[Hypertension.](http://www.ncbi.nlm.nih.gov/pubmed/25122928" \o "Hypertension.) 2014 Sep;64(3):644-52. doi: 10.1161/HYPERTENSIONAHA.114.03578.

**Early Pregnancy Prediction of Preeclampsia in Nulliparous Women, Combining Clinical Risk and Biomarkers: The Screening for Pregnancy Endpoints (SCOPE) International Cohort Study.**

[Kenny LC](http://www.ncbi.nlm.nih.gov/pubmed?term=Kenny%20LC%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)1, [Black MA](http://www.ncbi.nlm.nih.gov/pubmed?term=Black%20MA%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Poston L](http://www.ncbi.nlm.nih.gov/pubmed?term=Poston%20L%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Taylor R](http://www.ncbi.nlm.nih.gov/pubmed?term=Taylor%20R%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Myers JE](http://www.ncbi.nlm.nih.gov/pubmed?term=Myers%20JE%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Baker PN](http://www.ncbi.nlm.nih.gov/pubmed?term=Baker%20PN%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [McCowan LM](http://www.ncbi.nlm.nih.gov/pubmed?term=McCowan%20LM%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Simpson NA](http://www.ncbi.nlm.nih.gov/pubmed?term=Simpson%20NA%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Dekker GA](http://www.ncbi.nlm.nih.gov/pubmed?term=Dekker%20GA%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Roberts CT](http://www.ncbi.nlm.nih.gov/pubmed?term=Roberts%20CT%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Rodems K](http://www.ncbi.nlm.nih.gov/pubmed?term=Rodems%20K%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Noland B](http://www.ncbi.nlm.nih.gov/pubmed?term=Noland%20B%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2,[Raymundo M](http://www.ncbi.nlm.nih.gov/pubmed?term=Raymundo%20M%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [Walker JJ](http://www.ncbi.nlm.nih.gov/pubmed?term=Walker%20JJ%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2, [North RA](http://www.ncbi.nlm.nih.gov/pubmed?term=North%20RA%5BAuthor%5D&cauthor=true&cauthor_uid=25122928)2.

[**Author information**](http://www.ncbi.nlm.nih.gov/pubmed/25122928)

* 1From the Irish Centre for Fetal and Neonatal Translational Research (INFANT) and Department of Obstetrics and Gynaecology, University College Cork, Cork, Ireland (L.C.K.); Department of Biochemistry, Otago School of Medical Sciences, University of Otago, Dunedin, New Zealand (M.A.B.); Division of Women's Health, Women's Health Academic Centre, King's College London and King's Health Partners, London, United Kingdom (L.P., R.A.N.); Department of Obstetrics and Gynaecology, Faculty of Medical and Health Sciences (R.T., P.N.B., L.M.M.), National Centre for Growth and Development and Maternal and Fetal Health, Liggins Institute (P.N.B.), and South Auckland Clinical School, Faculty of Medical and Health Sciences (L.M.M.), University of Auckland, Auckland, New Zealand; Faculty of Medical and Human Sciences, Maternal & Fetal Health Research Centre, Institute of Human Development, Manchester Academic Health Science Centre, Central Manchester University Hospitals NHS Foundation Trust, University of Manchester, Manchester, United Kingdom (J.E.M.); Auckland District Health Board and Counties Manukau District Health Board, Auckland, New Zealand (P.N.B.); Section of Obstetrics and Gynaecology, Leeds Institute of Biomedical and Clinical Sciences, University of Leeds, Leeds, United Kingdom (N.A.B.S., J.J.W.); The Women's and Children's Division, Lyell McEwin Hospital (G.A.D., C.T.R.) and School of Paediatrics and Reproductive Health, Robinson Institute (G.A.D., C.T.R.), University of Adelaide, Adelaide, South Australia; and Alere Discovery, San Diego, CA (K.R., B.N., M.R.). l.kenny@ucc.ie.
* 2From the Irish Centre for Fetal and Neonatal Translational Research (INFANT) and Department of Obstetrics and Gynaecology, University College Cork, Cork, Ireland (L.C.K.); Department of Biochemistry, Otago School of Medical Sciences, University of Otago, Dunedin, New Zealand (M.A.B.); Division of Women's Health, Women's Health Academic Centre, King's College London and King's Health Partners, London, United Kingdom (L.P., R.A.N.); Department of Obstetrics and Gynaecology, Faculty of Medical and Health Sciences (R.T., P.N.B., L.M.M.), National Centre for Growth and Development and Maternal and Fetal Health, Liggins Institute (P.N.B.), and South Auckland Clinical School, Faculty of Medical and Health Sciences (L.M.M.), University of Auckland, Auckland, New Zealand; Faculty of Medical and Human Sciences, Maternal & Fetal Health Research Centre, Institute of Human Development, Manchester Academic Health Science Centre, Central Manchester University Hospitals NHS Foundation Trust, University of Manchester, Manchester, United Kingdom (J.E.M.); Auckland District Health Board and Counties Manukau District Health Board, Auckland, New Zealand (P.N.B.); Section of Obstetrics and Gynaecology, Leeds Institute of Biomedical and Clinical Sciences, University of Leeds, Leeds, United Kingdom (N.A.B.S., J.J.W.); The Women's and Children's Division, Lyell McEwin Hospital (G.A.D., C.T.R.) and School of Paediatrics and Reproductive Health, Robinson Institute (G.A.D., C.T.R.), University of Adelaide, Adelaide, South Australia; and Alere Discovery, San Diego, CA (K.R., B.N., M.R.).

**Abstract**

More than half of all cases of preeclampsia occur in healthy first-time pregnant women. Our aim was to develop a method to predict those at risk by combining clinical factors and measurements of biomarkers in women recruited to the Screening for Pregnancy Endpoints (SCOPE) study of low-risk nulliparous women. Forty-seven biomarkers identified on the basis of (1) association with preeclampsia, (2) a biological role in placentation, or (3) a role in cellular mechanisms involved in the pathogenesis of preeclampsia were measured in plasma sampled at 14 to 16 weeks' gestation from 5623 women. The cohort was randomly divided into training (n=3747) and validation (n=1876) cohorts. Preeclampsia developed in 278 (4.9%) women, of whom 28 (0.5%) developed early-onset preeclampsia. The final model for the prediction of preeclampsia included placental growth factor, mean arterial pressure, and body mass index at 14 to 16 weeks' gestation, the consumption of ≥3 pieces of fruit per day, and mean uterine artery resistance index. The area under the receiver operator curve (95% confidence interval) for this model in training and validation cohorts was 0.73 (0.70-0.77) and 0.68 (0.63-0.74), respectively. A predictive model of early-onset preeclampsia included angiogenin/placental growth factor as a ratio, mean arterial pressure, any pregnancy loss <10 weeks, and mean uterine artery resistance index (area under the receiver operator curve [95% confidence interval] in training and validation cohorts, 0.89 [0.78-1.0] and 0.78 [0.58-0.99], respectively). Neither model included pregnancy-associated plasma protein A, previously reported to predict preeclampsia in populations of mixed parity and risk. In nulliparous women, combining multiple biomarkers and clinical data provided modest prediction of preeclampsia.

© 2014 American Heart Association, Inc.

**KEYWORDS:**

biological markers; diagnosis; preeclampsia; pregnancy