

## **PPARG (Pro12Ala) genetic variant and risk of T2DM: a systematic review and meta-analysis**

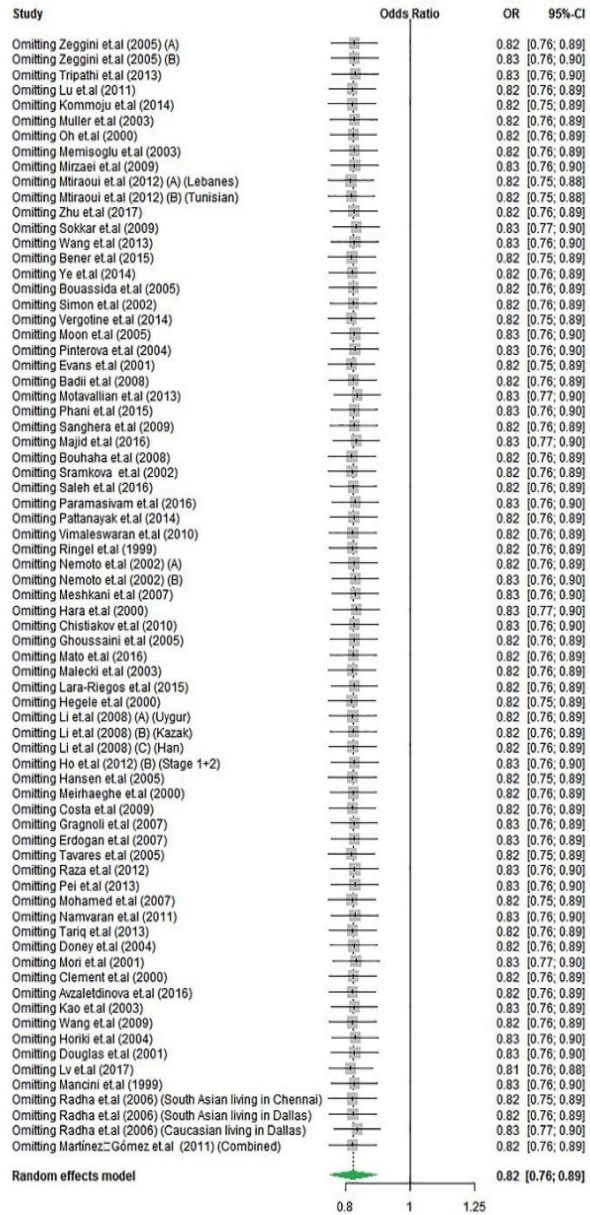
Negar Sarhangi <sup>1</sup>, Farshad Sharifi <sup>2</sup>, Leila Hashemian <sup>3</sup>, Maryam Hassani Doabsari <sup>3</sup>, Katayoun Heshmatzad <sup>3</sup>, Marzieh Rahbaran <sup>3</sup>, Seyed Hamid Jamaldini <sup>3</sup>, Hamid Reza Aghaei Meybodi <sup>1,4</sup>, Mandana Hasanzad <sup>1,3,\*</sup>

<sup>1</sup> Personalized Medicine Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran 1411413137, Iran

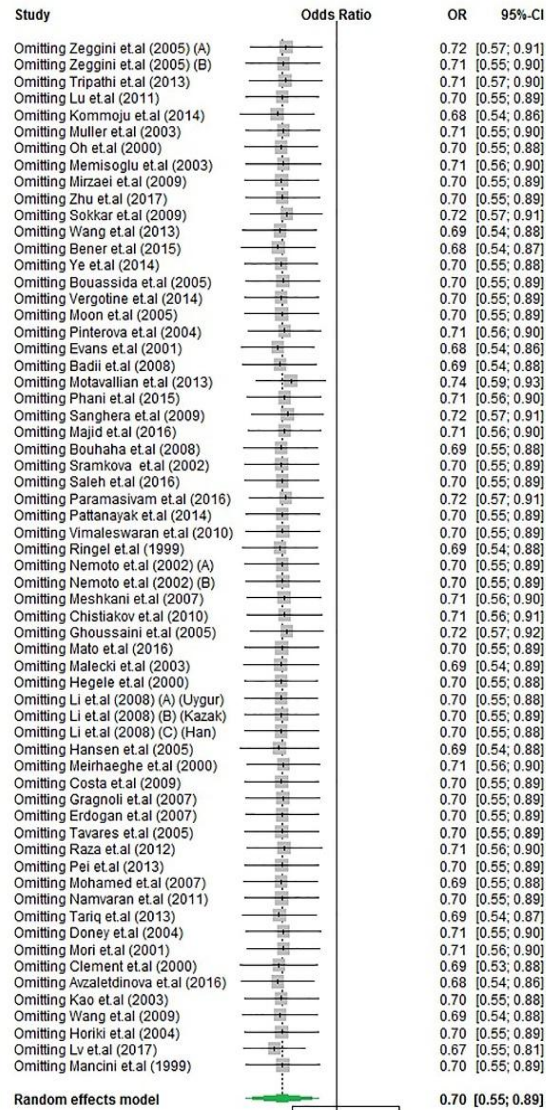
<sup>2</sup> Elderly Health Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran 1411413137, Iran

<sup>3</sup> Medical Genomics Research Center, Tehran Medical Sciences, Islamic Azad University, Tehran 1916893813, Iran

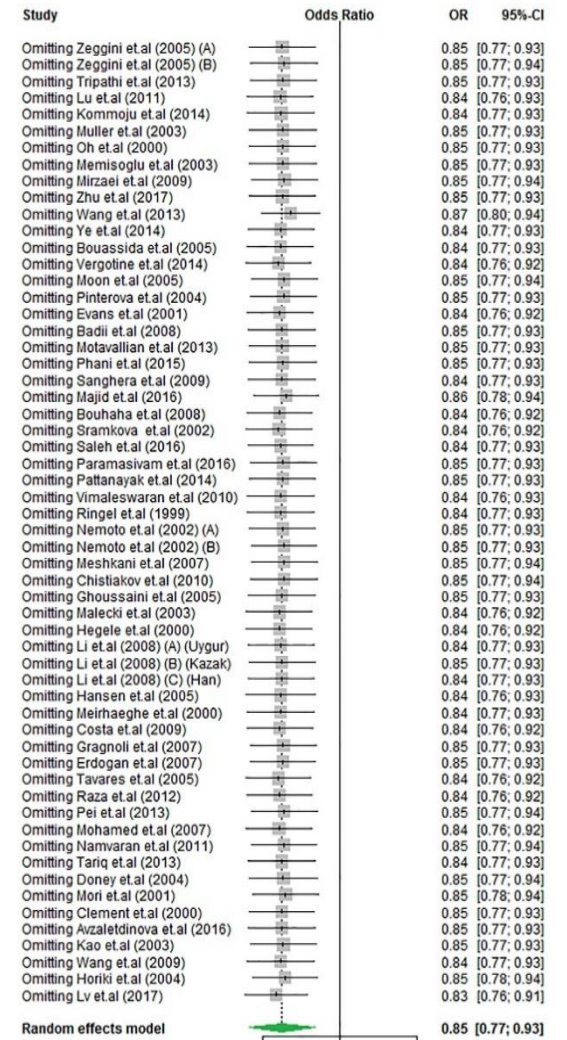
<sup>4</sup> Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran 1411413137, Iran



A



B





Study	Odds Ratio	OR	95%-CI
Omitting Zeggini et al (2005) (A)		0.83	[0.70; 0.98]
Omitting Zeggini et al (2005) (B)		0.82	[0.70; 0.97]
Omitting Tripathi et al (2013)		0.82	[0.70; 0.97]
Omitting Lu et al (2011)		0.82	[0.69; 0.96]
Omitting Kommoju et al (2014)		0.79	[0.67; 0.94]
Omitting Muller et al (2003)		0.82	[0.70; 0.97]
Omitting Oh et al (2000)		0.81	[0.69; 0.96]
Omitting Memisoglu et al (2003)		0.82	[0.70; 0.97]
Omitting Mirzaei et al (2009)		0.81	[0.69; 0.96]
Omitting Zhu et al (2017)		0.82	[0.69; 0.96]
Omitting Sokkar et al (2009)		0.82	[0.70; 0.97]
Omitting Wang et al (2013)		0.81	[0.68; 0.95]
Omitting Bener et al (2015)		0.80	[0.68; 0.95]
Omitting Ye et al (2014)		0.82	[0.69; 0.96]
Omitting Bouassida et al (2005)		0.82	[0.70; 0.97]
Omitting Vergotine et al (2014)		0.82	[0.69; 0.96]
Omitting Moon et al (2005)		0.82	[0.69; 0.96]
Omitting Pinterova et al (2004)		0.82	[0.70; 0.97]
Omitting Evans et al (2001)		0.80	[0.68; 0.95]
Omitting Badii et al (2008)		0.81	[0.69; 0.95]
Omitting Motavallian et al (2013)		0.88	[0.75; 1.05]
Omitting Phani et al (2015)		0.83	[0.70; 0.97]
Omitting Sanghera et al (2009)		0.83	[0.71; 0.98]
Omitting Majid et al (2016)		0.82	[0.70; 0.96]
Omitting Bouhaha et al (2008)		0.82	[0.69; 0.96]
Omitting Sramkova et al (2002)		0.82	[0.70; 0.97]
Omitting Saleh et al (2016)		0.82	[0.70; 0.96]
Omitting Paramasivam et al (2016)		0.83	[0.70; 0.98]
Omitting Pattanayak et al (2014)		0.82	[0.69; 0.96]
Omitting Vimalaswaran et al (2010)		0.82	[0.70; 0.97]
Omitting Ringel et al (1999)		0.81	[0.69; 0.96]
Omitting Nemoto et al (2002) (A)		0.82	[0.69; 0.96]
Omitting Nemoto et al (2002) (B)		0.82	[0.69; 0.96]
Omitting Meshkani et al (2007)		0.82	[0.70; 0.97]
Omitting Chistiakov et al (2010)		0.83	[0.70; 0.98]
Omitting Ghoussaini et al (2005)		0.84	[0.71; 0.99]
Omitting Mato et al (2016)		0.82	[0.69; 0.96]
Omitting Malecki et al (2003)		0.82	[0.69; 0.97]
Omitting Hegele et al (2000)		0.82	[0.69; 0.96]
Omitting Li et al (2008) (A) (Uyгур)		0.82	[0.69; 0.96]
Omitting Li et al (2008) (B) (Kazak)		0.82	[0.69; 0.96]
Omitting Li et al (2008) (C) (Han)		0.82	[0.69; 0.96]
Omitting Hansen et al (2005)		0.80	[0.67; 0.95]
Omitting Meirhaeghe et al (2000)		0.82	[0.70; 0.97]
Omitting Costa et al (2009)		0.82	[0.69; 0.96]
Omitting Gragnoli et al (2007)		0.82	[0.70; 0.96]
Omitting Erdogan et al (2007)		0.82	[0.69; 0.96]
Omitting Tavares et al (2005)		0.82	[0.69; 0.96]
Omitting Raza et al (2012)		0.86	[0.72; 1.01]
Omitting Pei et al (2013)		0.82	[0.69; 0.96]
Omitting Mohamed et al (2007)		0.81	[0.69; 0.96]
Omitting Namvaran et al (2011)		0.82	[0.69; 0.96]
Omitting Tariq et al (2013)		0.81	[0.69; 0.95]
Omitting Doney et al (2004)		0.82	[0.69; 0.97]
Omitting Mori et al (2001)		0.82	[0.70; 0.97]
Omitting Clement et al (2000)		0.82	[0.69; 0.96]
Omitting Avzaletdinova et al (2016)		0.80	[0.67; 0.94]
Omitting Kao et al (2003)		0.82	[0.69; 0.96]
Omitting Wang et al (2009)		0.81	[0.69; 0.96]
Omitting Horiki et al (2004)		0.82	[0.69; 0.96]
Omitting Lv et al (2017)		0.74	[0.62; 0.88]
Omitting Mancini et al (1999)		0.82	[0.69; 0.96]

Fixed effect model  
  
 0.75 1 1.5  
 0.82 [0.69; 0.96]

D

Study	Odds Ratio	OR	95%-CI
Omitting Zeggini et al (2005) (A)		0.84	[0.77; 0.92]
Omitting Zeggini et al (2005) (B)		0.85	[0.77; 0.92]
Omitting Tripathi et al (2013)		0.85	[0.77; 0.92]
Omitting Lu et al (2011)		0.84	[0.77; 0.92]
Omitting Kommoju et al (2014)		0.84	[0.77; 0.92]
Omitting Muller et al (2003)		0.84	[0.77; 0.92]
Omitting Oh et al (2000)		0.84	[0.77; 0.92]
Omitting Memisoglu et al (2003)		0.84	[0.77; 0.92]
Omitting Mirzaei et al (2009)		0.85	[0.78; 0.93]
Omitting Zhu et al (2017)		0.84	[0.77; 0.92]
Omitting Sokkar et al (2009)		0.85	[0.78; 0.92]
Omitting Wang et al (2013)		0.85	[0.77; 0.93]
Omitting Bener et al (2015)		0.84	[0.76; 0.91]
Omitting Ye et al (2014)		0.84	[0.77; 0.92]
Omitting Bouassida et al (2005)		0.84	[0.77; 0.92]
Omitting Vergotine et al (2014)		0.83	[0.76; 0.91]
Omitting Moon et al (2005)		0.85	[0.77; 0.92]
Omitting Pinterova et al (2004)		0.85	[0.77; 0.92]
Omitting Evans et al (2001)		0.84	[0.76; 0.91]
Omitting Badii et al (2008)		0.84	[0.77; 0.92]
Omitting Motavallian et al (2013)		0.85	[0.78; 0.92]
Omitting Phani et al (2015)		0.84	[0.77; 0.92]
Omitting Sanghera et al (2009)		0.84	[0.77; 0.92]
Omitting Majid et al (2016)		0.85	[0.78; 0.93]
Omitting Bouhaha et al (2008)		0.84	[0.77; 0.91]
Omitting Sramkova et al (2002)		0.84	[0.77; 0.91]
Omitting Saleh et al (2016)		0.84	[0.77; 0.92]
Omitting Paramasivam et al (2016)		0.85	[0.78; 0.92]
Omitting Pattanayak et al (2014)		0.84	[0.77; 0.92]
Omitting Vimalaswaran et al (2010)		0.84	[0.77; 0.92]
Omitting Ringel et al (1999)		0.84	[0.77; 0.92]
Omitting Nemoto et al (2002) (A)		0.84	[0.77; 0.92]
Omitting Nemoto et al (2002) (B)		0.85	[0.78; 0.92]
Omitting Meshkani et al (2007)		0.85	[0.78; 0.93]
Omitting Chistiakov et al (2010)		0.85	[0.77; 0.93]
Omitting Ghoussaini et al (2005)		0.84	[0.77; 0.92]
Omitting Mato et al (2016)		0.84	[0.77; 0.92]
Omitting Malecki et al (2003)		0.84	[0.77; 0.91]
Omitting Hegele et al (2000)		0.84	[0.76; 0.91]
Omitting Li et al (2008) (A) (Uyгур)		0.84	[0.77; 0.92]
Omitting Li et al (2008) (B) (Kazak)		0.84	[0.77; 0.92]
Omitting Li et al (2008) (C) (Han)		0.84	[0.77; 0.92]
Omitting Hansen et al (2005)		0.84	[0.76; 0.92]
Omitting Meirhaeghe et al (2000)		0.84	[0.77; 0.92]
Omitting Costa et al (2009)		0.84	[0.77; 0.91]
Omitting Gragnoli et al (2007)		0.84	[0.77; 0.92]
Omitting Erdogan et al (2007)		0.84	[0.77; 0.92]
Omitting Tavares et al (2005)		0.83	[0.76; 0.91]
Omitting Raza et al (2012)		0.83	[0.76; 0.91]
Omitting Pei et al (2013)		0.85	[0.78; 0.92]
Omitting Mohamed et al (2007)		0.83	[0.76; 0.91]
Omitting Namvaran et al (2011)		0.85	[0.78; 0.92]
Omitting Tariq et al (2013)		0.84	[0.77; 0.92]
Omitting Doney et al (2004)		0.84	[0.77; 0.92]
Omitting Mori et al (2001)		0.85	[0.78; 0.93]
Omitting Clement et al (2000)		0.84	[0.77; 0.92]
Omitting Avzaletdinova et al (2016)		0.84	[0.77; 0.92]
Omitting Kao et al (2003)		0.84	[0.77; 0.92]
Omitting Wang et al (2009)		0.84	[0.77; 0.92]
Omitting Horiki et al (2004)		0.85	[0.78; 0.93]
Omitting Lv et al (2017)		0.83	[0.76; 0.90]
Omitting Mancini et al (1999)		0.85	[0.77; 0.92]

Random effects model  
  
 0.8 1 1.25  
 0.84 [0.77; 0.92]

E

Study	Odds Ratio	OR	95%-CI
Omitting Zeggini et al (2005) (A)		0.74	[0.60; 0.92]
Omitting Zeggini et al (2005) (B)		0.73	[0.58; 0.91]
Omitting Tripathi et al (2013)		0.74	[0.59; 0.92]
Omitting Lu et al (2011)		0.73	[0.58; 0.91]
Omitting Kommoju et al (2014)		0.70	[0.56; 0.88]
Omitting Muller et al (2003)		0.73	[0.58; 0.91]
Omitting Oh et al (2000)		0.72	[0.58; 0.90]
Omitting Memisoglu et al (2003)		0.73	[0.58; 0.91]
Omitting Mirzaei et al (2009)		0.72	[0.58; 0.90]
Omitting Zhu et al (2017)		0.73	[0.58; 0.91]
Omitting Sokkar et al (2009)		0.74	[0.60; 0.92]
Omitting Wang et al (2013)		0.71	[0.57; 0.89]
Omitting Bener et al (2015)		0.71	[0.57; 0.89]
Omitting Ye et al (2014)		0.72	[0.58; 0.90]
Omitting Bouassida et al (2005)		0.73	[0.58; 0.91]
Omitting Vergotine et al (2014)		0.72	[0.58; 0.90]
Omitting Moon et al (2005)		0.72	[0.58; 0.90]
Omitting Pinterova et al (2004)		0.73	[0.59; 0.92]
Omitting Evans et al (2001)		0.70	[0.57; 0.88]
Omitting Badii et al (2008)		0.71	[0.57; 0.89]
Omitting Motavallian et al (2013)		0.78	[0.64; 0.96]
Omitting Phani et al (2015)		0.74	[0.59; 0.92]
Omitting Sanghera et al (2009)		0.75	[0.60; 0.93]
Omitting Majid et al (2016)		0.73	[0.59; 0.91]
Omitting Bouhaha et al (2008)		0.72	[0.58; 0.90]
Omitting Sramkova et al (2002)		0.72	[0.58; 0.91]
Omitting Saleh et al (2016)		0.73	[0.58; 0.91]
Omitting Paramasivam et al (2016)		0.74	[0.59; 0.93]
Omitting Pattanayak et al (2014)		0.73	[0.58; 0.91]
Omitting Vimalaswaran et al (2010)		0.73	[0.58; 0.91]
Omitting Ringel et al (1999)		0.72	[0.57; 0.90]
Omitting Nemoto et al (2002) (A)		0.72	[0.58; 0.91]
Omitting Nemoto et al (2002) (B)		0.73	[0.58; 0.91]
Omitting Meshkani et al (2007)		0.73	[0.59; 0.91]
Omitting Chistiakov et al (2010)		0.73	[0.58; 0.92]
Omitting Ghoussaini et al (2005)		0.75	[0.60; 0.93]
Omitting Mato et al (2016)		0.72	[0.58; 0.90]
Omitting Malecki et al (2003)		0.72	[0.57; 0.90]
Omitting Hegele et al (2000)		0.72	[0.58; 0.90]
Omitting Li et al (2008) (A) (Uyгур)		0.72	[0.58; 0.90]
Omitting Li et al (2008) (B) (Kazak)		0.72	[0.58; 0.90]
Omitting Li et al (2008) (C) (Han)		0.72	[0.58; 0.90]
Omitting Hansen et al (2005)		0.71	[0.56; 0.90]
Omitting Meirhaeghe et al (2000)		0.73	[0.58; 0.91]
Omitting Costa et al (2009)		0.72	[0.58; 0.90]
Omitting Gragnoli et al (2007)		0.73	[0.58

**Figure S5.** Influence plots of the included studies. “A” represents allele (G vs. C); “B” represents homozygote (GG vs. CC); “C” represents heterozygote (CG vs. CC); “D” represents additive (GG vs. CG); “E” represents dominant (CG+GG vs. CC); “F” represents recessive (GG vs. CC+CG); “G” co-dominant model (CG vs. CC+GG). Vertical and horizontal lines represent ORs and 95% CIs pooled by successively excluding one study in turn. Red stroked diamonds represent the overall estimates (pooled ORs and 95% CIs) of population with fixed effect model, and green stroked diamonds symbolize results pooled with random effects model. 95% CI = 95% confidence interval, OR = odds ratio.

