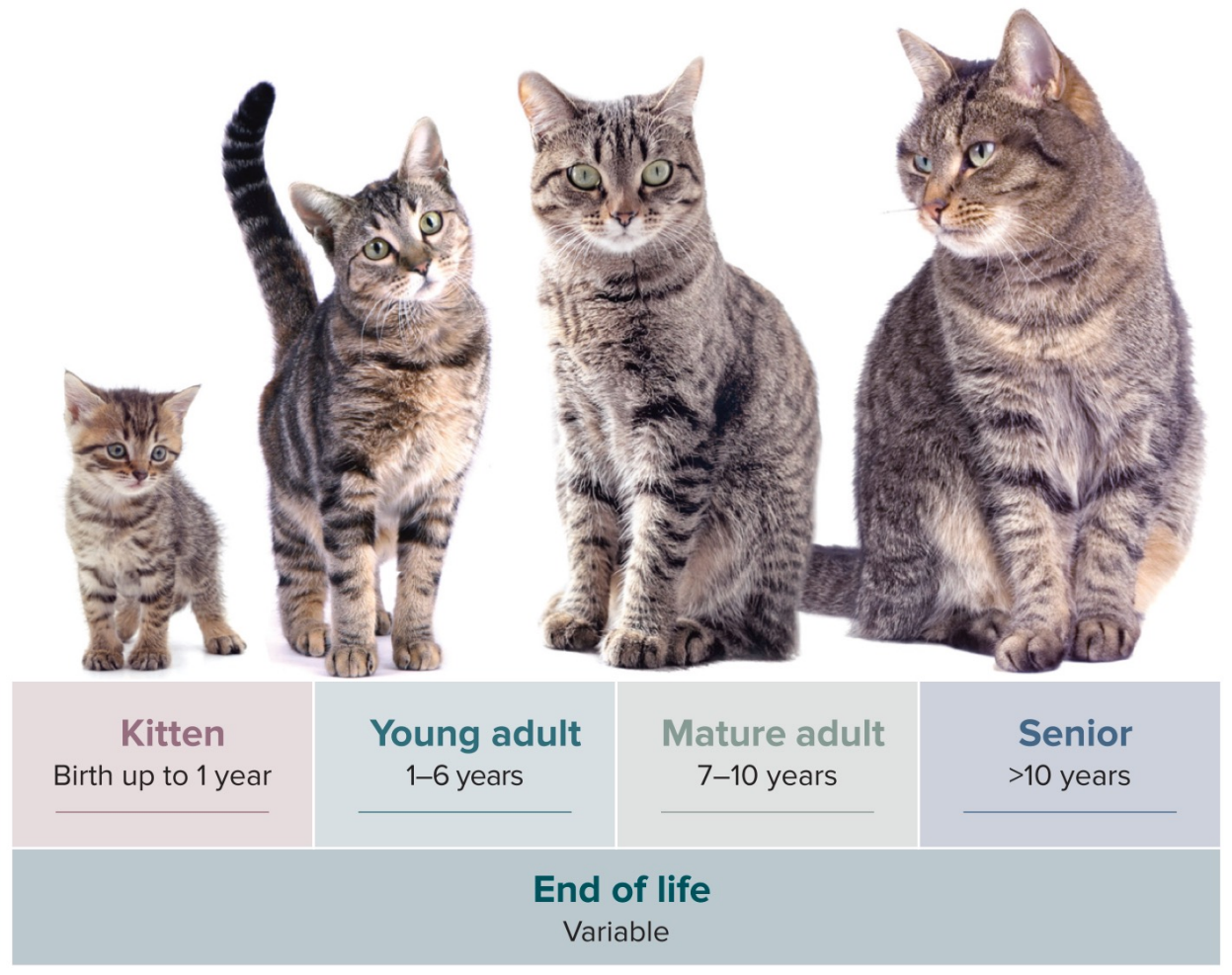


Take-Home Points

- Aging is
  - Modifiable risk factor
  - Just biology



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- Senior cats
  - >10
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Take-Home Points

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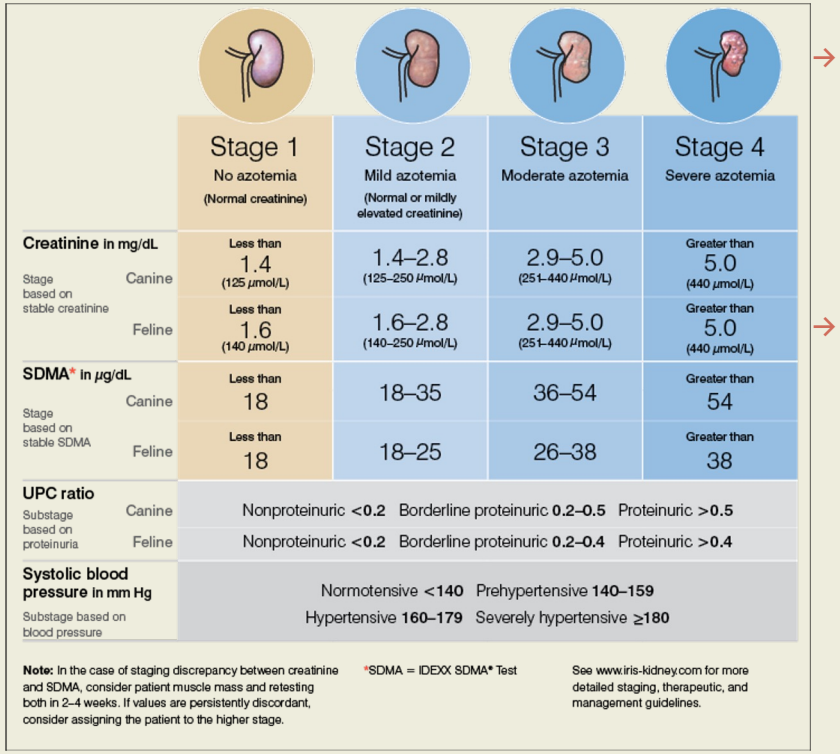
  - Modifiable risk factor
  - Just biology
- Senior cats
  - >10
  - Geriatric >15
- Use the Tools
  - Clinical metrology
  - Clinical practice guidelines



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