

Dairy protein and muscle strength; Implications for fall prevention.

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ABC
NEWS ONLINE

Wednesday, May 15, 2002.

Print Email

A grey Australia puts the pinch on future spending

Tighten your belts Australia, our greying population will cost us dearly.

This chilling warning was an essential component of Treasurer Peter Costello's seventh Federal Budget, delivered last night.

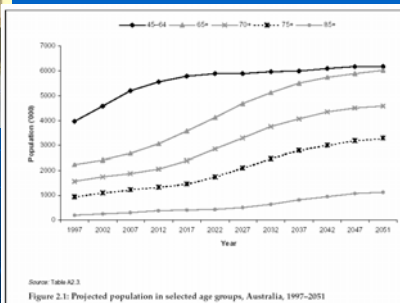
Outlined in the Intergenerational Report, which looks at the shape of Australia in 2042, the Government predicts spending on health, aged care and aged pensions will rapidly escalate.

Released with the Budget, the report is required by the Government's Charter of Budget Honesty and assesses the sustainability of policies over the next 40 years.



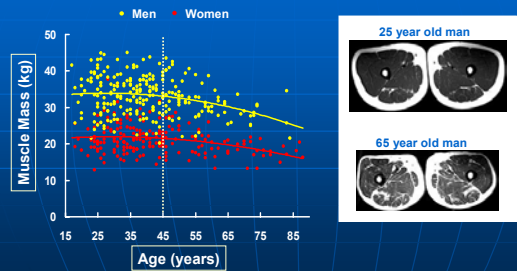
Australia's ageing population could see future budget blowouts.

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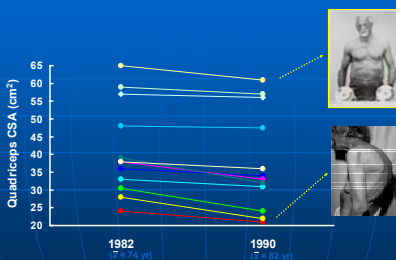
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Influence of age on muscle mass



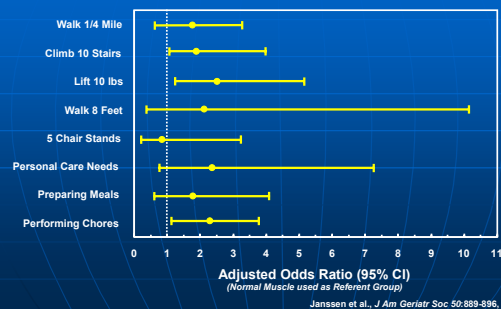
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Longitudinal changes in muscle mass



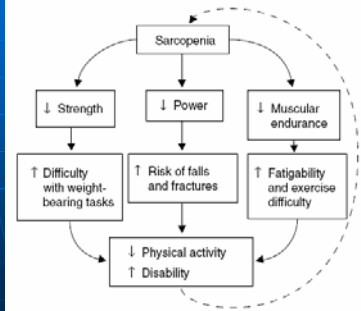
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Association between severe sarcopenia and physical function in older women



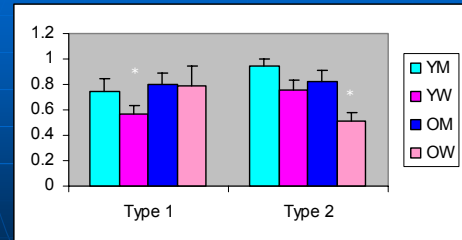
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Vicious Cycle of Sarcopenia



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No loss of fibre strength with age



Trappe S et al *J. Physiol.* 552: 47-58, 2003.

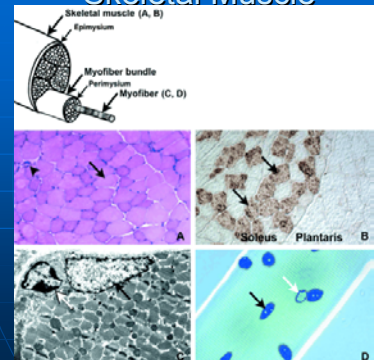
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Muscle plasticity



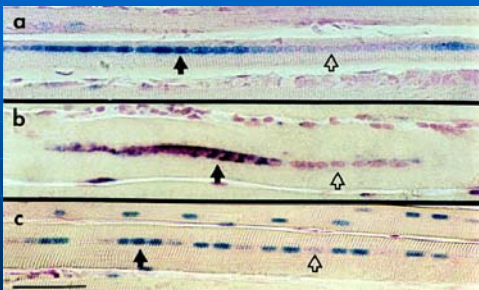
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Skeletal Muscle



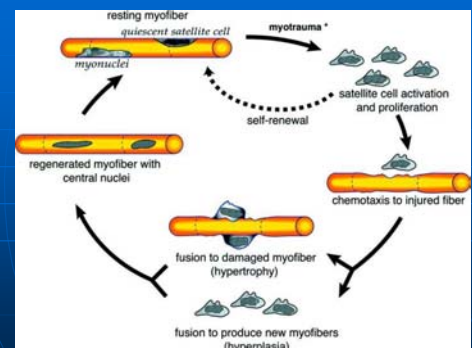
10

Multinucleated myofibres



Newlands S. et al. *Genes & Development* 12: 2748-2758, 1998

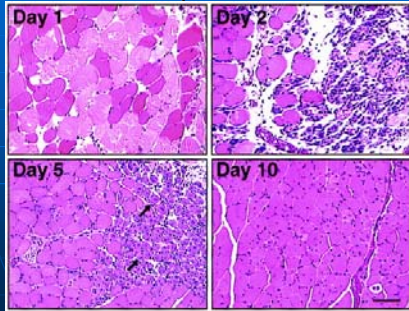
11



Hawke & Garry *J App Physiol.* 91: 534-551, 2001.

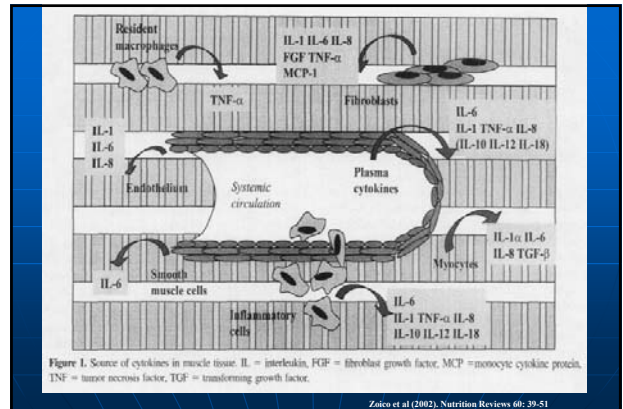
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Muscle recovery following cardiotoxin exposure



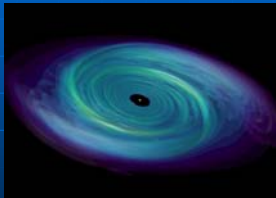
Garry DJ et al PNAS 97: 5416-21, 2000

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Zaico et al (2002), Nutrition Reviews 60: 39-51

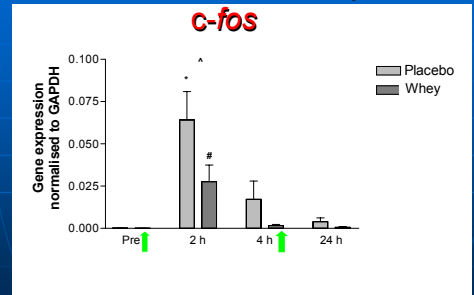
The Interplay Between Chronic Inflammation & Acute Phase Response



- As yet there is no data that demonstrates whether supplemental protein ingestion, following eccentric exercise is able to favourably impact on the chronic and acute-phase

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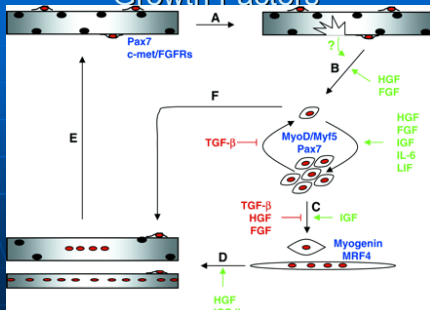
Muscle Inflammation & Dairy Protein



Mathers et al, Unpublished

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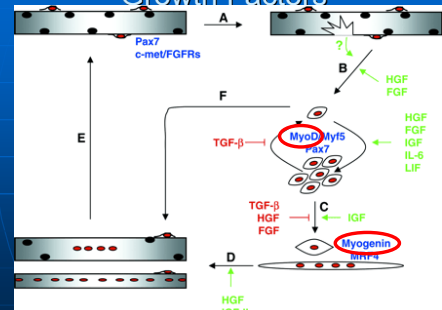
Myogenic Regulatory Factors (MRFs) & Growth Factors



Charge & Rudnicki. *Physiol. Rev.* 84: 209-38, 2004.

17

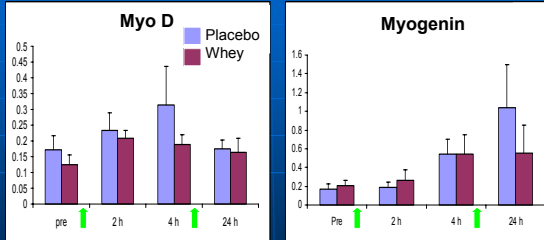
Myogenic Regulatory Factors (MRFs) & Growth Factors



Charge & Rudnicki. *Physiol. Rev.* 84: 209-38, 2004.

18

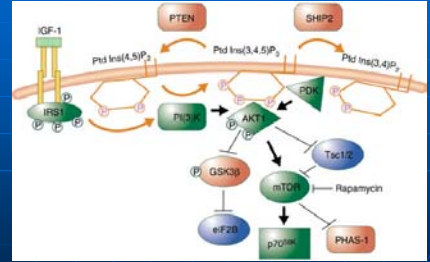
Myogenic Factors and Dairy Protein



Carey et al, Unpublished data

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Growth Factor Signalling Pathways



Glass D. *Nature Cell Biology* 5: 87 - 90, 2003.

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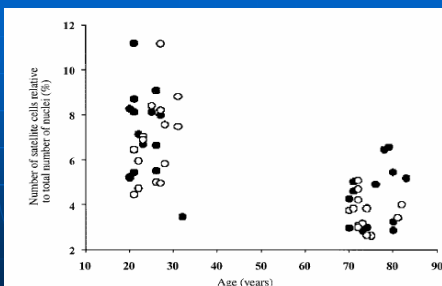
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Muscle Biopsies



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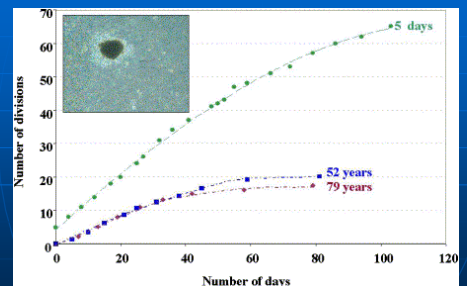
1. Reductions in satellite cell number



Kadi et al, *Muscle & Nerve* 29: 120-27, 2004

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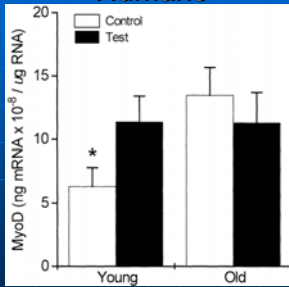
2. Reduced Proliferative Potential



Bortoli et al *Gene* 321: 145-154, 2003.

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Acute MyoD Response in Older Humans



Hameed et al. J. Physiol. 547: 247-54, 2002.

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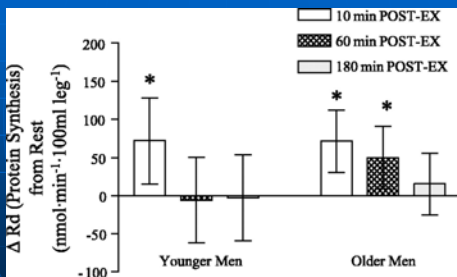
Genetic basis of impaired proliferation is poorly understood

Expression Profiles		Proliferative stages		
		Early	Proneurotic	Senescent
NB 52Y 79Y	Increased expression only in the 79-year-old donor	2 ID 0 No ID	1 ID 0 No ID	2 ID 2 No ID
	Decreased expression only in the 79-year-old donor	11 ID 9 No ID	3 ID 6 No ID	3 ID 2 No ID
NB 52Y 79Y	Increased expression in adult vs new born donors	9 ID 8 No ID	23 ID 24 No ID	6 ID 5 No ID
	Decreased expression in adult vs new born donors	67 ID 84 No ID	18 ID 59 No ID	5 ID 5 No ID

Bortoli et al. Gene 321: 145-154, 2003.

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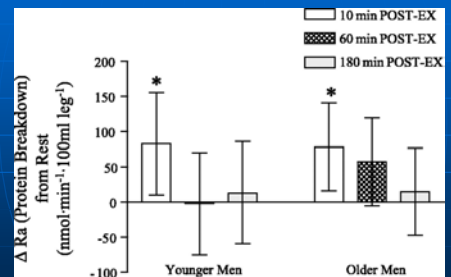
Protein Synthesis – Post-Exercise



Sheffield-Moore et al. Am. J. Physiol. Endo. Metab. 287:E513-E522, 2004

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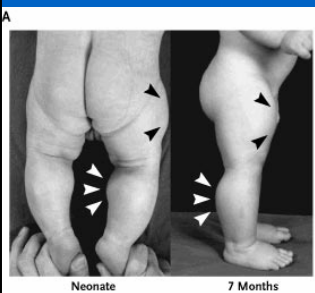
Protein Breakdown – Post-Exercise



Sheffield-Moore et al. Am. J. Physiol. Endo. Metab. 287:E513-E522, 2004

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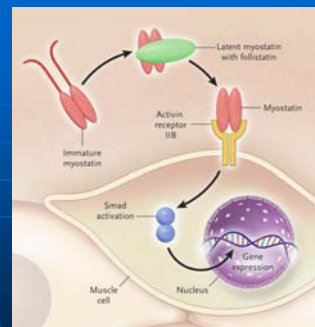
Muscle Atrophy Gene - Myostatin



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Shuelke et al. New Eng J. Med. 350: 2682-88, 2004

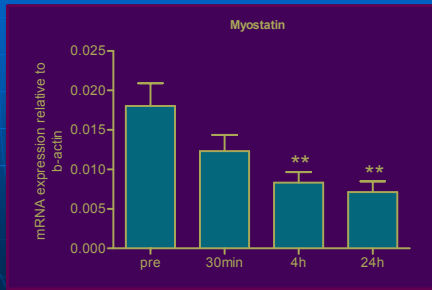
Myostatin Function



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McNally New Eng J Med 350: 2642-43, 2004

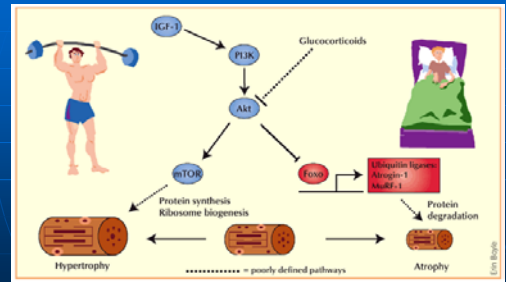
Myostatin mRNA response to resistance exercise



Carey et al, Unpublished data

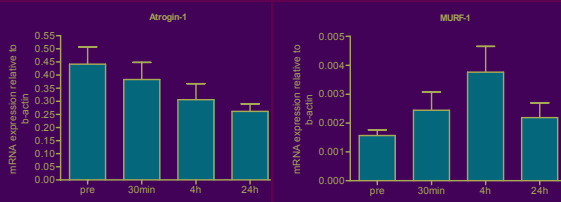
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Atrogenic Pathway



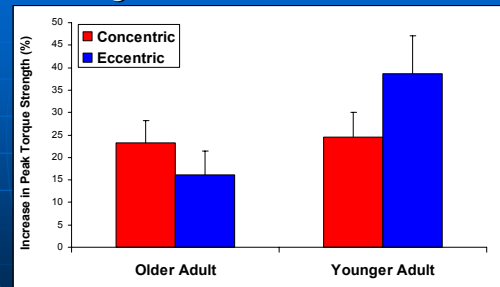
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Atrogin-1 and MURF-1



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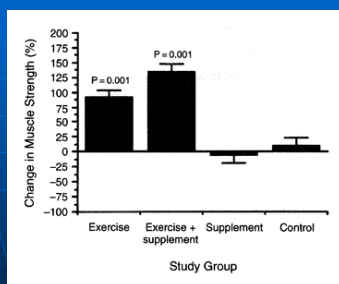
Strength Gains in 12 Weeks



Farnfield et al, Unpublished Data

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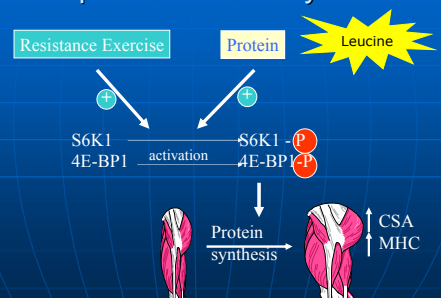
Exercise training in the very old: 85+ yrs



Fiatrone MA et al *New Eng. J. Med.* 330: 1769-75, 1994

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Cross-over between exercise and protein availability



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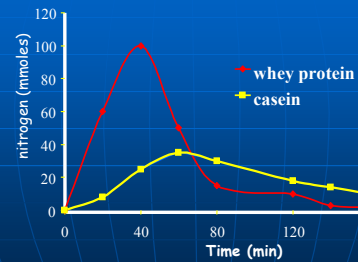
Leucine Comparisons

Protein Source	Leucine (mg/g protein)
b-Lactoglobulin	136
lactalbumin	104
BSA	104
Immunoglobulins	96
GMP	170
Lactoferrin	106
Casein	95

Harper WJ, 2000

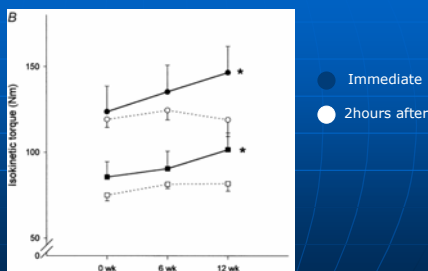
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Fast versus slow



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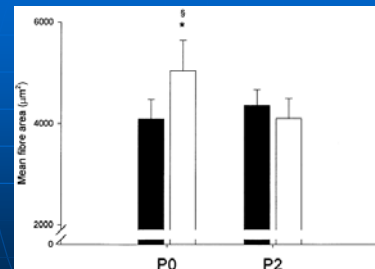
Older males – Impact of Timing



Esmark et al. J. Physiol. 535: 301-311, 2001

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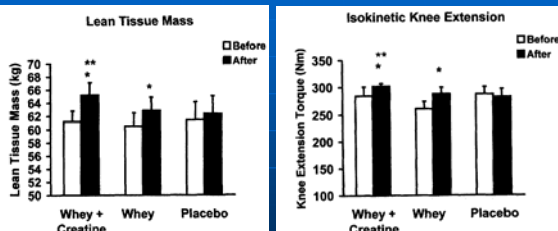
Changes in Muscle Characteristics



Esmark et al. J. Physiol. 535: 301-311, 2001

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In young males?

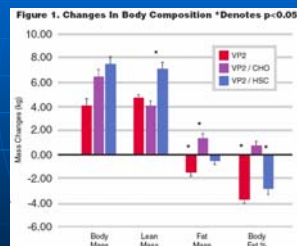


Burke et al. Int. J. Sport Nutr. Exerc. Metab. 11: 349-64, 2001

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In bodybuilders...

The effect of VP2 whey isolate, micronized creatine and resistance training on fibre characteristics, strength and body composition



11 week intervention in resistance-trained men.

Strength gains (1RM max)
 Creatine/carbohydrate 284%
 Whey isolate 308%
 Creatine/Whey isolate 371%
 versus placebo

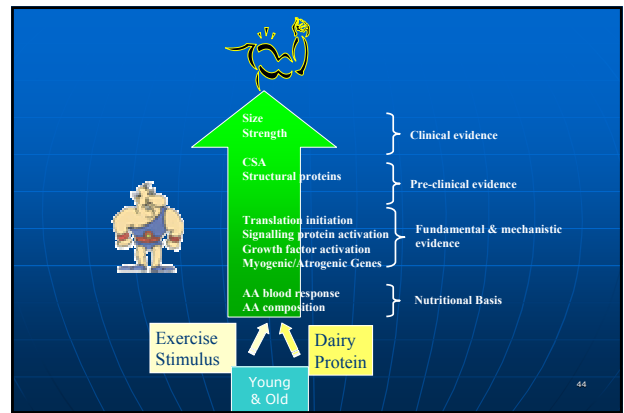
Type 2 muscle fibre area
 Creatine/carbohydrate 793%
 Whey isolate 543%
 Creatine/Whey isolate 1230%
 versus placebo

Cribb et al 2003 Experimental Biology meeting

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THAT'S IT FOLKS!!

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Thanks



muscle
by
Tony

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