PPARα activation influences plasma one-carbon metabolites and B-vitamin status in rats

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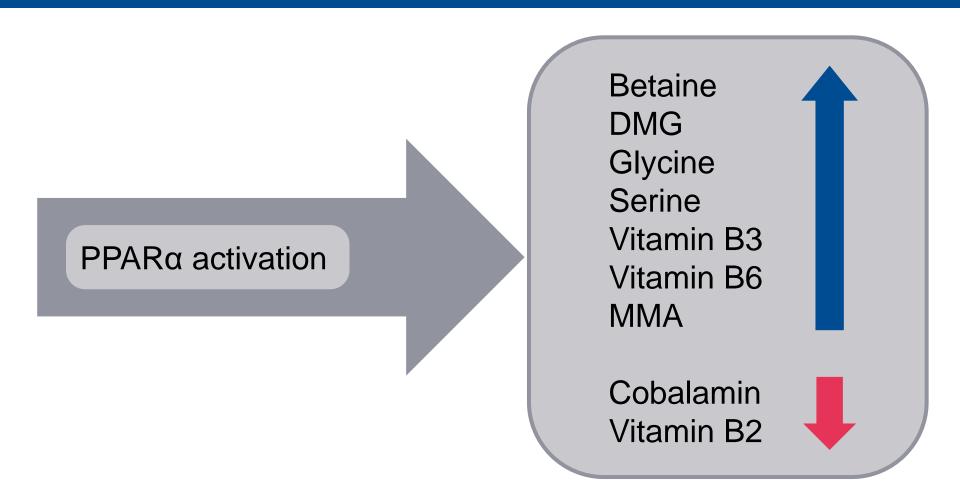
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Key findings PPARα activation influences plasma metabolites



PPARs

Peroxisome proliferator-activated receptors

3 subtypes:

PPARα, PPARγ, PPARβ/δ

Energy metabolism

PPARα involved in one-carbon metabolism

- DMGDH ↓
- SARDH |
- GNMT ↓

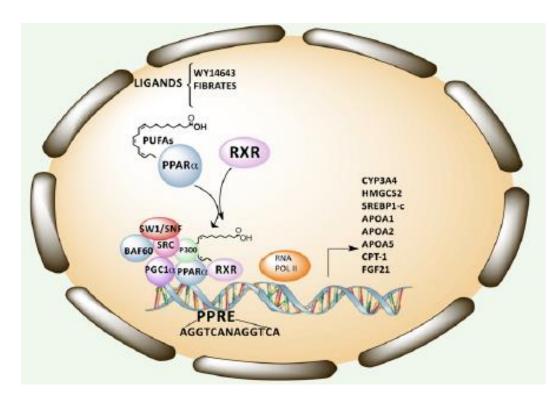


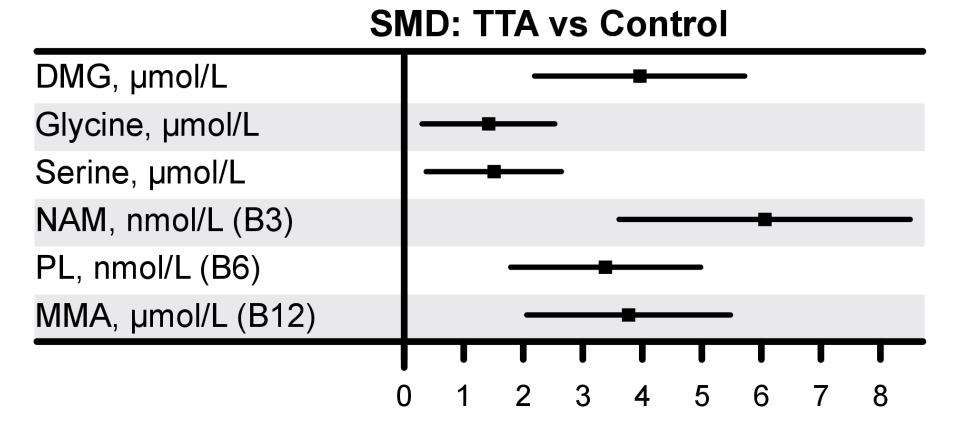
Figure: Contreras, A, et al. Adv Nutr 2013.

Sheikh, K. Am J Physiol Endocrinol Metab(2007).

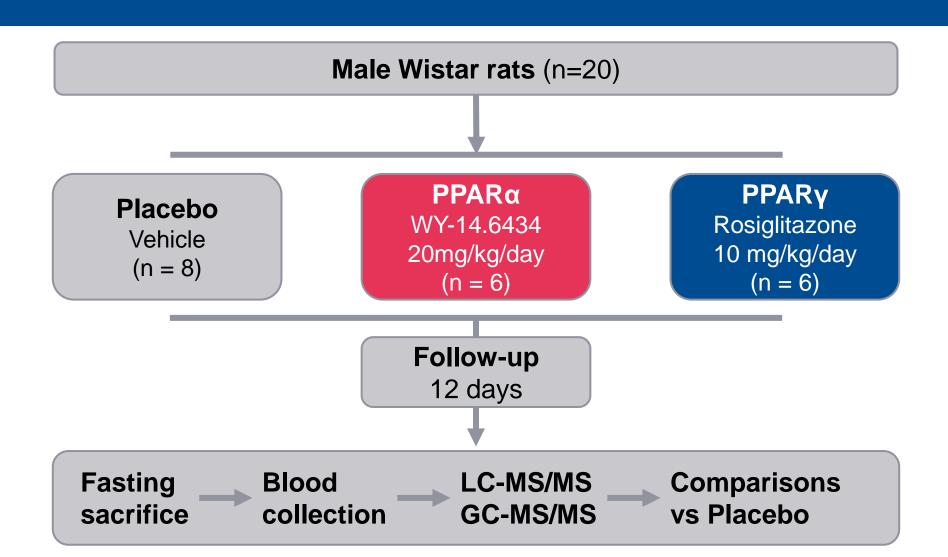
Chu, R. Mol Cell Biol(2004).

Wrzesinski, K. J Proteomics. (2013)

PPAR activation by a tetradecylthioacetic acid (TTA) increased plasma one-carbon and B-vitamins in rats



Study design



Effect of PPAR activation One-carbon metabolites and B-vitamins

	Placebo (n = 8)	PPARα (n = 6)	PPARγ (n = 6)	SMD vs Placebo (■α, ■γ)	
Choline, µmol/L	10.7 (1.10)	10.0 (1.15)	9.07 (1.15)		1 0 0
Betaine, µmol/L	103 (1.25)	167 (1.08)	92.0 (1.23)		
DMG, µmol/L	12.5 (1.26)	29.6 (1.32)	10.0 (1.61)	L	
Glycine, µmol/L	422 (1.17)	873 (1.20)	484 (1.18)		
Serine, µmol/L	290 (1.13)	415 (1.20)	356 (1.09)		
Riboflavin, nmol/L	62.3 (1.19)	51.0 (1.26)	54.0 (1.18)		
FMN, nmol/L	33.1 (1.23)	20.1 (1.23)	33.3 (1.12)		
NA, nmol/L	71.4 (1.21)	83.1 (1.24)	68.6 (1.17)		
NAM, nmol/L	1535 (1.28)	8942 (1.35)	1432 (1.34)		
PA, nmol/L	64.8 (1.25)	62.0 (1.20)	74.2 (1.19)		
PL, nmol/L	298 (1.14)	499 (1.14)	274 (1.25)		
PLP, nmol/L	507 (1.13)	712 (1.24)	511 (1.22)		
mTHF, nmol/L	140 (1.32)	119 (1.59)	135 (1.20)		
Cobalamin, pmol/L	2104 (1.08)	1784 (1.12)	1974 (1.06)		
MMA, µmol/L	0.46 (1.22)	0.96 (1.36)	0.42 (1.22)		

Values are geometric means (Multiplicative SD)

Conclusion

Activation of PPARα, but not PPARγ, influences plasma concentration of metabolites along the choline oxidation pathway and markers of B-vitamin status in rats.

