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Fatty acid composition of certified organic, conventional and omega-3 eggs

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Background – Organic foods of plant origin are reported to have lower nitrate and higher vitamin C content than their conventional counterparts. Relatively less is known about the composition of animal-derived organic foods.
Objective – To compare the total fat content, fatty acid composition, and physical characteristics of commercially available conventional, certified organic, and omega-3 eggs.
Design – A total of 180 eggs [conventional (n=96), organic (n=72) and omega-3 (n=12)] were purchased from supermarkets and organic food outlets in the Sydney metropolitan area. After the assessment of egg characteristics, total fat was extracted and gas chromatography was used to determine the fatty acid composition of yolks.
Outcomes – Organic egg yolk contained a higher percentage of palmitic and stearic acids than conventional yolk ($P < 0.05$) with no differences observed in the monounsaturated or polyunsaturated fatty acid compositions. Compared with organic and conventional eggs, omega-3 egg yolk contained lower percentages of myristic and palmitic acids, and higher omega-3 fatty acids. In a sub-analysis of conventional egg types, the percent of stearic acid in "cage" egg yolk was significantly lower ($P < 0.05$) as compared to "barn-laid" and "free-range" eggs. "Cage" eggs had a significantly lower ($P < 0.05$) percentage of arachidonic acid compared to "barn-laid" eggs.
Conclusion – With regard to organic or conventional methods of production, the differences in saturated fatty acids observed in the present study are small and unlikely to have any significant metabolic effect on the consumer. Omega-3 egg consumption has the potential to confer health benefits associated with an increased omega-3 fatty acid intake.

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Saturated fatty acids are potent activators of the nutrient-sensitive mTOR pathway in skeletal muscle cells

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Background – The mammalian target of rapamycin (mTOR) is a central integrator of signals arising from growth factors, nutrients and cellular energy metabolism. In situations of nutrient over-supply, chronic stimulation of mTOR and the downstream target p70 S6 kinase (S6K1), has been linked to impaired insulin sensitivity. Despite the well-established activation of the mTOR pathway by amino acids, few studies have addressed the impact of saturated fatty acids on mTOR signalling.
Objective – To determine the impact of a saturated fatty acid (Palmitic acid, C16:0) on the activation of p-mTOR (Ser2448) and p-p70S6K1 (Thr389) in L6 myocytes.
Design – Differentiated L6 cells were treated with 0.1 and 0.5mM palmitic acid for 2 and 6 hours (n=4). Western-blotting with phosphorylation specific antibodies was used to measure mTOR and p70S6K signalling.
Outcomes – Palmitic acid (0.1 and 0.5mM) resulted in a ~ 2-fold increase in p-mTOR (Ser2448), which was sustained for 6 hours, where p70S6K (Thr389) phosphorylation increased within 2 hours of treatment (~ 2-fold), returning to baseline levels by 6hrs.
Conclusions – Previous studies have identified mTOR-p70S6K signalling as a possible regulator of insulin sensitivity. Heightened mTOR signalling has been reported in response to both hyperglycaemia and hyperaminoacidaemia, yet whether mTOR is acutely regulated fatty acids in skeletal muscle is not known. The results of the current study demonstrate rapid mTOR phosphorylation in the presence of physiological concentrations of the saturated fatty acid, palmitic acid. Further studies are required to assess whether the activation of mTOR and p70S6K persists with chronic exposure (24 hr) and impairs insulin signalling.