Curso Nutrigenomica y Avanzado

Dra. Elia Obis Monné
Departamento de Formación Instituto Nutrigenomica

Nutrigenómica y longevidad.

Nutrigenómica y longevidad.

1. Bases moleculares del envejecimiento
2. Restricción calórica y modificación de la expresión de genes
3. Genómica mitocondrial y envejecimiento

Nutrigenómica y longevidad.

Nutrigenómica y longevidad.

Edad cronológica y biológica. Fragilidad. Fenotipos de envejecimiento

Nutrigenómica y longevidad.

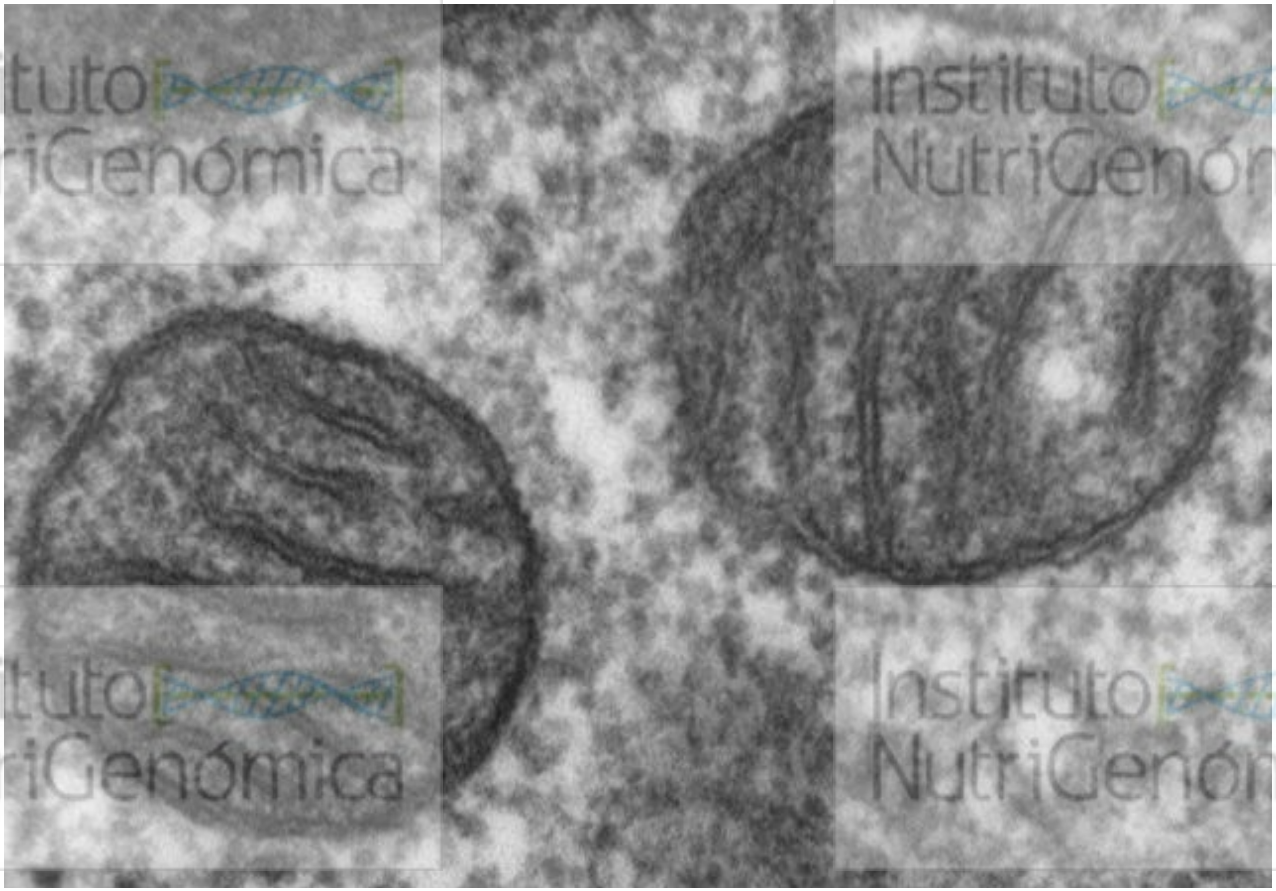
Exposición y respuesta al daño. Resiliencia

Nutrigenómica y longevidad.

$$\mathrm{BA}_i = \mathrm{Predicted\,CA}_i = a_0 + \sum_{j=1}^{m} b_j x_{ji}.$$

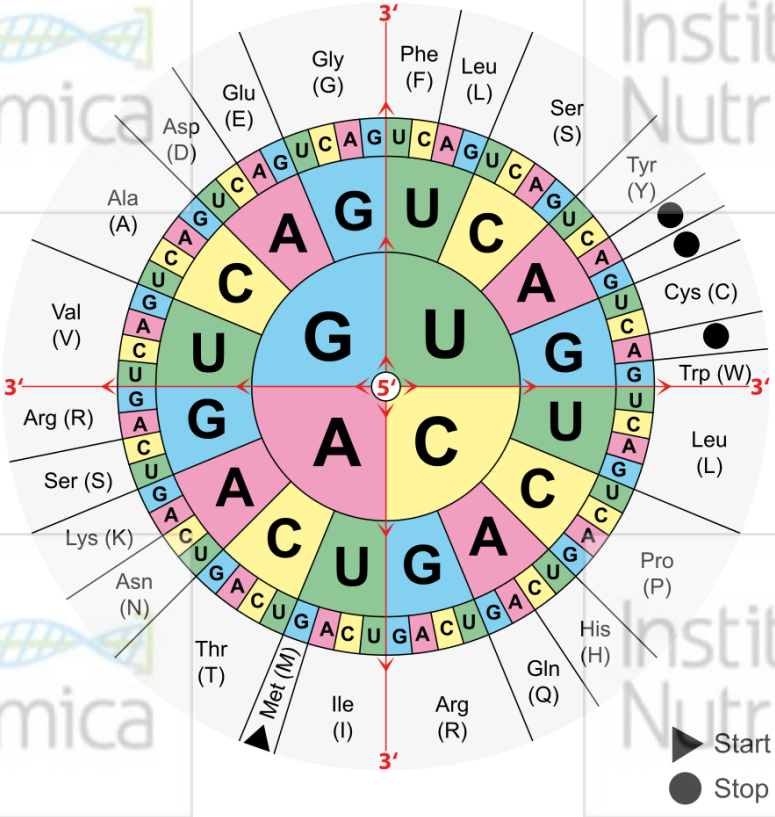
Exposición , características, reparación.

Nutrigenómica y longevidad.



Azar. Acumulación de daños. Teoría de los radicales libres

Nutrigenómica y longevidad.



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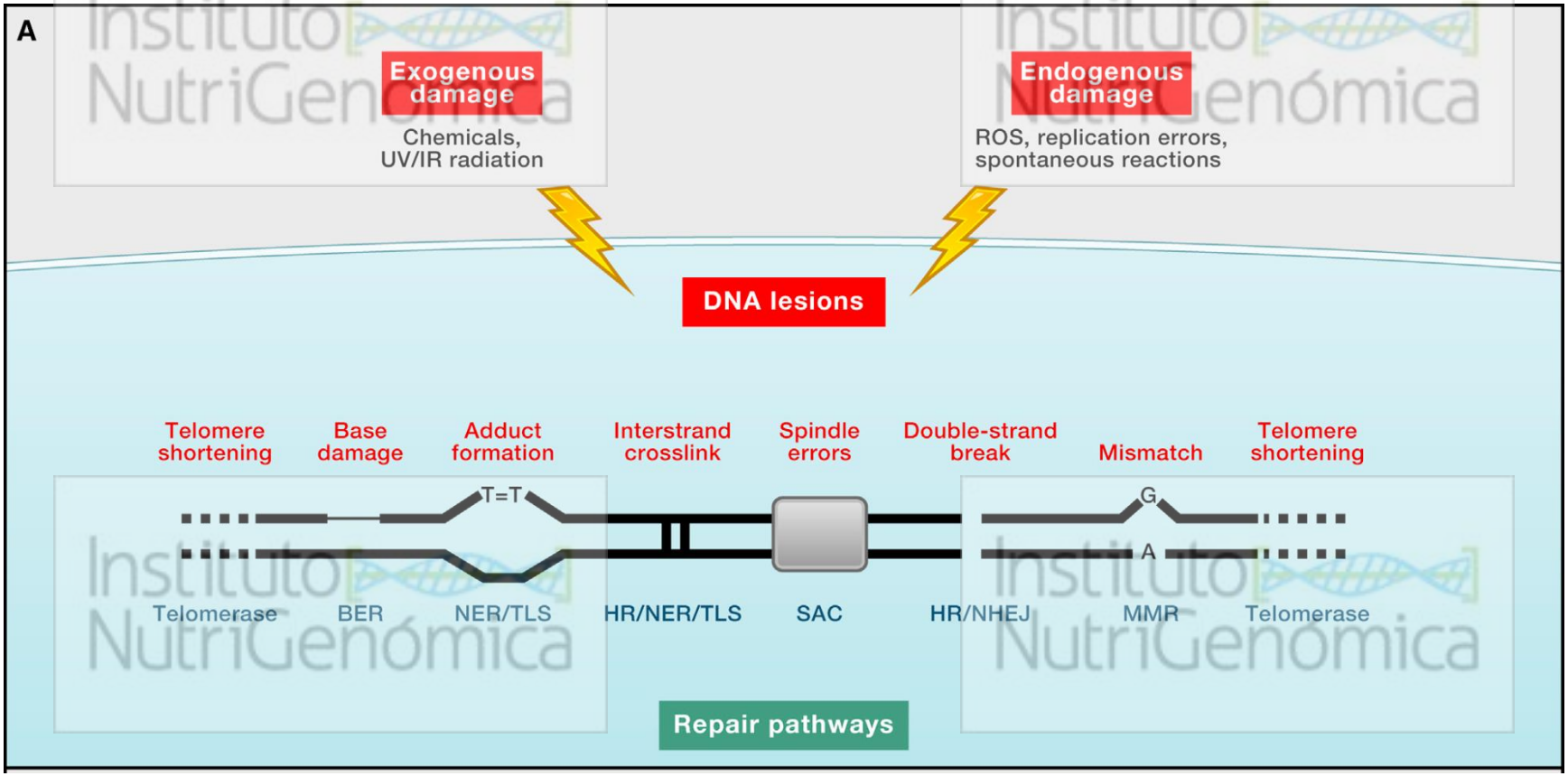
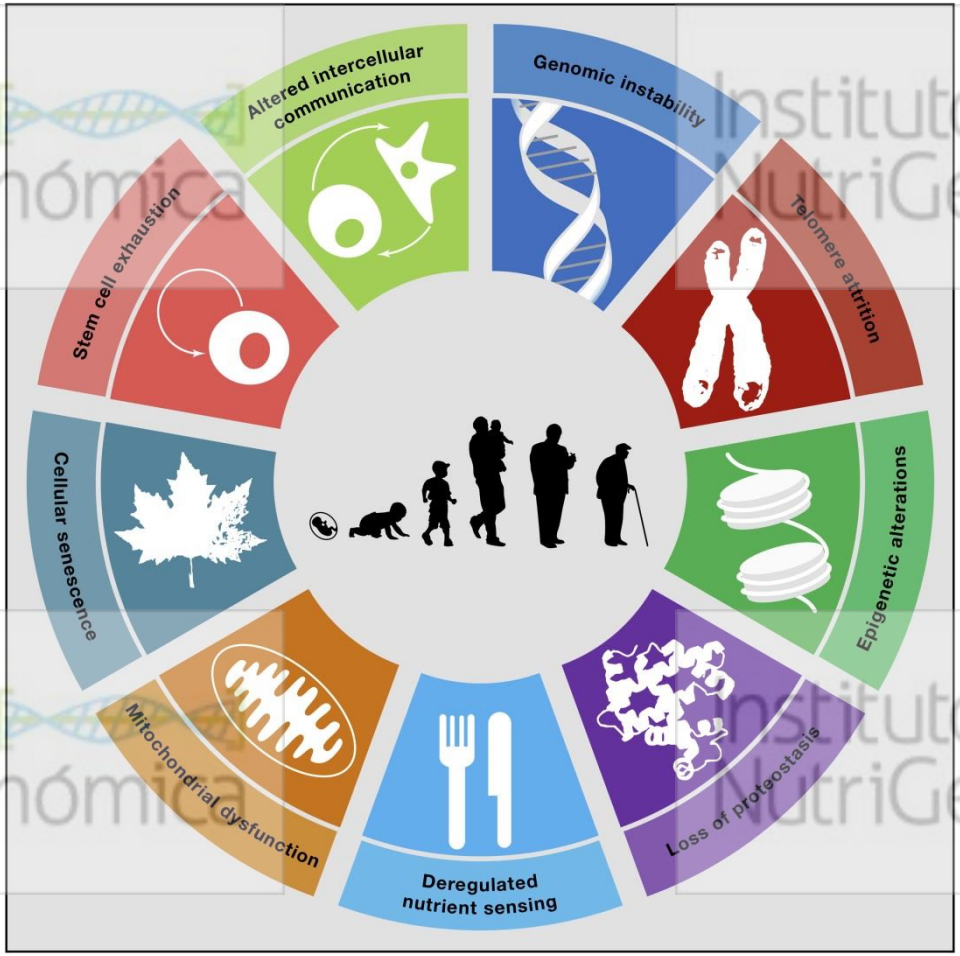
Nutrigenómica y longevidad.



Cell 2013 153, 1194-1217

Nutrigenómica y longevidad.

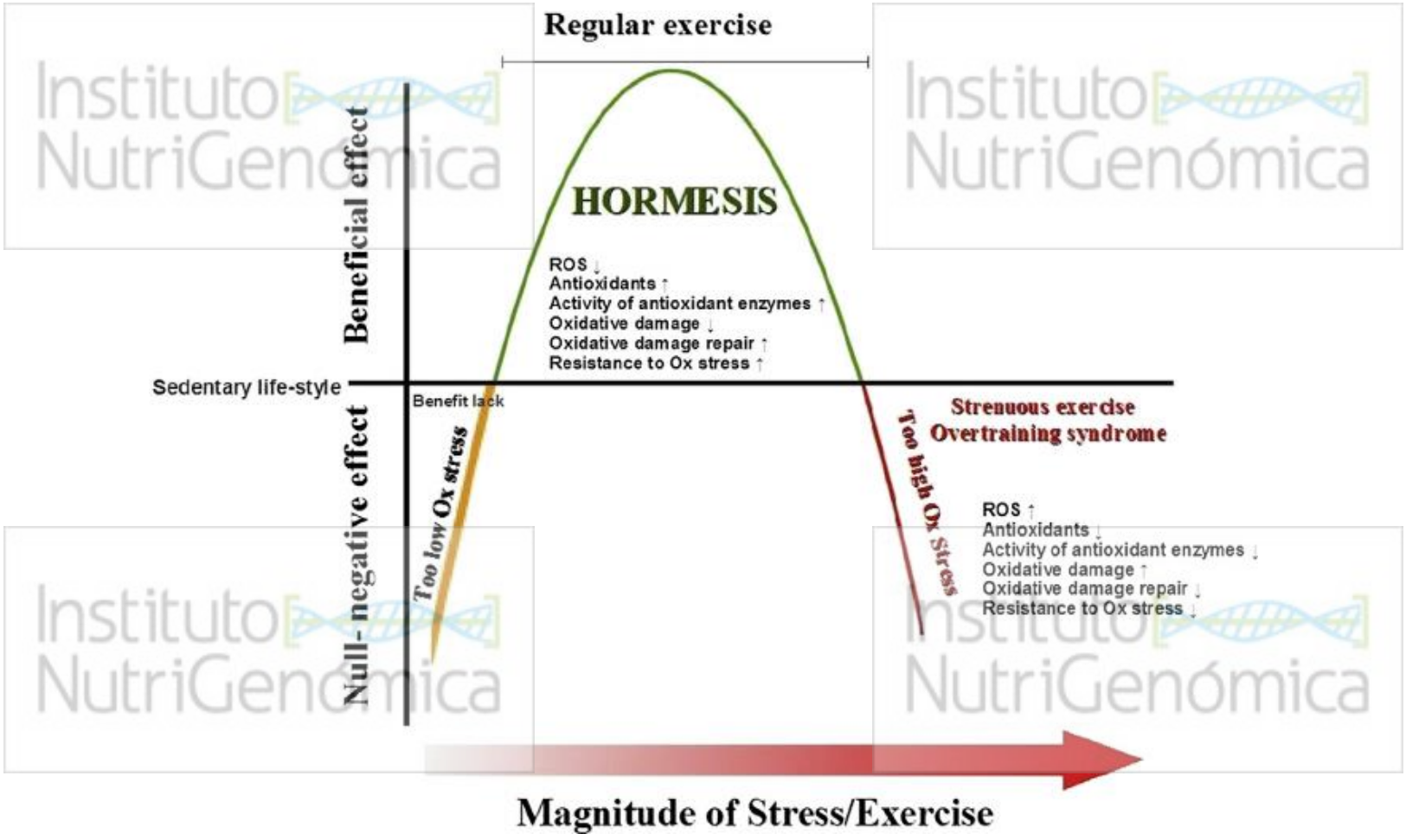


Cell 2013 153, 1194-1217

Nutrigenómica y longevidad.

Alimentación y Nutrición

Nutrigenómica y longevidad.



Nutrition. 2015 Jul-Aug;31(7-8):916-22.

Nutrigenómica y longevidad.

Table 3
Blood oxidative damage-related parameters

	CO	H-EVOO	L-EVOO
DNA strand breaks (%DNA in tail)	6.33±0.40	5.75±0.44	6.08±0.47
DNA FPG sites (%DNA in tail)	16.06±1.70	13.59±1.47#	19.83±1.40
plasma TBARS (μmol/ml)	3.12±0.64	1.61±0.30*,#	2.95±0.55

CO, corn oil; H-EVOO, extra-virgin olive oil rich in natural antioxidants; L-EVOO, extra-virgin olive oil poor in natural antioxidants. Values are expressed as mean±S.E.M. (n=11–13). Leukocyte DNA strand breaks and FPG sites were measured with the comet assay.

* P<.05 vs. CO.

\# P<.05 vs. L-EVOO.

Cell 2013 153, 1194-1217

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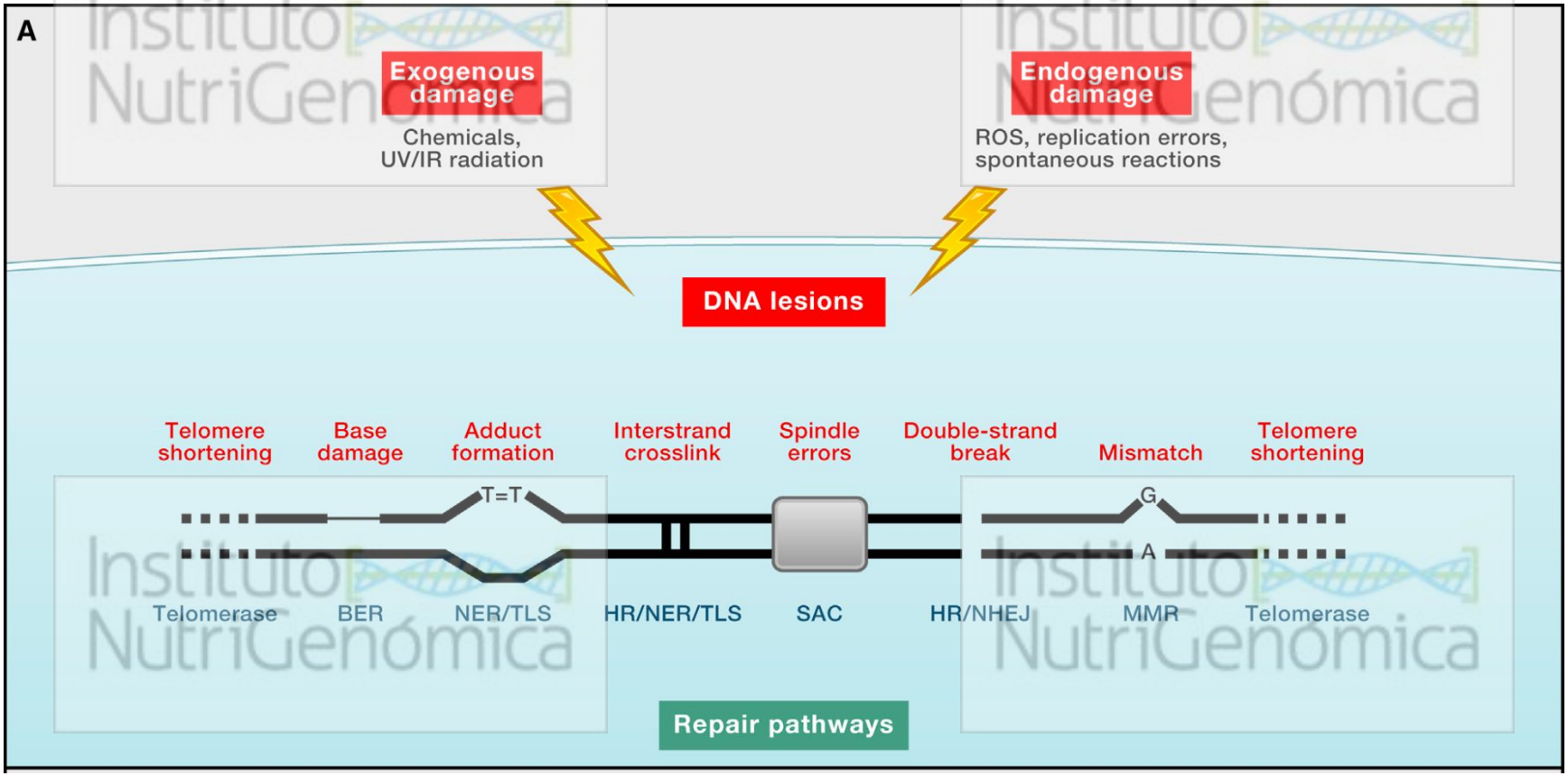
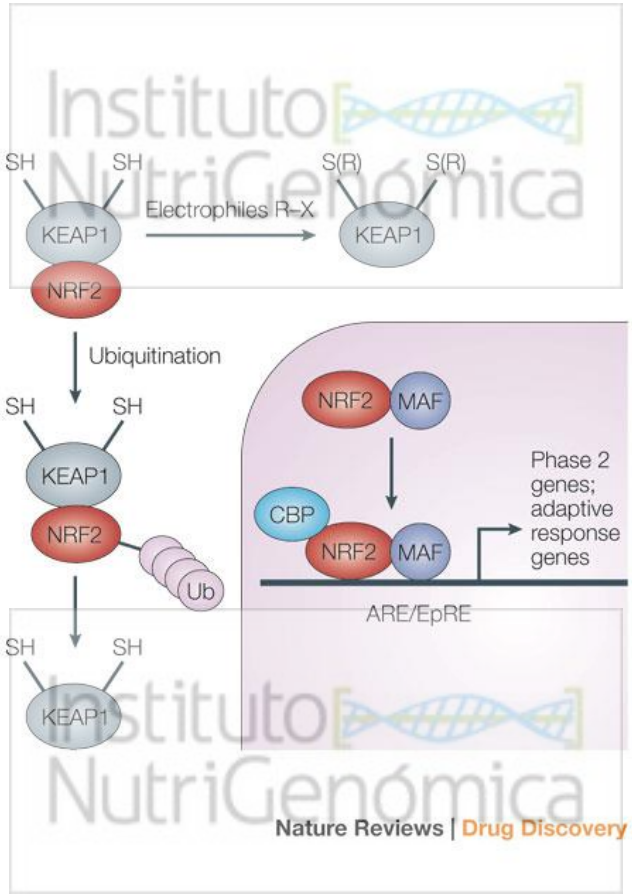
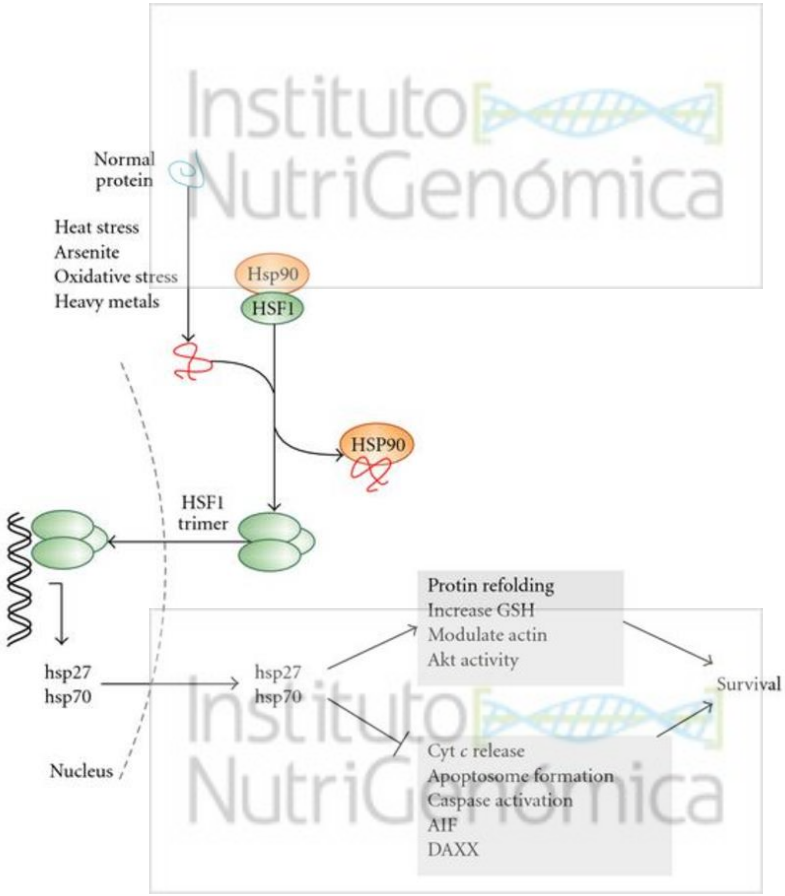


Cell 2013 153, 1194-1217

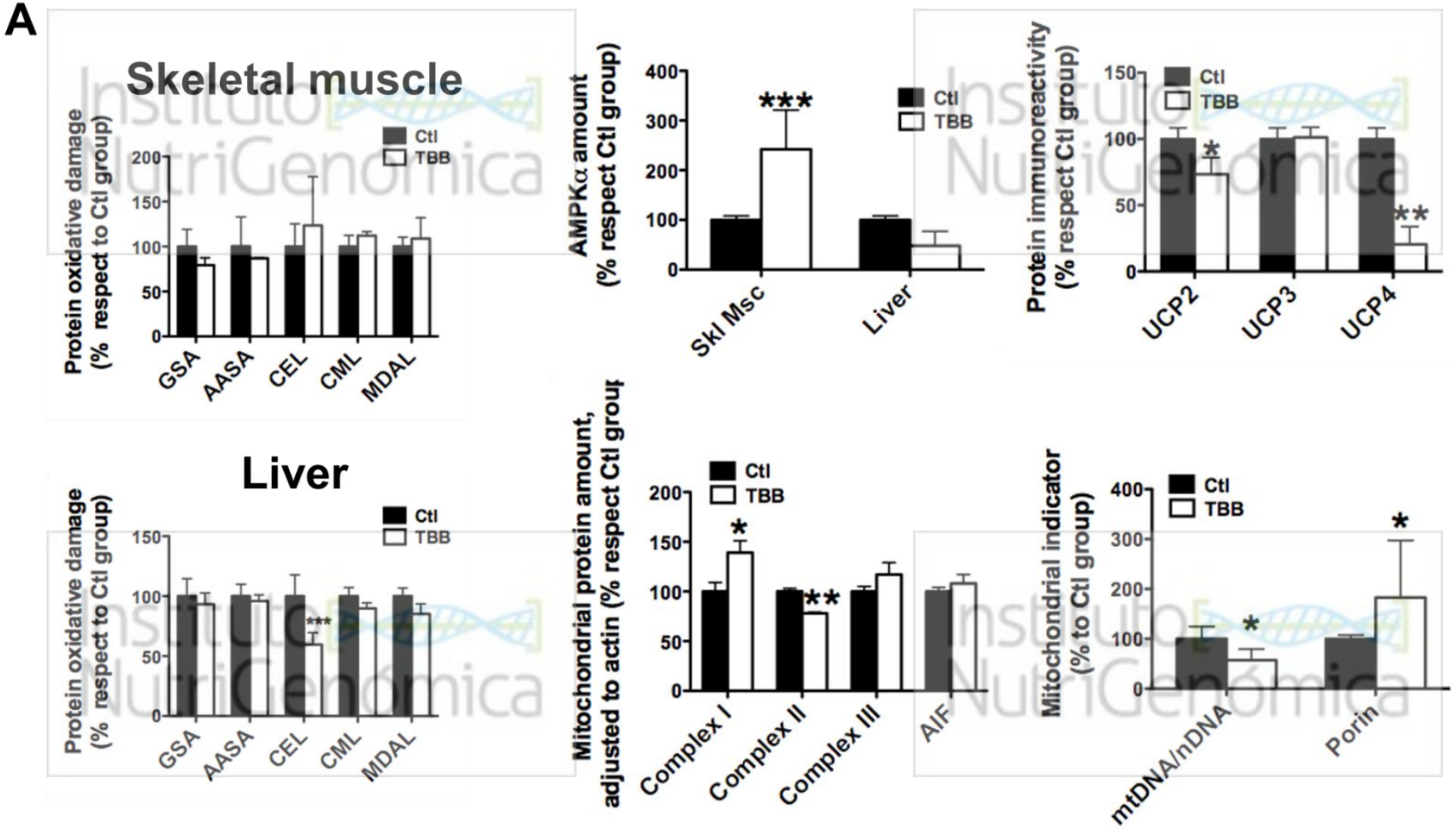
Nutrigenómica y longevidad.





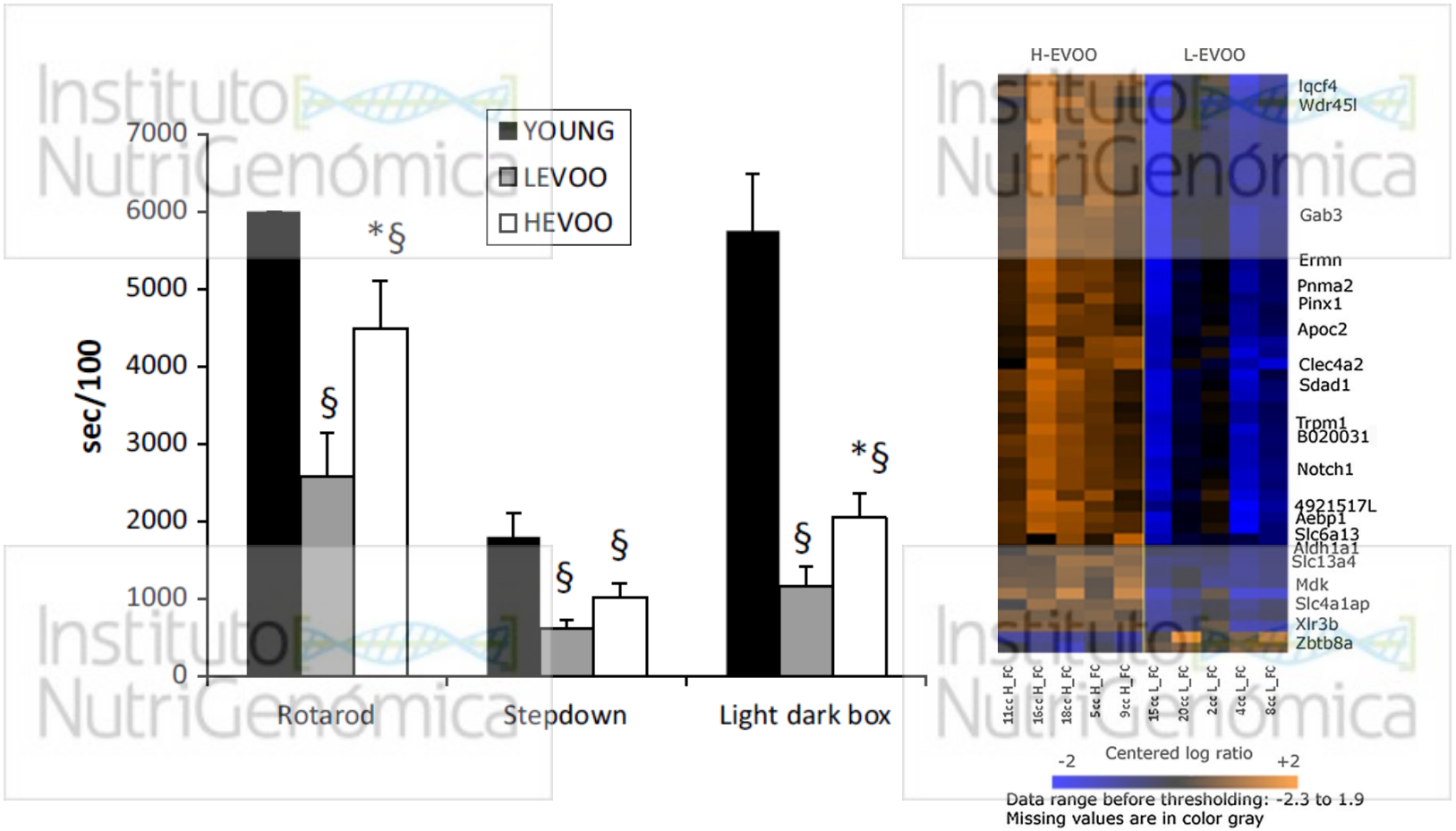
Nature Reviews Drug Discovery 4, 410-420 (May 2005) y IJCB Vol 2010 (2010), Article ID 214074

Nutrigenómica y longevidad.



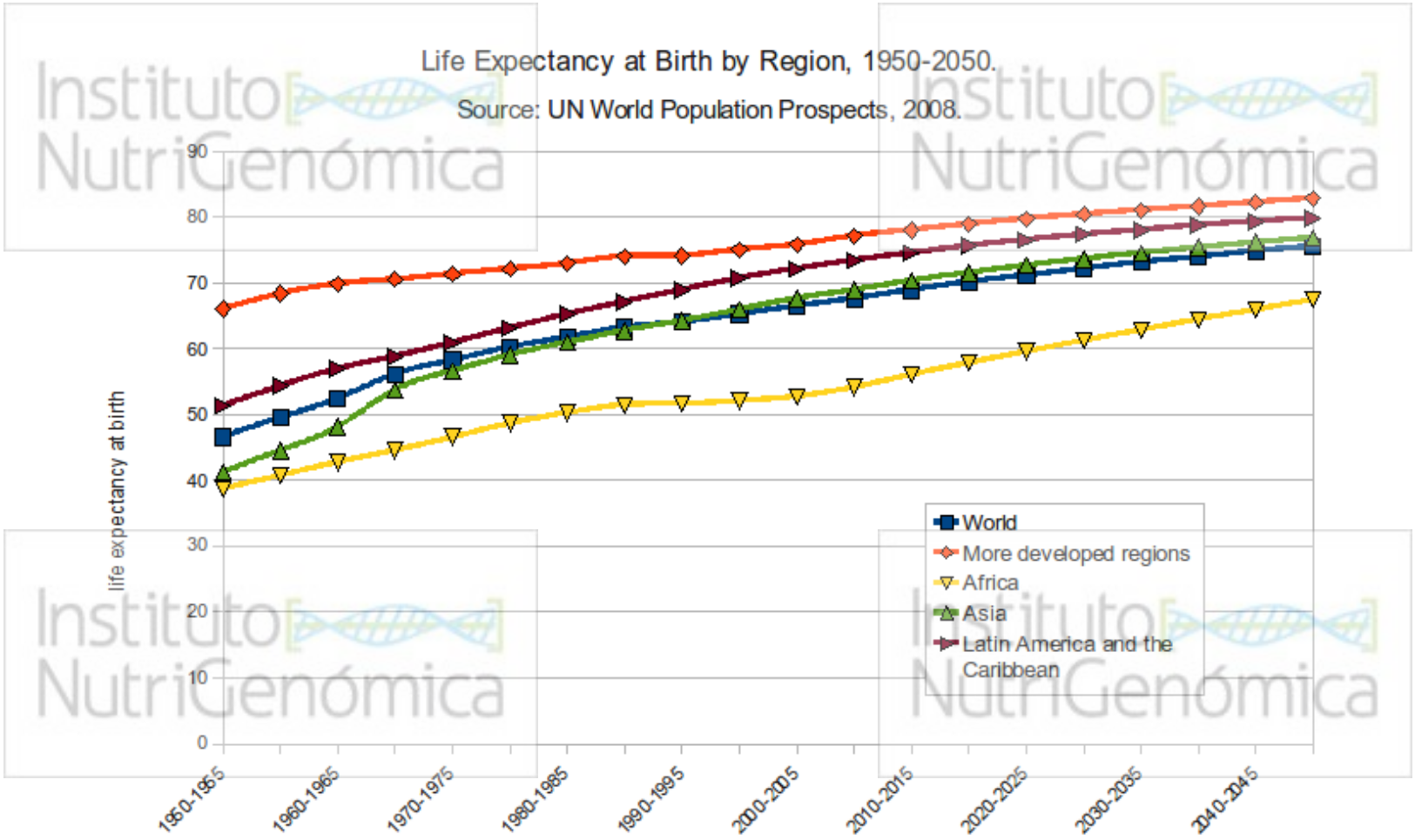
Mol Nutr Food Res. 2013 Mar;57(3):459-70

Nutrigenómica y longevidad.



British Journal of Nutrition (2010), 103, 1674–1683

Nutrigenómica y longevidad.



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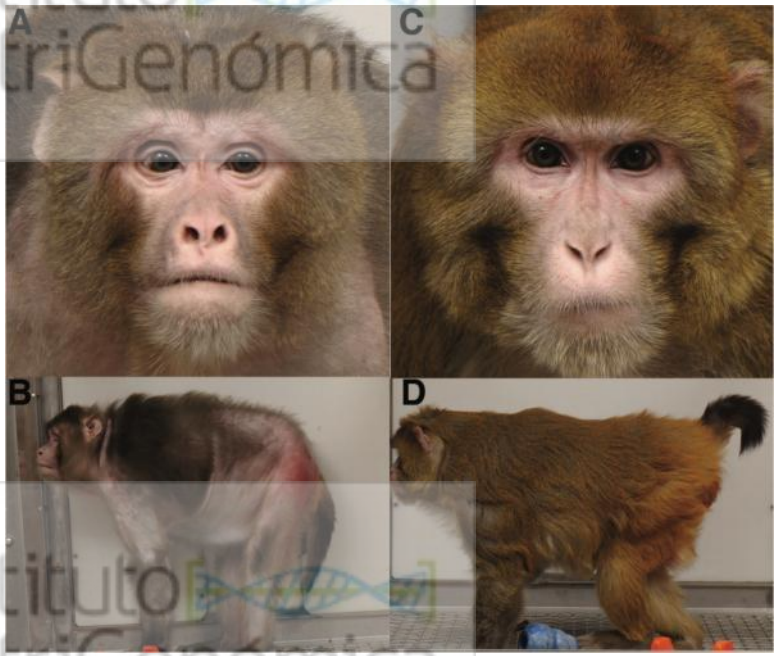
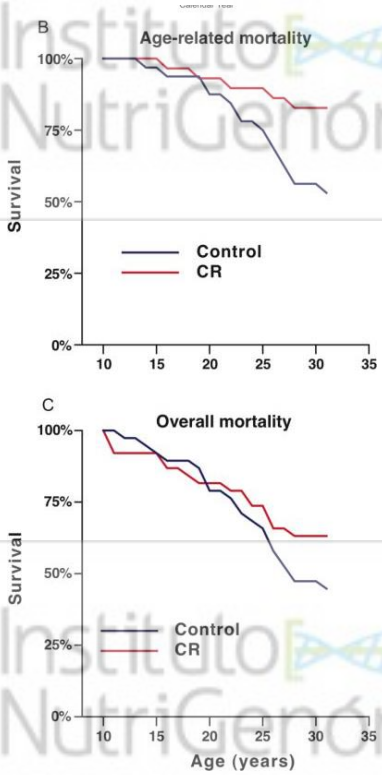
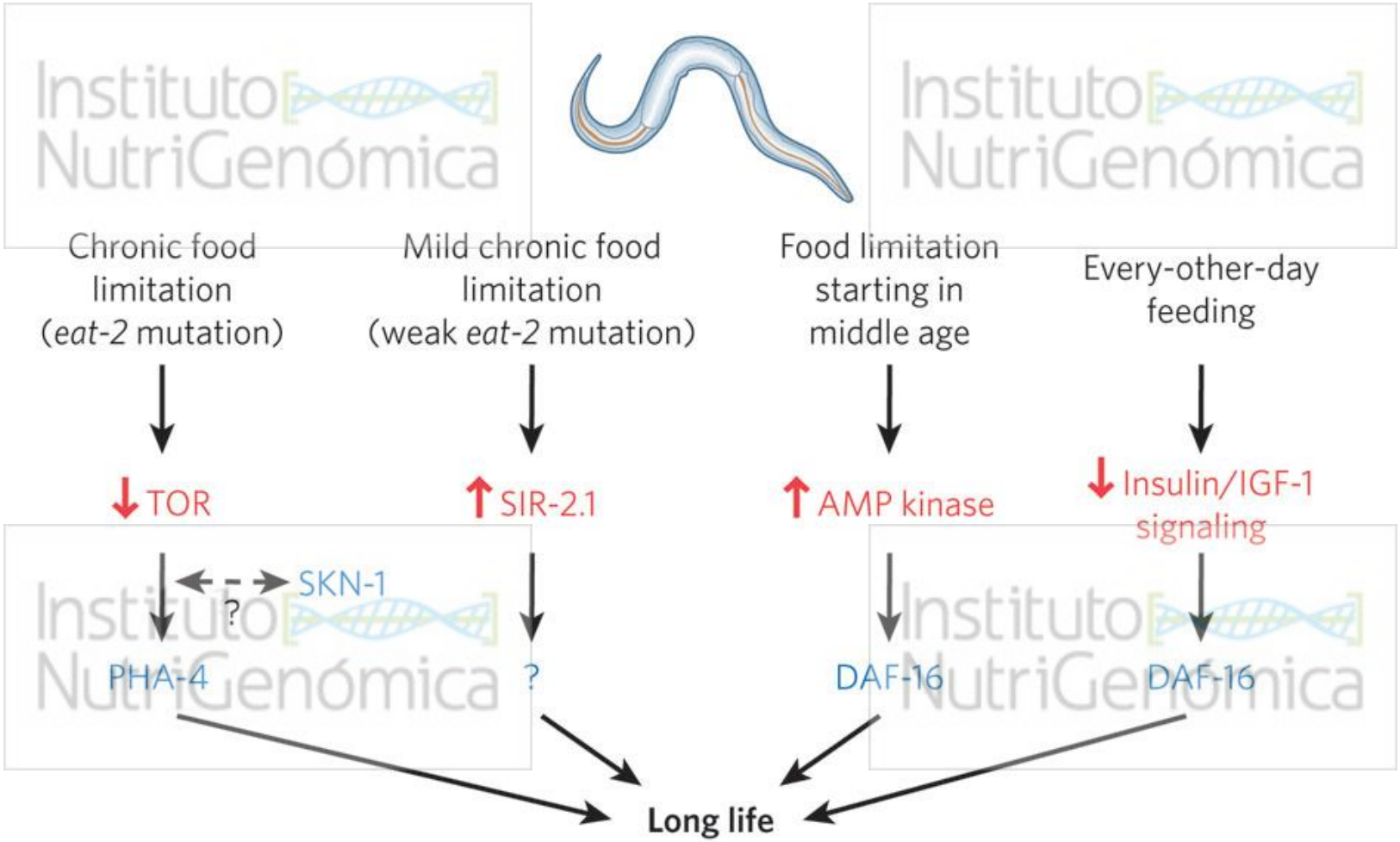




Science. 2009 Jul 10;325(5937):201-4

Nutrigenómica y longevidad.



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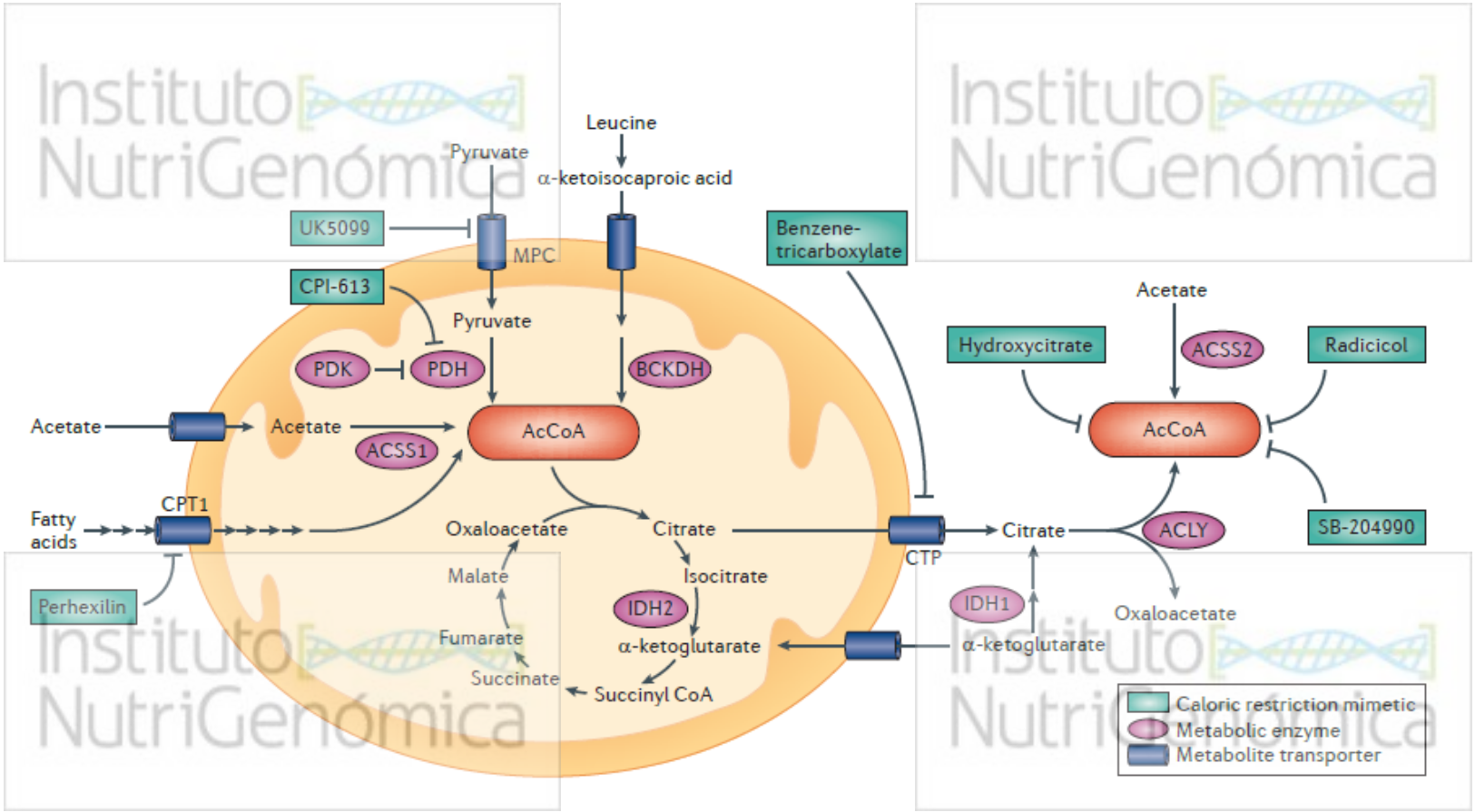
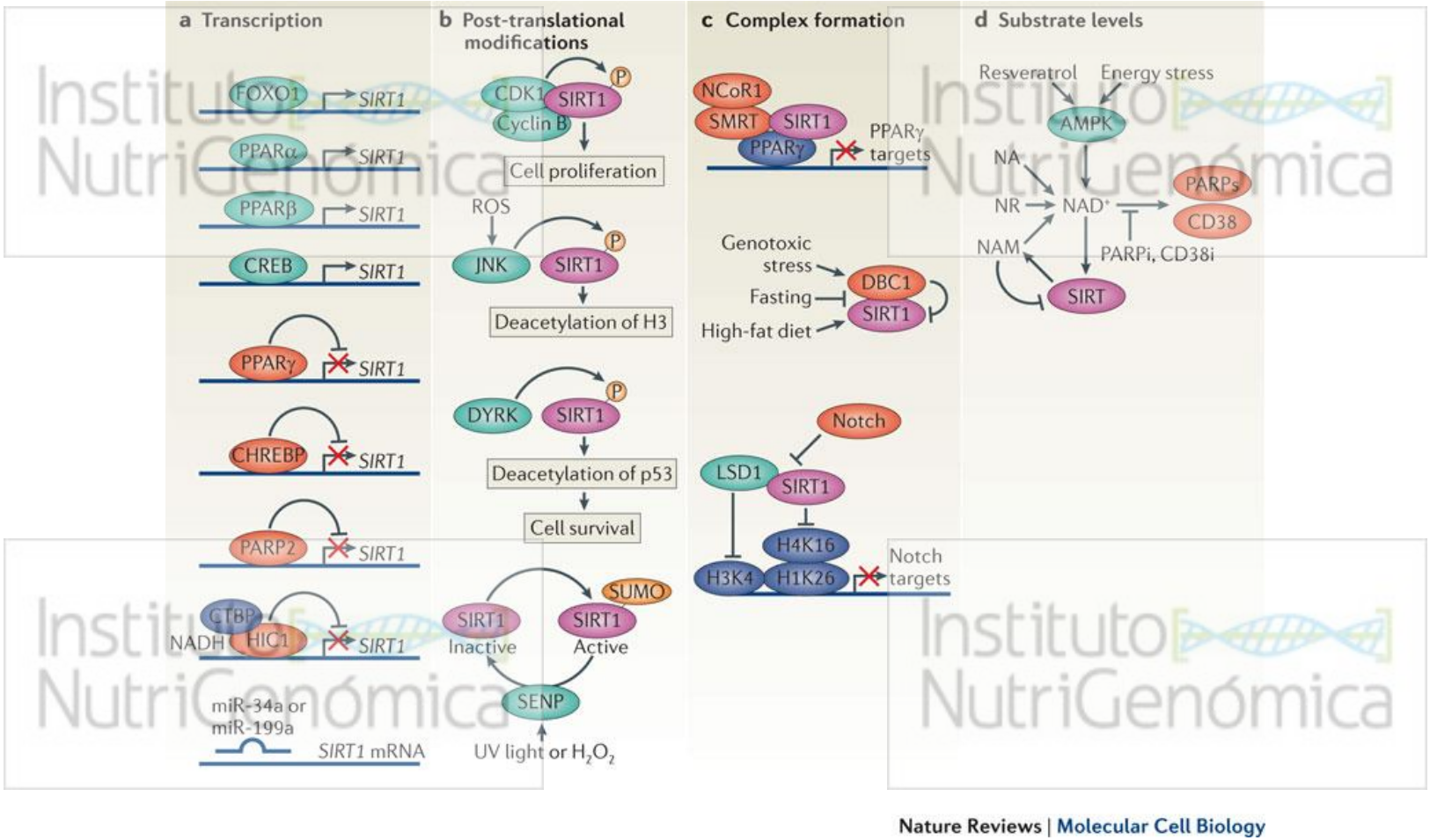


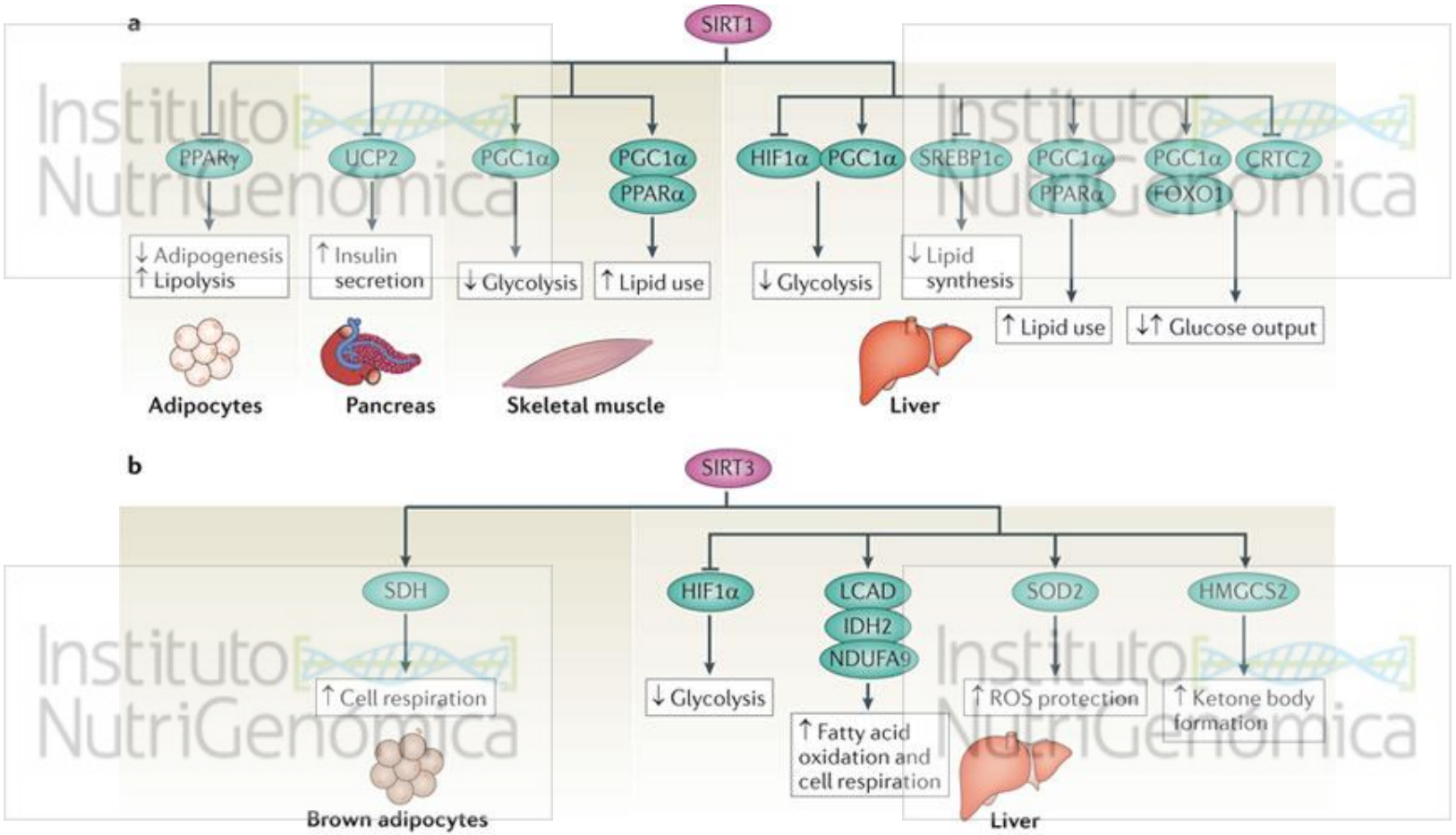
Nature Reviews Drug Discovery 13, 727–740 (2014)

Nutrigenómica y longevidad.



Nature Reviews Molecular Cell Biology 13, 225-238 (April 2012)

Nutrigenómica y longevidad.



Nature Reviews Molecular Cell Biology 13, 225-238 (April 2012)

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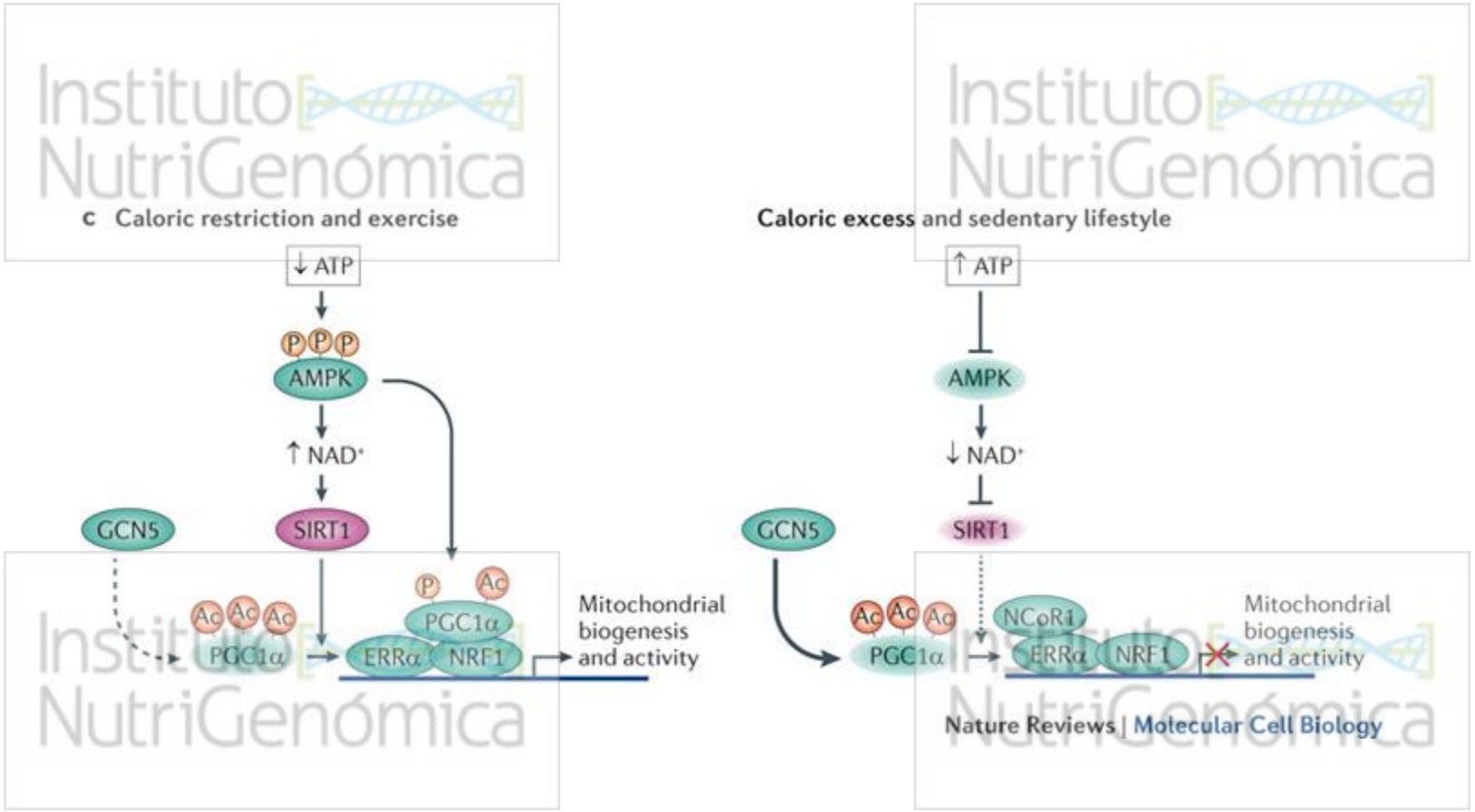

Nature Reviews Molecular Cell Biology 13, 225-238 (April 2012)

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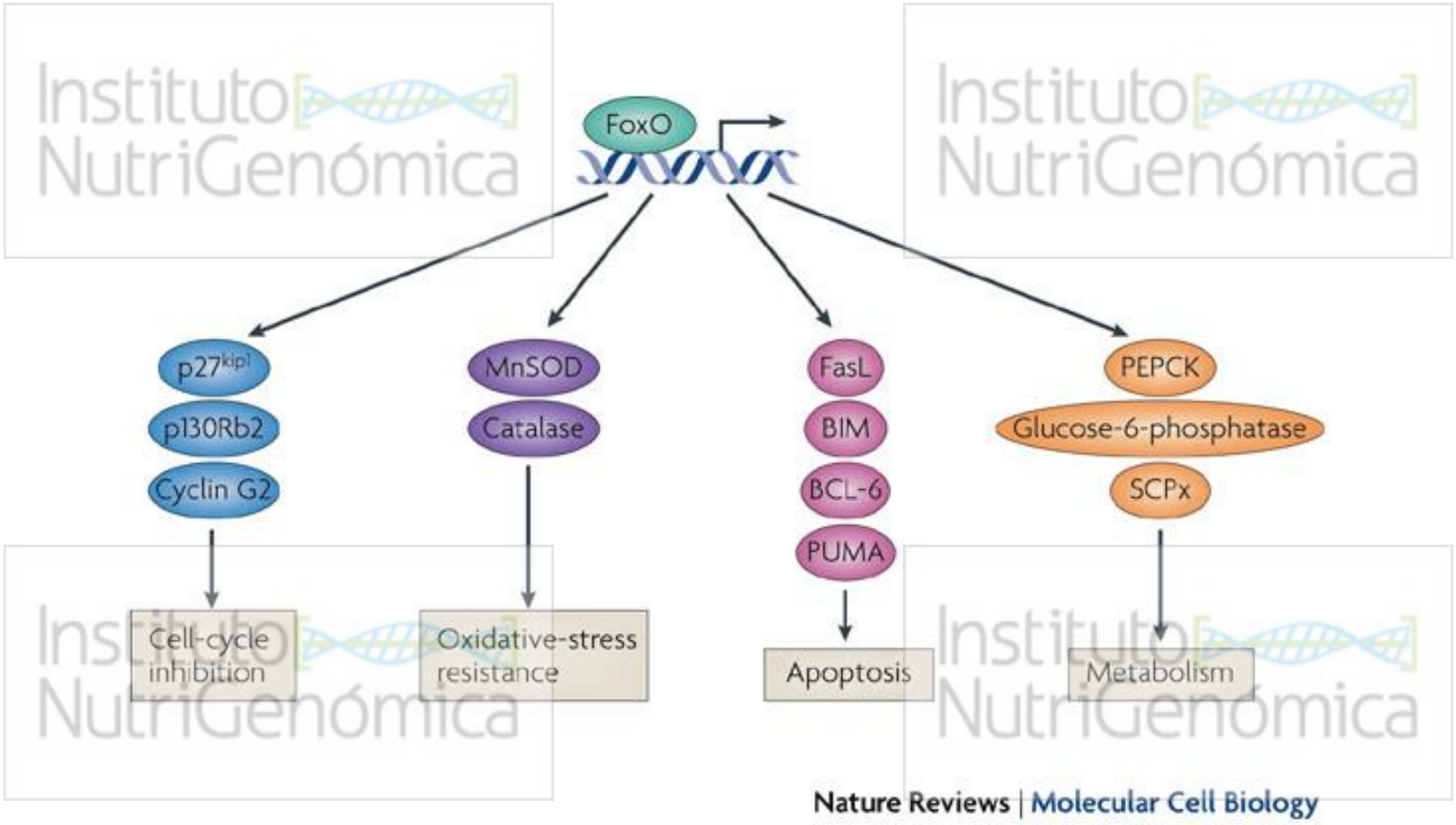
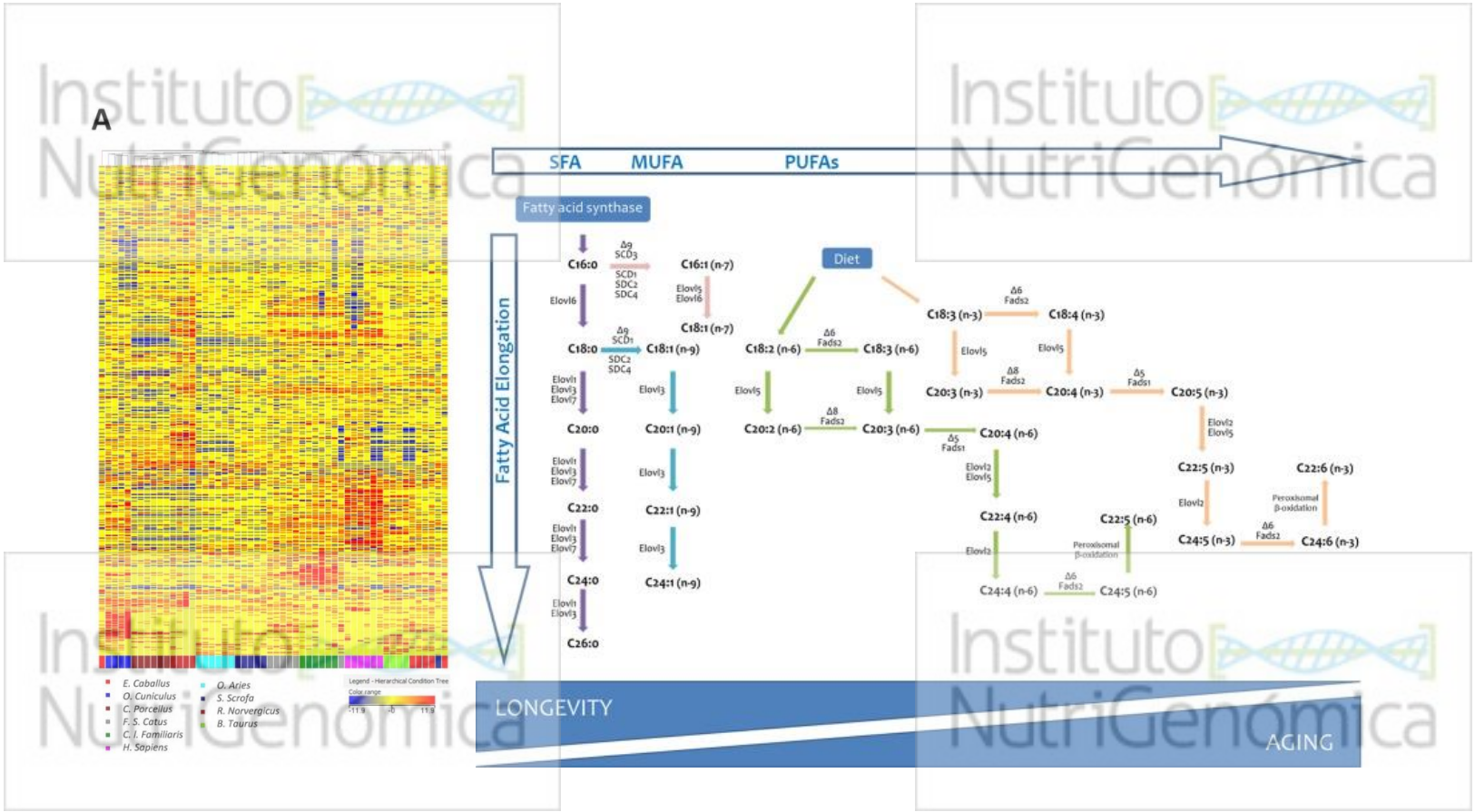


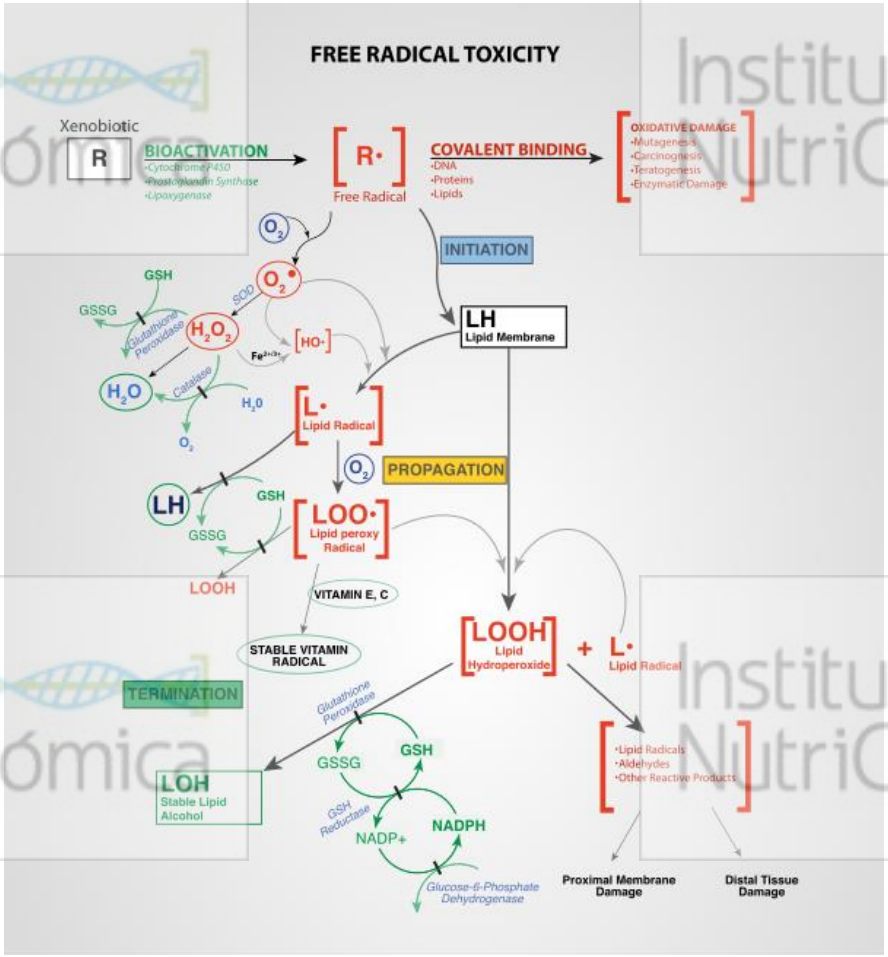
Nature Reviews Molecular Cell Biology 8, 440-450 (June 2007)

Nutrigenómica y longevidad.



Scientific Reports **3**, Article number: 3346 (2013) y Front Physiol. 2013; 4: 372.

Nutrigenómica y longevidad.



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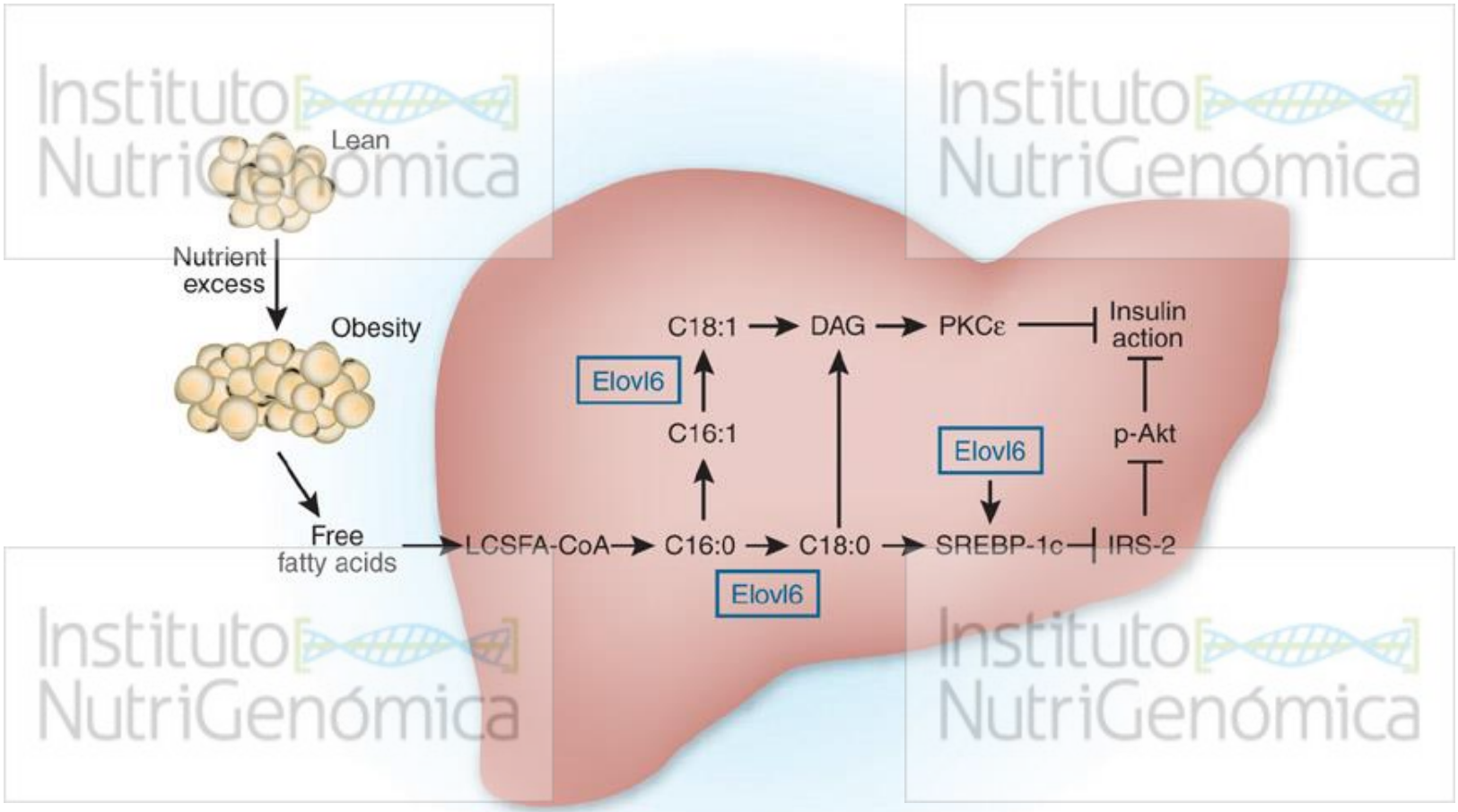
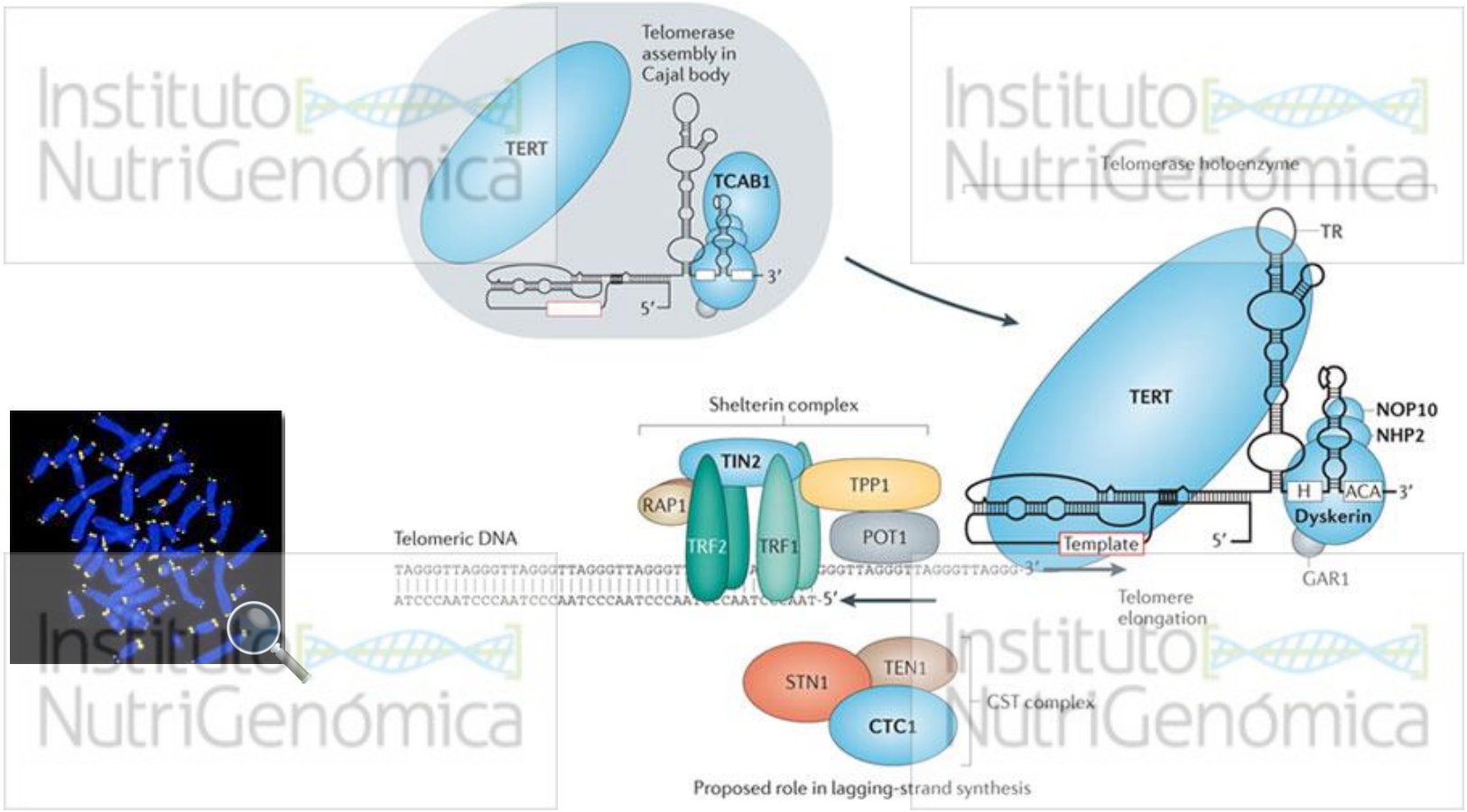


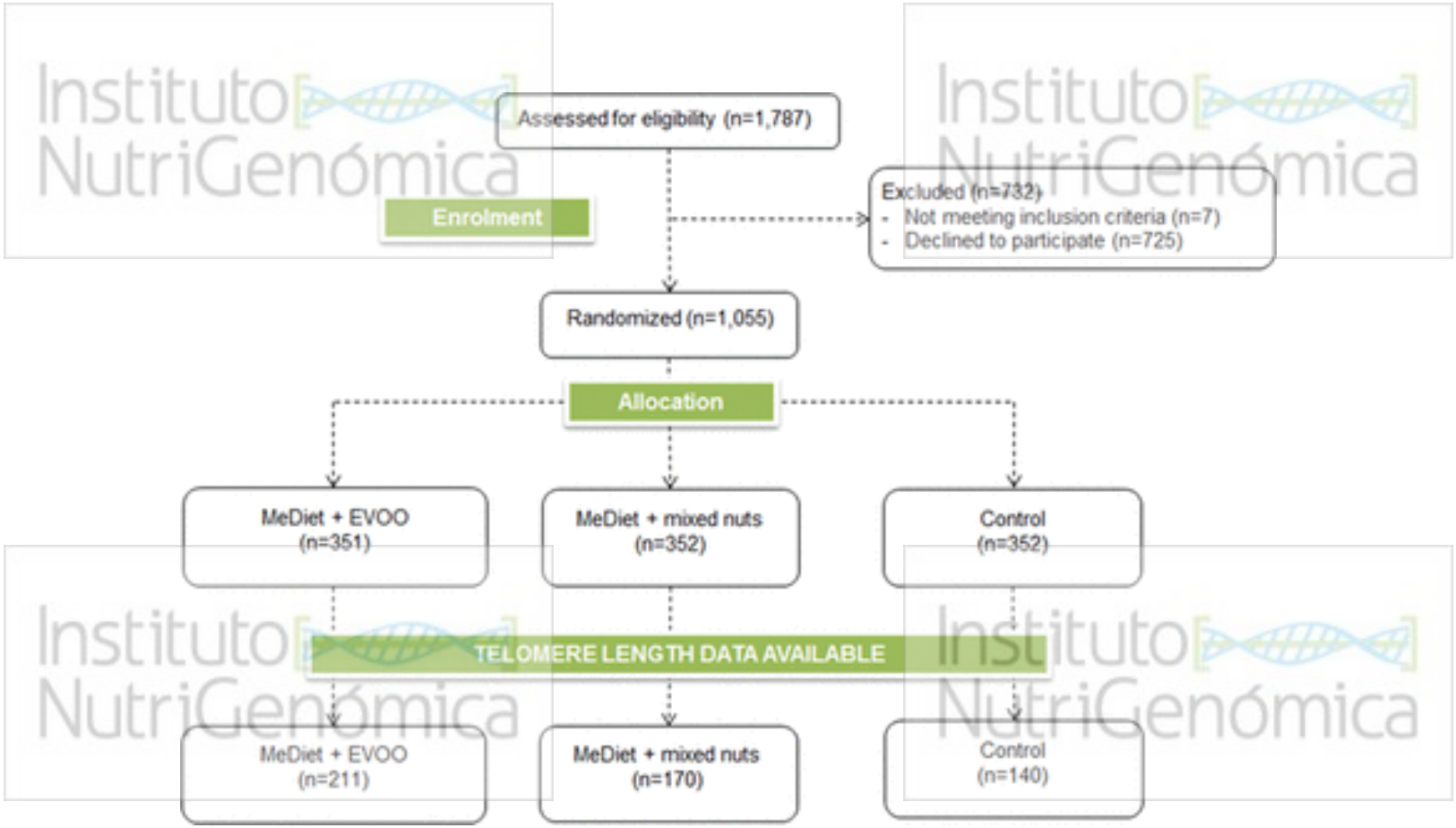
Nature Medicine 13, 1137 - 1138 (2007)

Nutrigenómica y longevidad.



Cell 2013 153, 1194-1217

Nutrigenómica y longevidad.



Circulation: Cardiovascular Genetics. 2015; 8: 91-99

Nutrigenómica y longevidad.

Table 4. Association between telomere length changes during follow-up and changes in anthropometric variables after 5 years of a nutritional intervention, according to tertiles of baseline TL in participants of the PREDIMED-NAVARRA trial

	Tertiles of baseline TL			*P for trend*
	T1	*T2*	*T3*	
Weight change (kg)				
Change in TL during follow-up				
TL decreased ($n=314$)	0 (Ref.)	0.10 (−1.19 to 1.39)	−0.71 (−1.96 to 0.53)	0.197
TL increased ($n=207$)	0.29 (−1.03 to 1.61)	−0.34 (−1.80 to 1.13)	−1.58 (−3.21 to 0.06)	0.008
BMI change ($kg\,m^{-2}$)				
Change in TL during follow-up				
TL decreased ($n=314$)	0 (Ref.)	−0.06 (−0.57 to 0.44)	−0.39 (−0.87 to 0.10)	0.111
TL increased ($n=207$)	0.01 (−0.51 to 0.52)	−0.24 (−0.81 to 0.33)	−0.71 (−1.35 to −0.08)	0.009
Waist circumference change (cm)				
Change in TL during follow-up				
TL decreased ($n=314$)	0 (Ref.)	0.68 (−0.89 to 2.25)	−0.88 (−2.41 to 0.64)	0.083
TL increased ($n=207$)	−0.01 (−1.62 to 1.61)	−0.62 (−2.40 to 1.16)	−1.95 (−3.94 to 0.04)	0.044
Waist to height ratio change				
Change in TL during follow-up				
TL decreased ($n=314$)	0 (Ref.)	0.003 (−0.007 to 0.013)	−0.007 (−0.016 to 0.003)	0.053
TL increased ($n=207$)	−0.001 (−0.011 to 0.009)	−0.005 (−0.016 to 0.006)	−0.013 (−0.025 to 0.001)	0.051

Abbreviation: BMI, body mass index; TL, telomere length; The table shows B coefficients (95% CI). Adjusted for age, sex, basal BMI, basal WC, basal weight or WHtR, smoking (three categories), diabetes status (dichotomous), hypertensive status (dichotomous), dyslipidaemia status (dichotomous), physical activity (METs-min per day), total energy intake (Kcal per day) and group of intervention. T1 ⩽78.25; T2 = 78.25–198.08; T3 ⩾198.08.

Circulation: Cardiovascular Genetics. 2015; 8: 91-99

Nutrigenómica y longevidad.

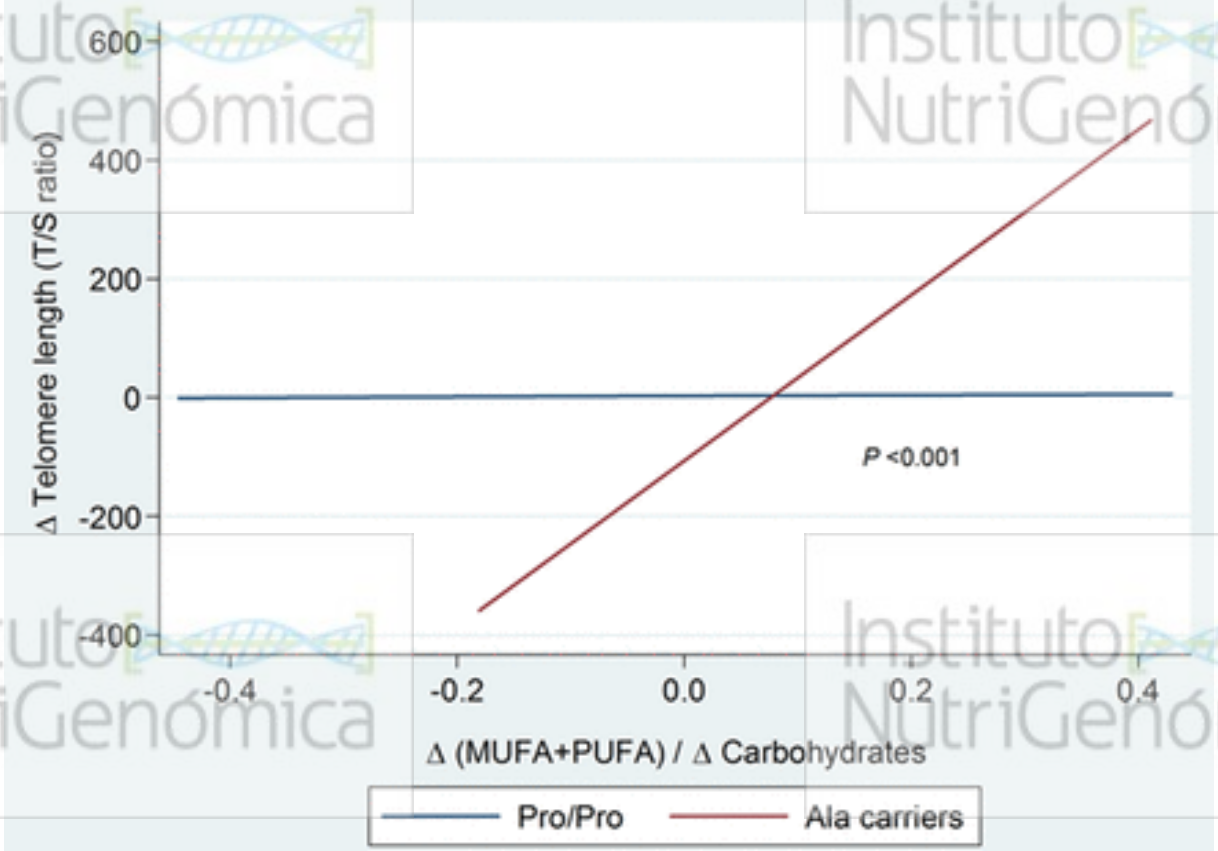
Table 5. Odds ratio and 95% CI of remaining obese (BMI $\geqslant 30$ kg m^{-2}) after 5 years of a nutritional intervention, according to tertiles of baseline TL and change in TL during follow-up

	Tertiles of baseline TL		
	T1	*T2*	*T3*
Change in TL during follow-up			
TL decreased ($n = 119$)	1 (Ref.)	0.50 (0.12–2.15)	0.43 (0.10–1.89)
TL increased ($n = 77$)	0.91 (0.19–4.42)	0.48 (0.10–2.31)	0.27 (0.03–2.03)

Abbreviations: BMI, body mass index; CI, confidence interval; TL, telomere length. Adjusted for age, sex, basal BMI, basal WC, smoking (three categories), diabetes status (dichotomous), hypertensive status (dichotomous), dyslipidaemia status (dichotomous), physical activity (METS-min per day), total energy intake (Kcal per day) and group of intervention. T1 $\leqslant$ 78.25; T2 = 78.25–198.08; T3 $\geqslant$ 198.08.

Circulation: Cardiovascular Genetics. 2015; 8: 91-99

Nutrigenómica y longevidad.



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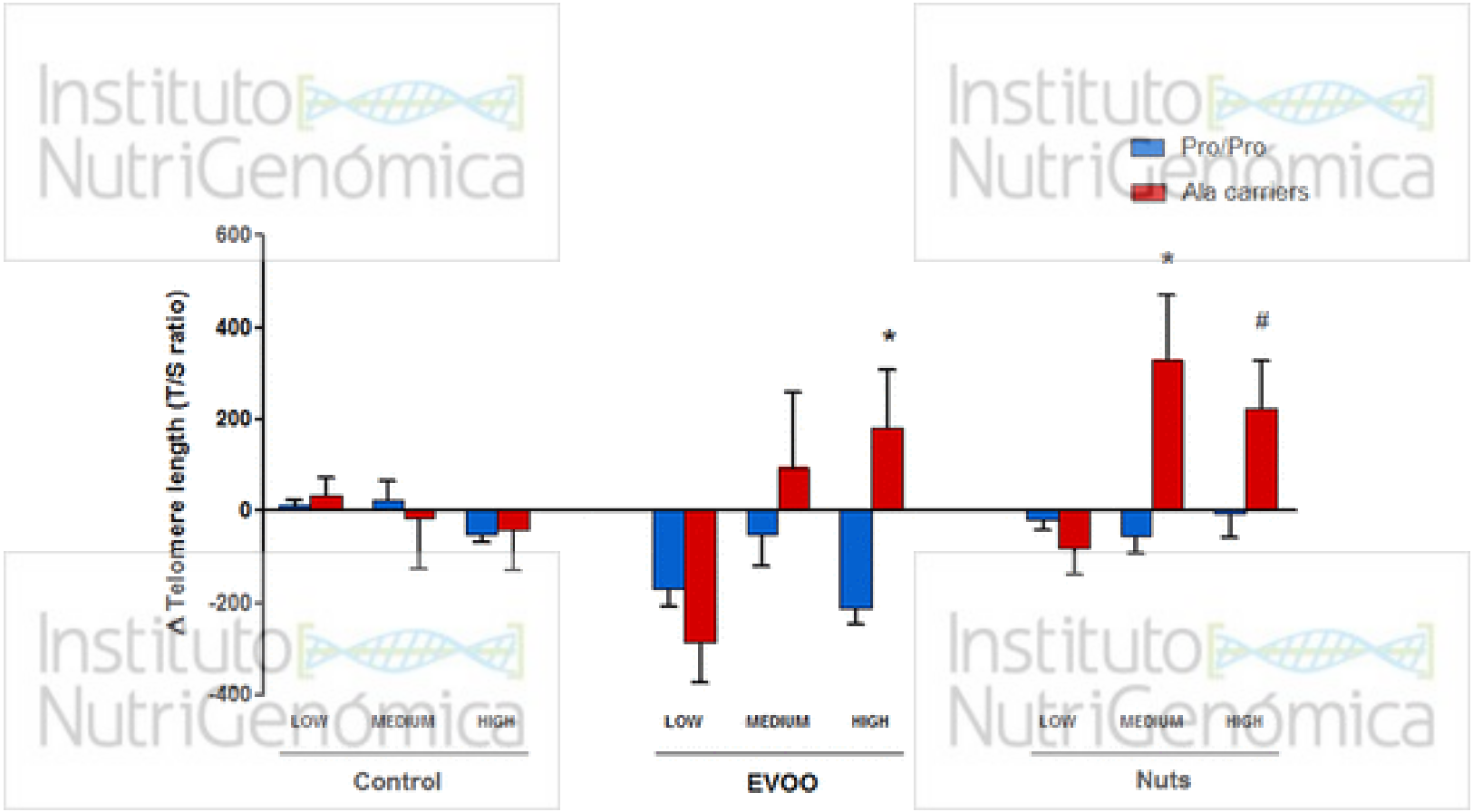
Nutrigenómica y longevidad.



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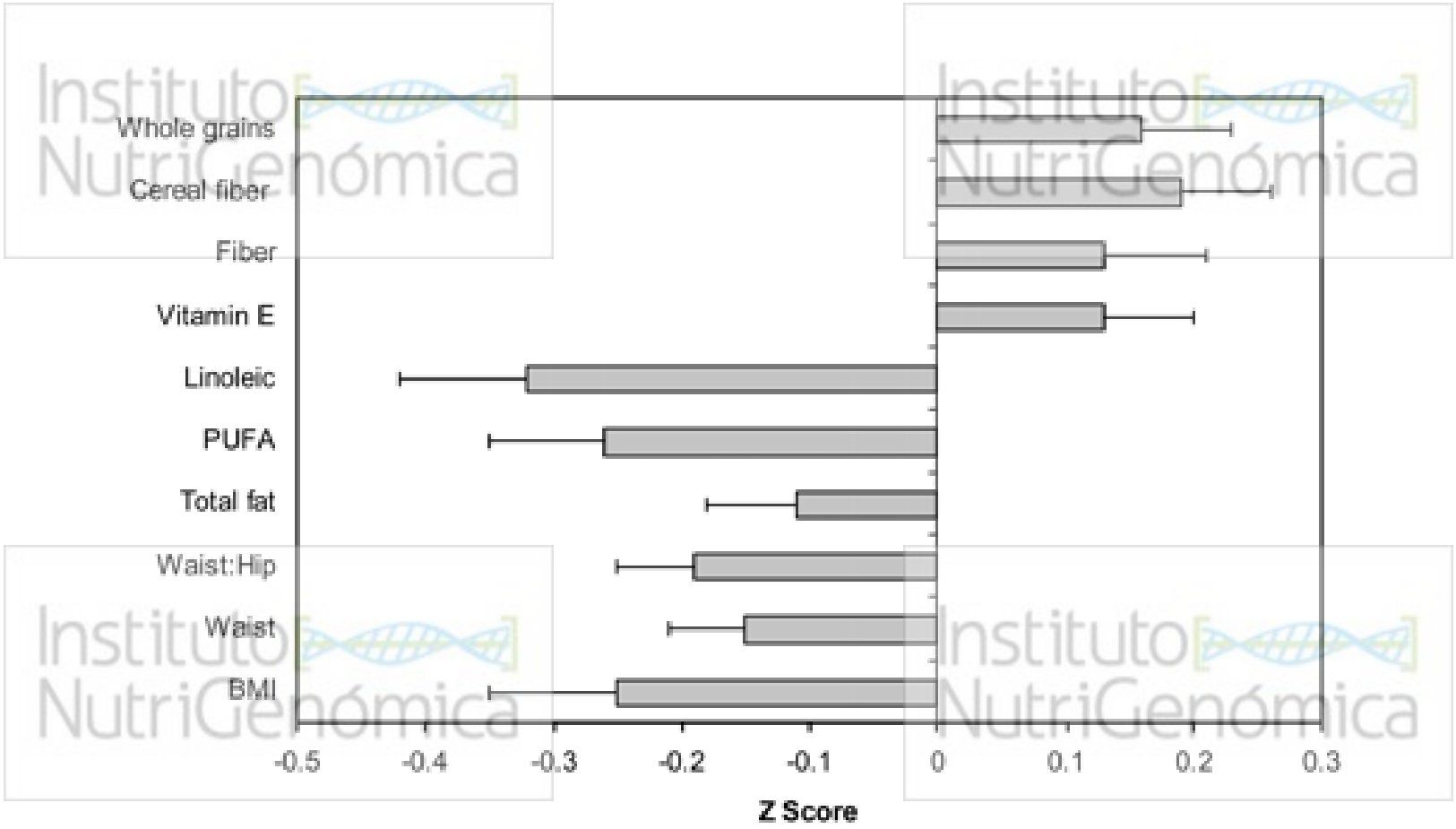
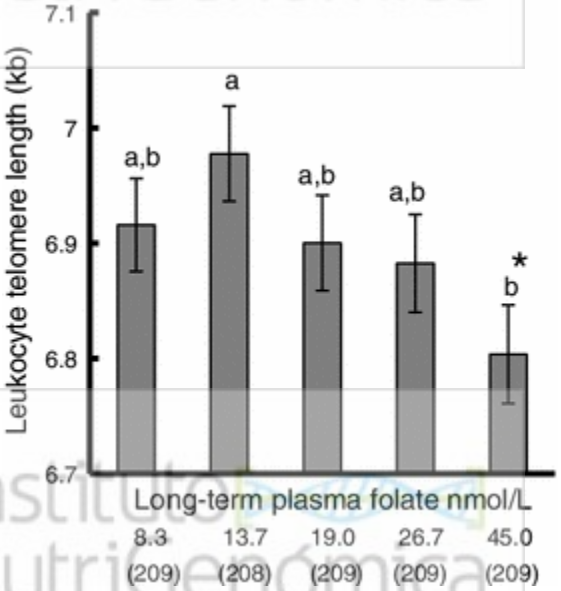
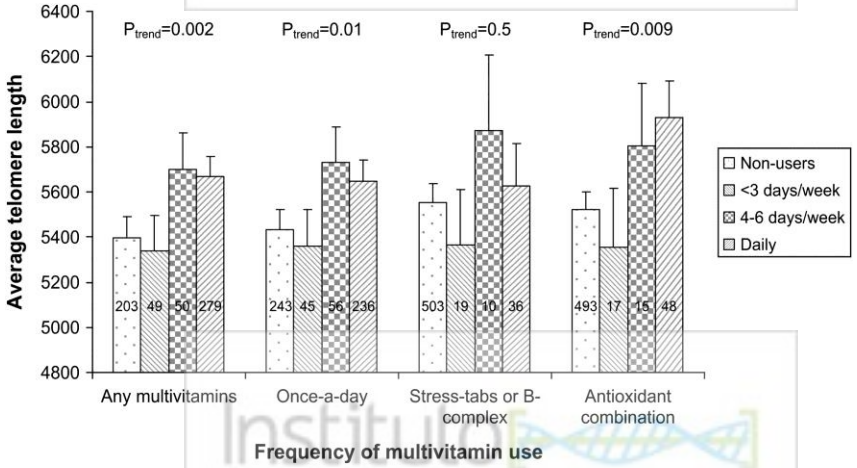


Am J Clin Nutr May 1, 2010 vol. 91 no. 5 1273-1280

Nutrigenómica y longevidad.





EJN March 2015, Volume 54, Issue 2, pp 235–241 y J Clin Nutr June 2009 vol. 89 no. 6 1857-1863

Nutrigenómica y longevidad.

Variables	Model 1 β	Model 2 β	Model 3 β
Individual micronutrient z-scores			
Lutein and zeaxanthin	0.079	0.107	0.120
β-cryptoxanthin	0.060	0.041	0.040
Canthaxanthin	0.018	0.049	0.056
Lycopene	−0.080	−0.064	−0.069
α-carotene	−0.027	−0.020	−0.028
β-carotene	−0.069	−0.065	−0.077
α-tocopherol	−0.012	0.013	0.019
γ-tocopherol	−0.002	0.041	0.044
Vitamin C	0.160	0.152	0.14
Retinol	−0.055	−0.065	−0.058

JAGS Volume 62, Issue 2 February 2014 Pages 222–229

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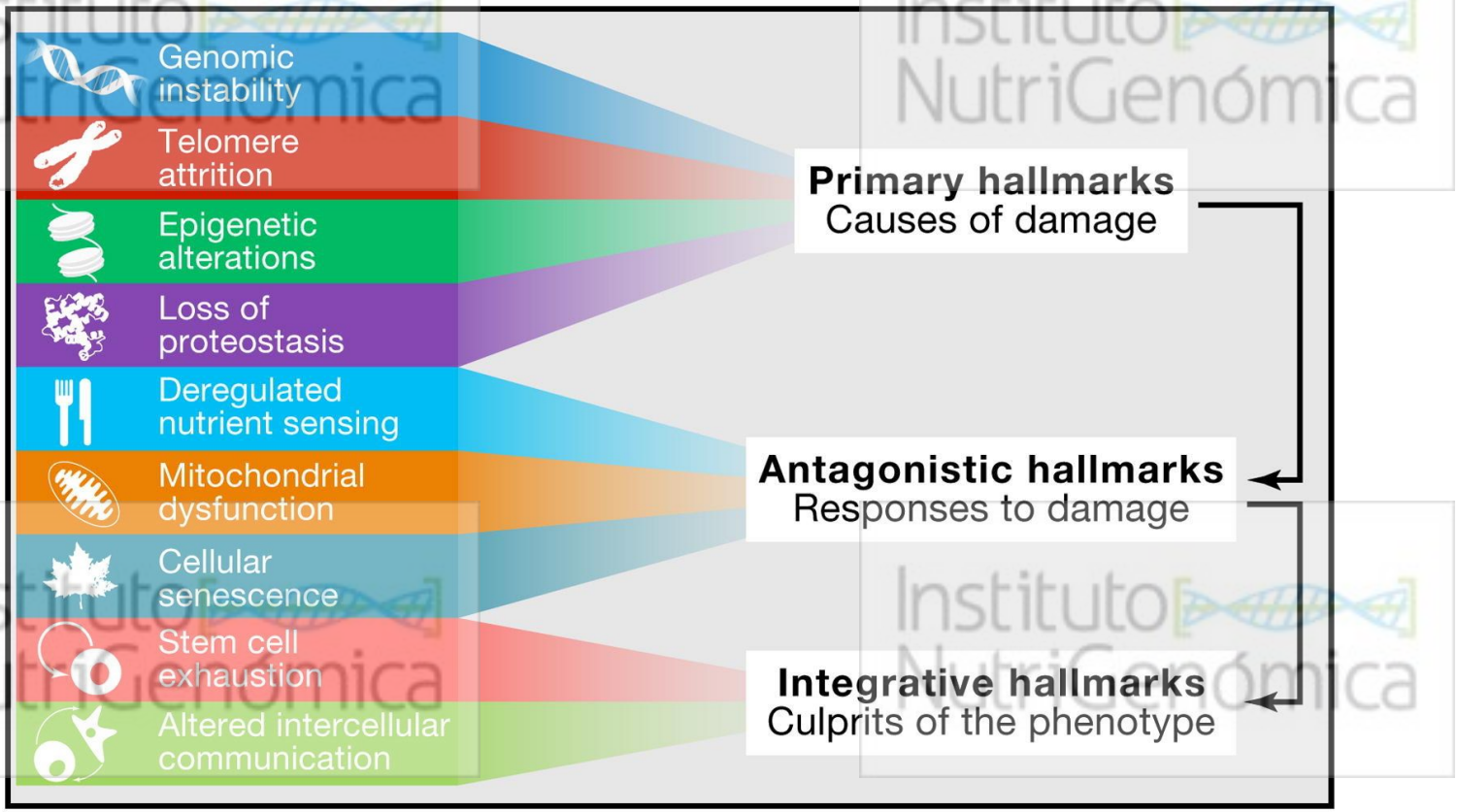

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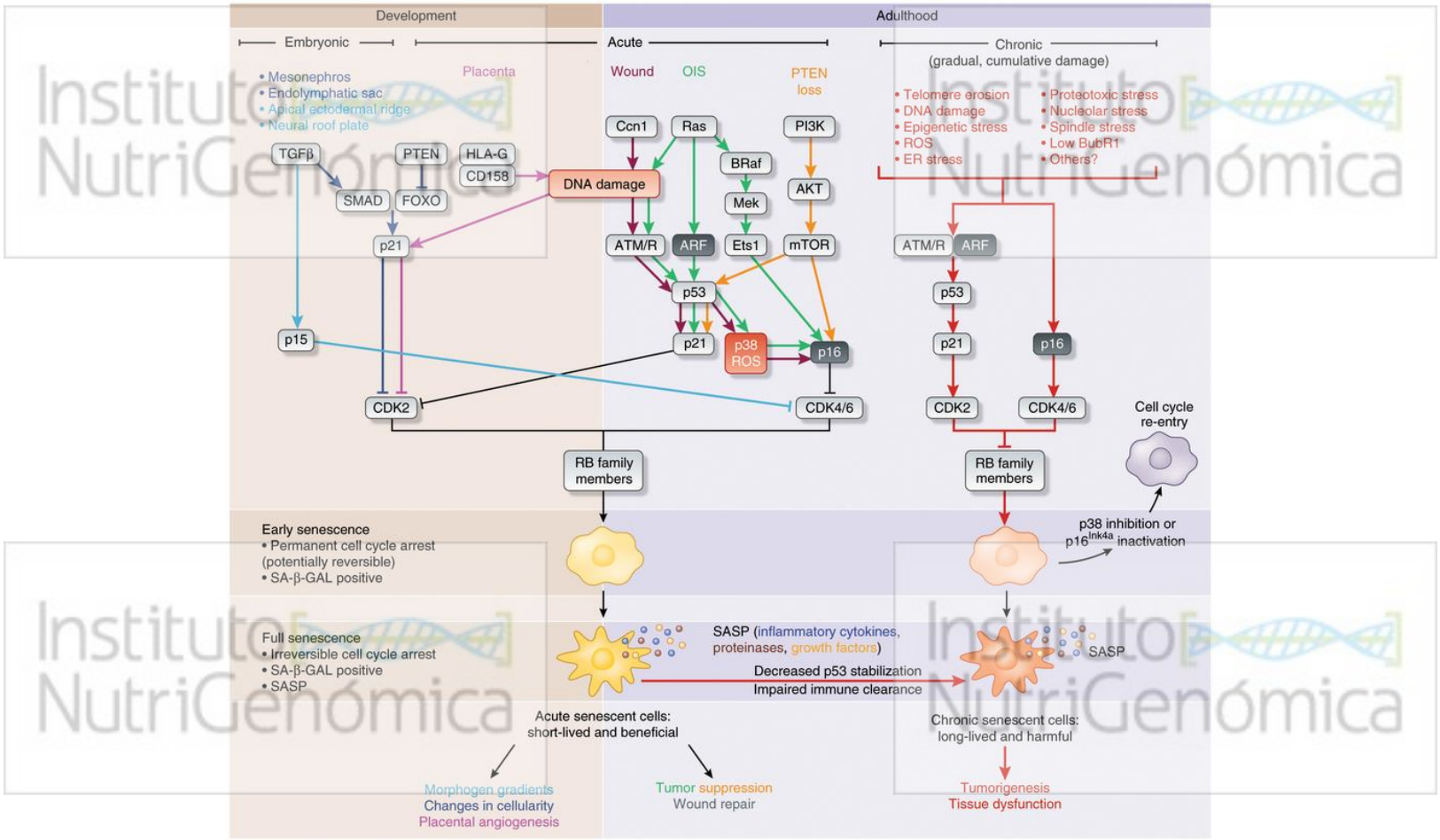
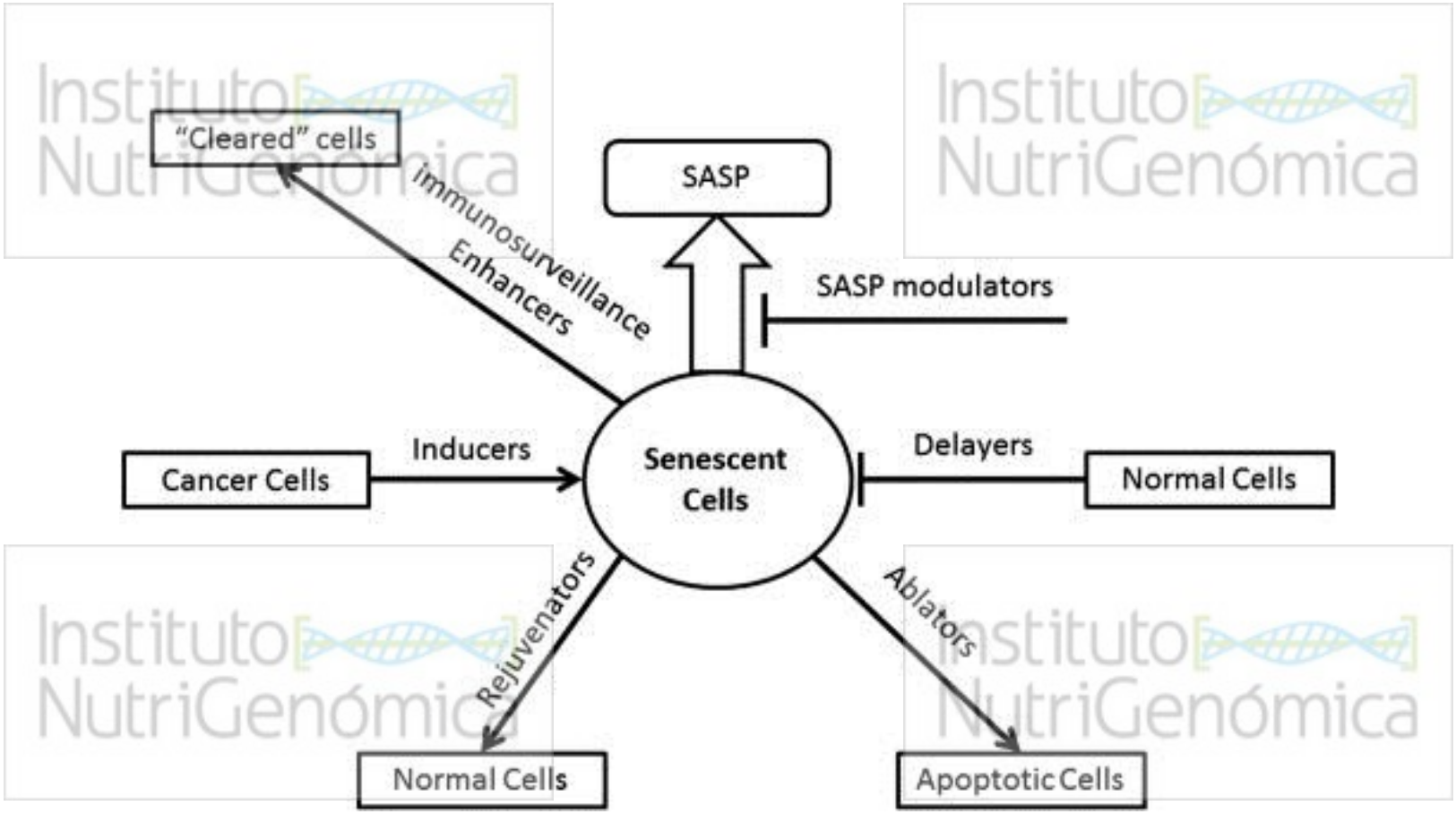


Nature Medicine 21, 1424–1435 (2015)

Nutrigenómica y longevidad.



Nature Medicine 21, 1424–1435 (2015)

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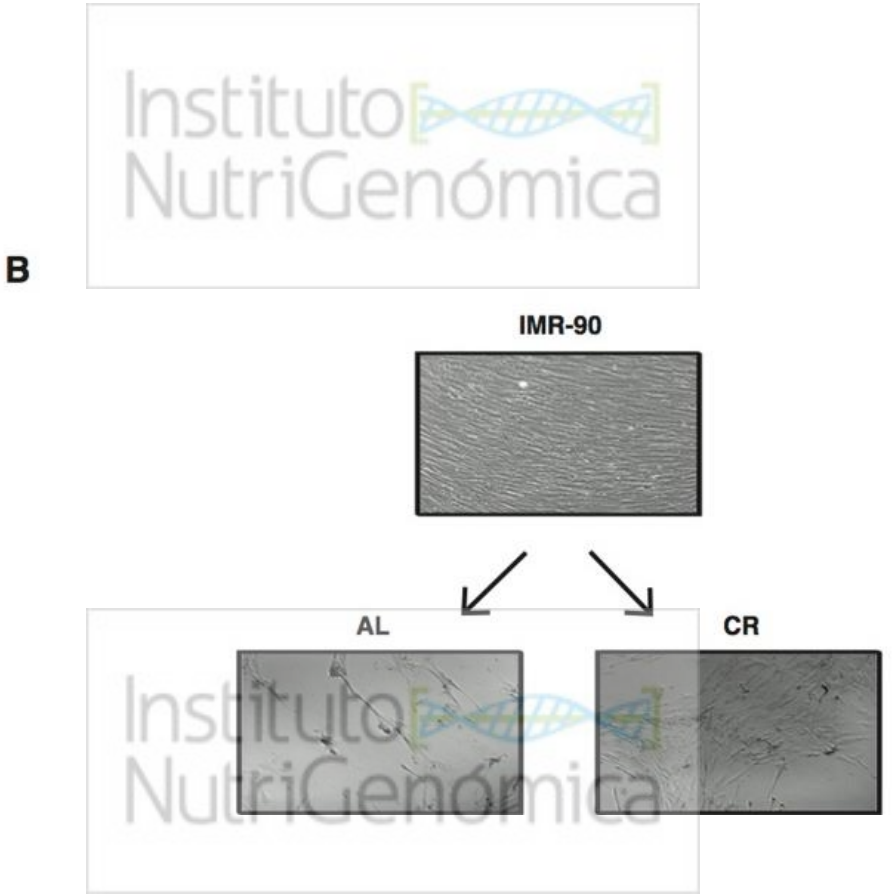
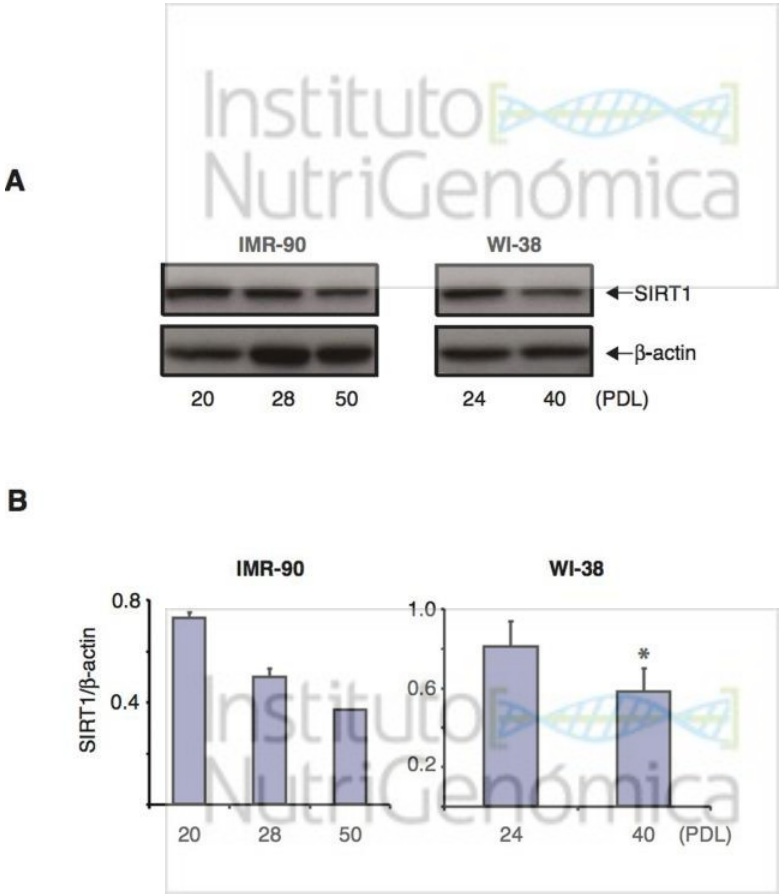
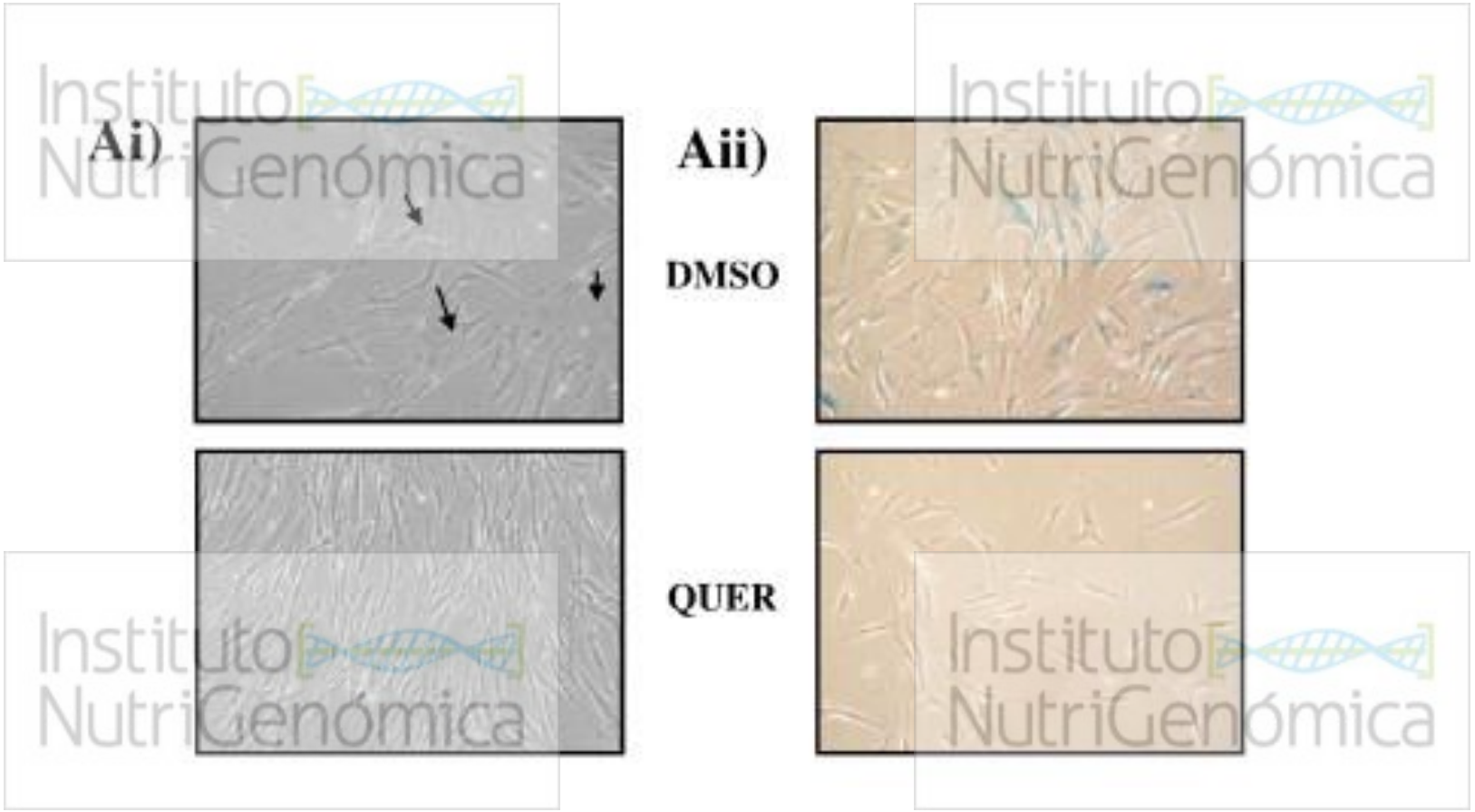




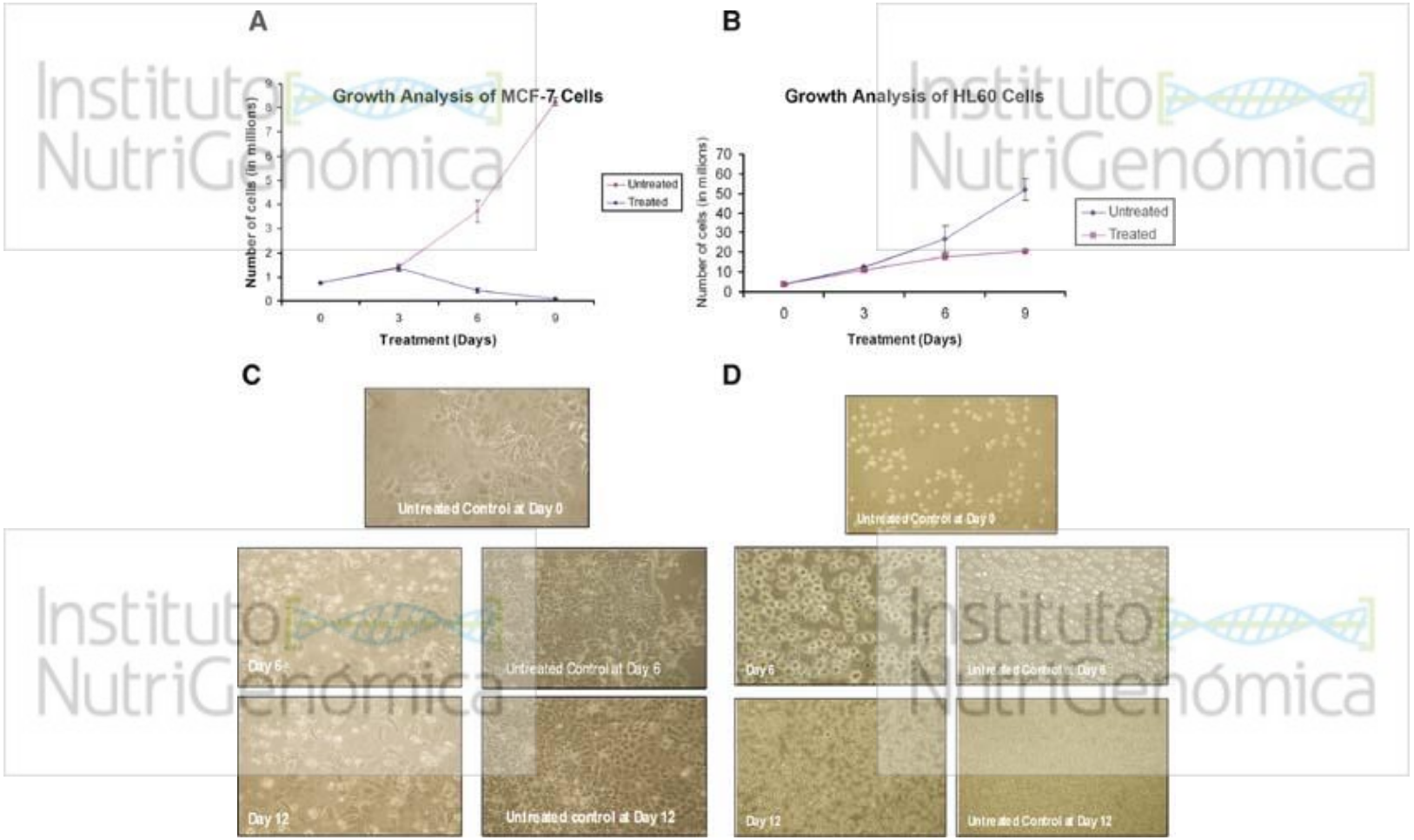
Aging (Albany NY). 2015 Mar;7(3):152-66.

Nutrigenómica y longevidad.



Exp Gerontol. 2010 Oct;45(10):763-71

Nutrigenómica y longevidad.



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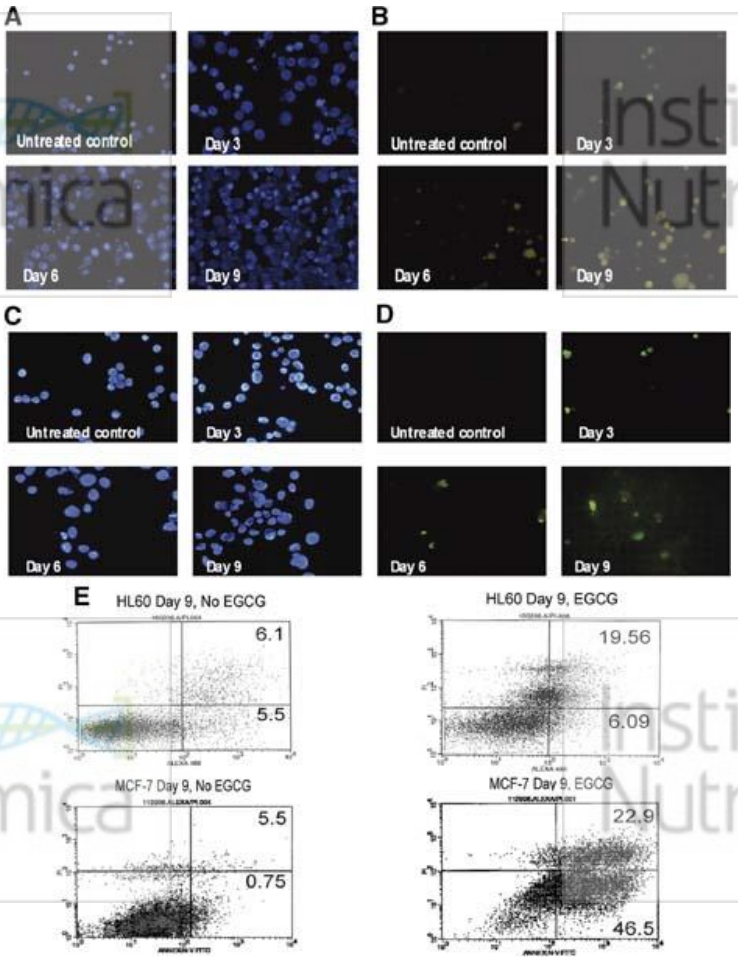

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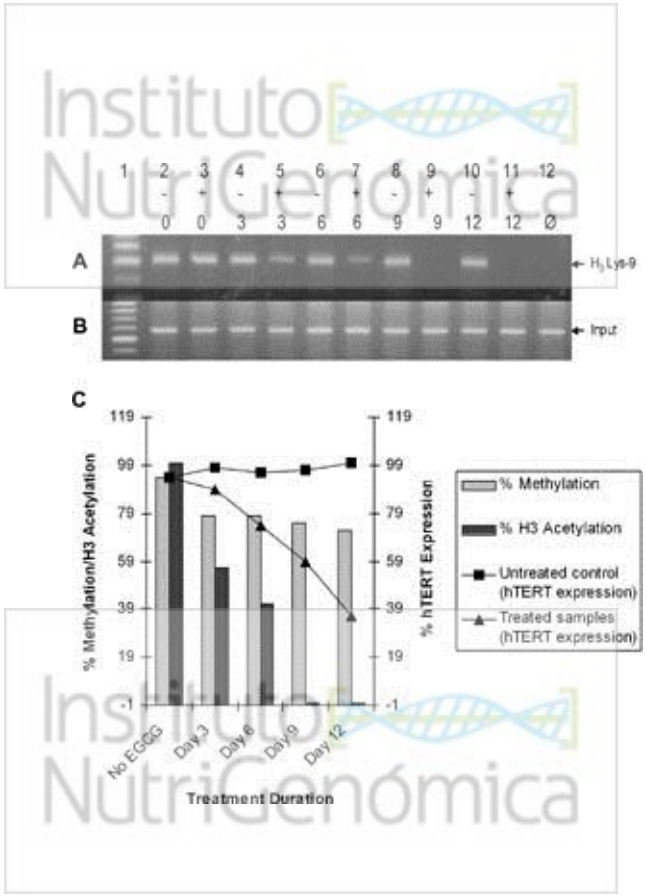

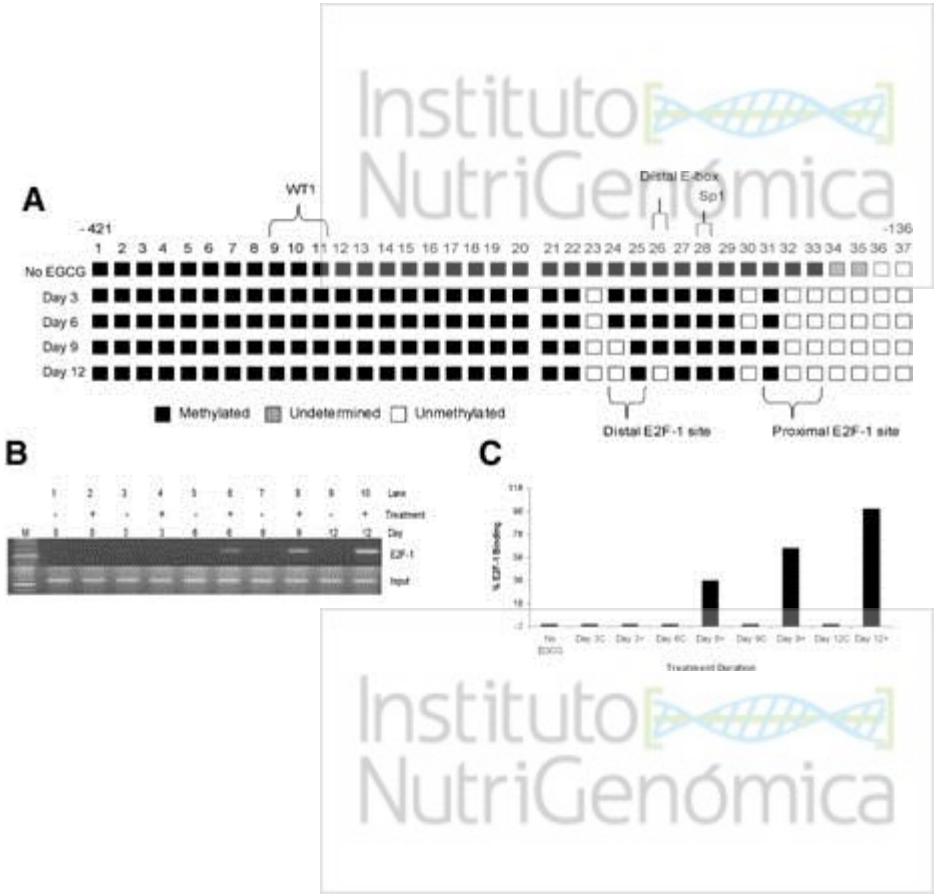

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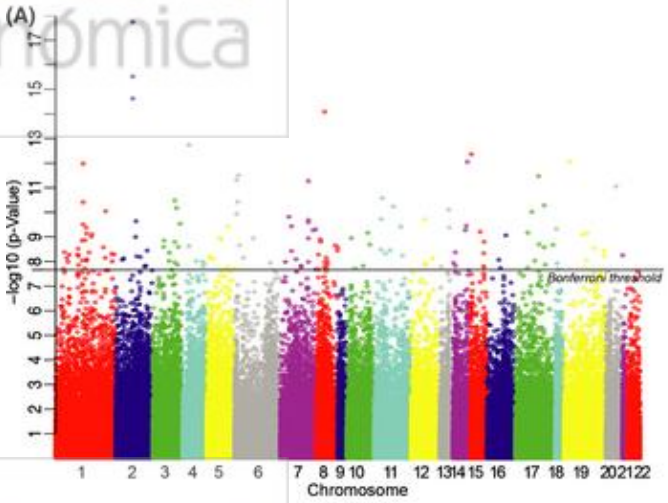
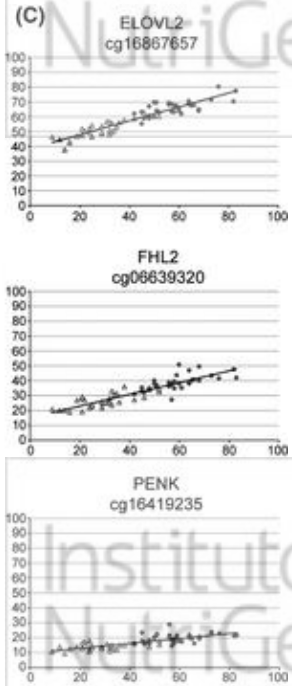


(B)

Rank position	Target ID	Gene name	p-Value	Correlation with age
1	cg06639320	FHL2	1.82E-18	0.91
2	cg16867657	ELOVL2	3.97E-18	0.91
3	cg22454769	FHL2	3.00E-16	0.92
4	cg24079702	FHL2	2.37E-15	0.86
5	cg16419235	PENK	8.10E-15	0.76
13	cg21572722	ELOVL2	4.92E-12	0.89
26	cg24724428	ELOVL2	1.16E-10	0.85
129	cg16219603	PENK	1.05E-08	0.62
149	cg12877723	PENK	1.65E-08	0.63

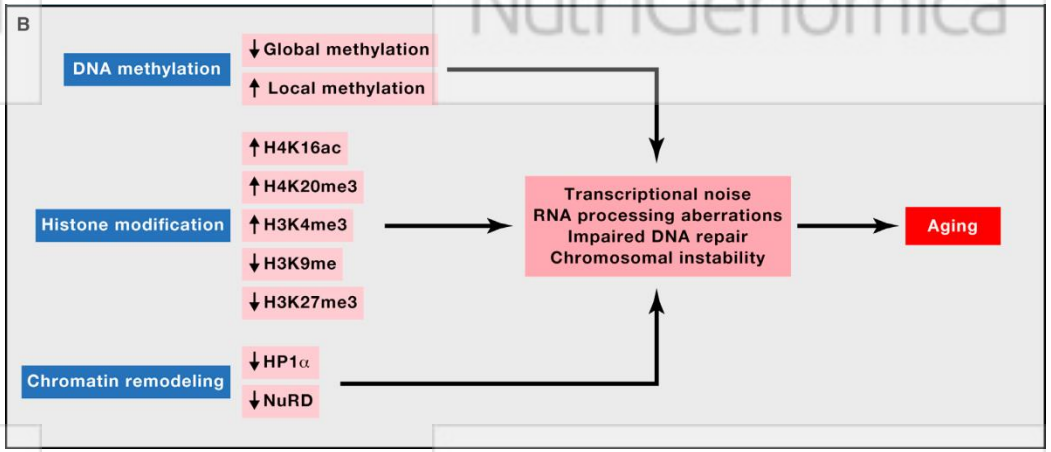


Aging Cell. 2012 Dec;11(6):1132-4.

Nutrigenómica y longevidad.

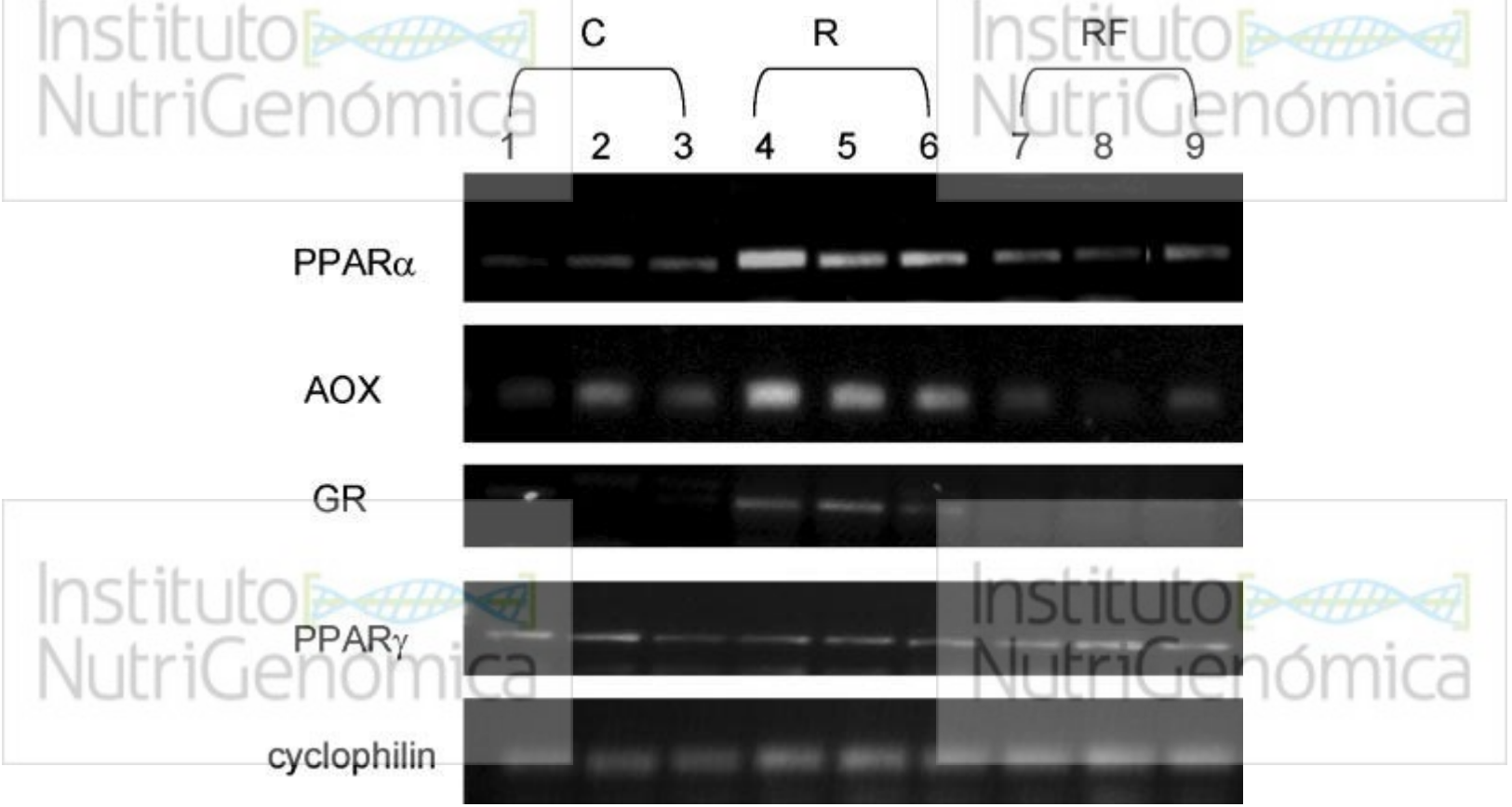
Componentes y prácticas dietarias con acciones epigenéticas

- Metilación
  - Folato y Colina
  - Isoflavonas: genisteína
  - Zinc
  - Selenio
  - Vitamina A
  - Restricción proteica
- Modificación de histonas
  - Butirato
  - Isotiocianatos
  - Folato y colina
  - Ácido retinoico
  - Restricción proteica
- RNAs no codificantes
  - Zinc
  - Vitamina D



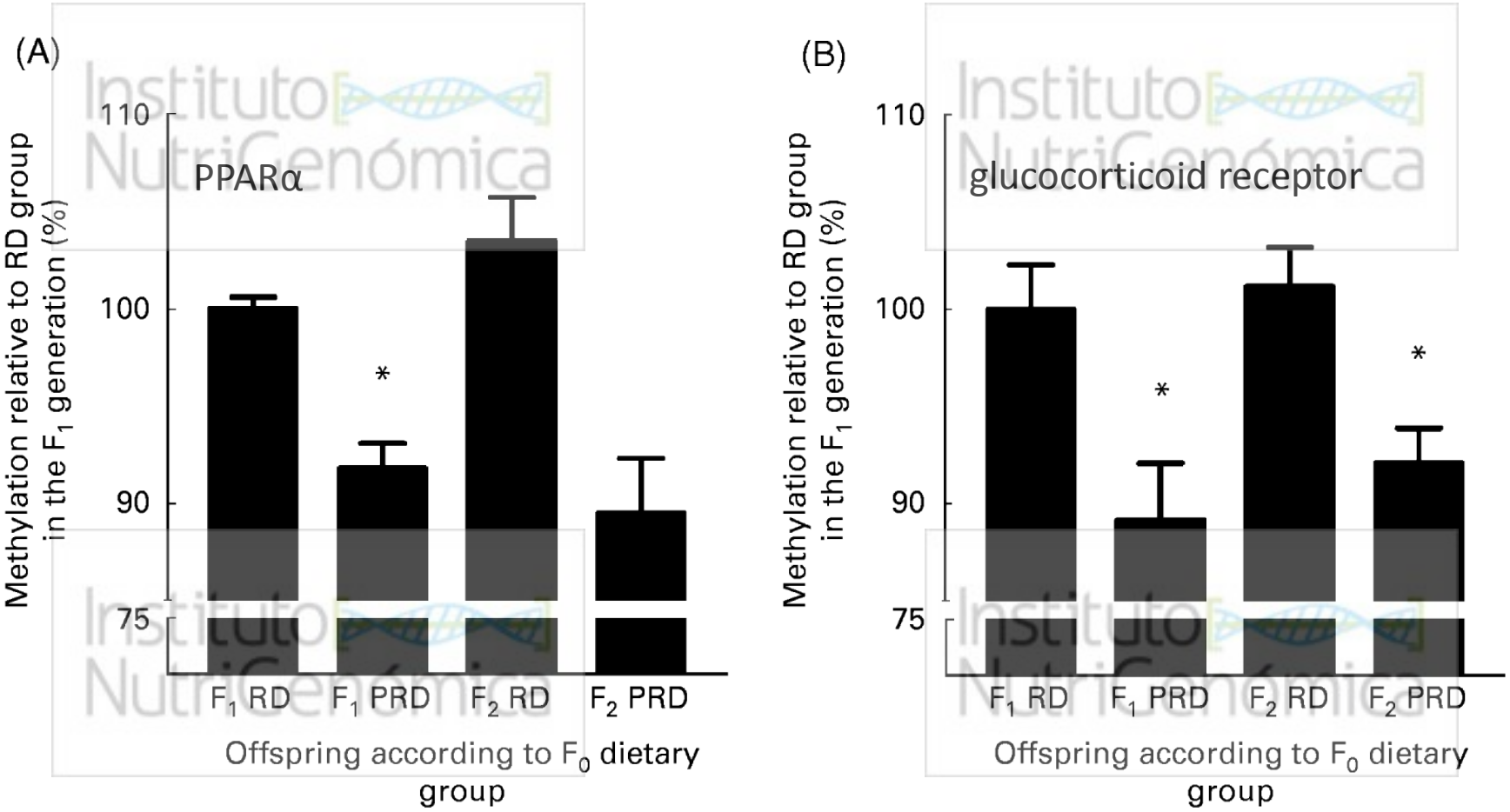
Cell 2013 153, 1194-1217

Nutrigenómica y longevidad.



J Nutr. 2005 Jun;135(6):1382-6.

Nutrigenómica y longevidad.



Br J Nutr. 2007 Mar; 97(3): 435–439.

Nutrigenómica y longevidad.