

Feto-maternale Inkompatibilität: Bestimmung des fetalen RHD aus mütterlichem Plasma

1. Daniels G. Blood group antibodies in haemolytic disease of the fetus and newborn. In: Hadley A, Soothill P, eds. Alloimmune disorders of pregnancy: Cambridge University Press, New York, 2002:21ff.
2. Vaughan JI, Manning M, Warwick RM, Letsky EA, Murray NA, Roberts IA. Inhibition of erythroid progenitor cells by anti-Kell antibodies in fetal alloimmune anemia. *N Engl J Med* 1998;338: 798-803.
3. Flegel WA, Wagner FF. Molecular genetics of RH. *Vox Sang* 2000;78 Suppl 2: 109-15.
4. Wagner F, Flegel, WA. RHD gene deletion occurred in the Rhesus box. *Blood* 2000;95: 3662-8.
5. Wagner FF. The Human RhesusBase [monograph on the internet]. Available from: <http://www.rhesusbase.info/>
6. Lo YMD, Corbetta N, Chamberlain PF, Rai V, Sargent IL, Redman CWG, Wainscoat JS. Presence of fetal DNA in maternal plasma and serum. *The Lancet* 1997;350: 485-487.
7. (Quality) OH. Noninvasive Fetal RhD Blood Group Genotyping: A Health Technology Assessment. *Ont Health Technol Assess Ser*. 2020;20: 1-160.
8. Achargui S, Tijane M, Benchemsi N. [Fetal RHD genotyping by PCR using plasma from D negative pregnant women]. *Transfus Clin Biol* 2011;18: 13-9.
9. Ahmadi MH, Hantuoshzadeh S, Okhovat MA, Nasiri N, Azarkeivan A, Amirizadeh N. Fetal RHD Genotyping from Circulating Cell-Free Fetal DNA in Plasma of Rh Negative Pregnant Women in Iran. *Indian J Hematol Blood Transfus* 2016;32: 447-453.
10. Allen RW, Ward S, Harris R. Prenatal genotyping for the RhD blood group antigen: considerations in developing an accurate test. *Genet Test* 2000;4: 377-81.
11. Bingulac-Popovic J, Babic I, Dogic V, Kundid R, Simovic Medica J, Miskovic B, Jukic I. Prenatal RHD genotyping in Croatia: preliminary results. *Transfus Clin Biol* 2021;28: 38-43.
12. Bischoff FZ, Nguyen, D. D., Marquez-Do, D., Moise, K. J., Jr., Simpson, J. L., Elias, S. Noninvasive determination of fetal RhD status using fetal DNA in maternal serum and PCR. *J Soc Gynecol Investig* 1999;6: 64-9.
13. Boggione CT, Lujan Brajovich ME, Mattaloni SM, Di Monaco RA, Garcia Borras SE, Biondi CS, Cotorruelo CM. Genotyping approach for non-invasive foetal RHD detection in an admixed population. *Blood Transfus* 2017;15: 66-73.
14. Breveglieri G, D'Aversa E, Finotti A, Borgatti M. Non-invasive Prenatal Testing Using Fetal DNA. *Mol Diagn Ther* 2019;23: 291-299.
15. Brojer E, upanska B, Guz K, Orzińska A, Kalińska A. Noninvasive determination of fetal RHD status by examination of cell-free DNA in maternal plasma. *Transfusion* 2005;45: 1473-1480.
16. Clausen FB, Barrett AN, Krog GR, Fanning K, Dziegiej MH. Non-invasive foetal RhD genotyping to guide anti-D prophylaxis: an external quality assurance workshop. *Blood Transfus* 2018;16: 359-362.
17. Clausen FB, Christiansen M, Steffensen R, Jorgensen S, Nielsen C, Jakobsen MA, Madsen RD, Jensen K, Krog GR, Rieneck K, Sprogoe U, Homburg KM, Grunnet N, Dziegiej MH. Report of the first nationally implemented clinical routine screening for fetal RHD in D- pregnant women to ascertain the requirement for antenatal RhD prophylaxis. *Transfusion* 2012;52: 752-8.
18. Clausen FB, Krog GR, Rieneck K, Nielsen LK, Lundquist R, Fanning K, Dickmeiss E, Hedegaard M, Dziegiej MH. Reliable test for prenatal prediction of fetal RhD type using maternal plasma from RhD negative women. *Prenatal Diagnosis* 2005;25: 1040-1044.
19. Clausen FB, Steffensen R, Christiansen M, Rudy M, Jakobsen MA, Jakobsen TR, Krog GR, Madsen RD, Nielsen KR, Rieneck K, Sprogoe U, Homburg KM, Baech J, Dziegiej MH, Grunnet N. Routine noninvasive prenatal screening for fetal RHD in plasma of RhD-negative pregnant women-2 years of screening experience from Denmark. *Prenat Diagn* 2014;34: 1000-5.
20. Cotorruelo C, Biondi, C., Garcia Borras, S., Di Monaco, R., Racca, A. Early detection of RhD status in pregnancies at risk of hemolytic disease of the newborn. *Clin Exp Med* 2002;2: 77-81.
21. de Haas M, Thurik FF, van der Ploeg CP, Veldhuisen B, Hirschberg H, Soussan AA, Woortmeijer H, Abbink F, Page-Christiaens GC, Scheffer PG, Ellen van der Schoot C. Sensitivity of fetal RHD screening for safe guidance of targeted anti-D immunoglobulin prophylaxis: prospective cohort study of a nationwide programme in the Netherlands. *BMJ* 2016;355: i5789.
22. Fanning KM, Martin, P. G., Soothill, P. W. Avent, N. D. Prediction of fetal D status from maternal plasma: introduction of a new noninvasive fetal RHD genotyping service. *Transfusion* 2002;42: 1079-85.

23. Geifman-Holtzman O, Grotegut CA, Gaughan JP. Diagnostic accuracy of noninvasive fetal Rh genotyping from maternal blood--A meta-analysis. *American Journal of Obstetrics and Gynecology* 2006;195: 1163-1173.
24. Hyland CA, Gardener GJ, Davies H, Ahvenainen M, Flower RL, Irwin D, Morris JM, Ward CM, Hyett JA. Evaluation of non-invasive prenatal RHD genotyping of the fetus. *Med J Aust* 2009;191: 21-5.
25. Hyland CA, Millard GM, O'Brien H, Schoeman EM, Lopez GH, McGowan EC, Tremellen A, Puddephatt R, Gaerty K, Flower RL, Hyett JA, Gardener GJ. Non-invasive fetal RHD genotyping for RHD negative women stratified into RHD gene deletion or variant groups: comparative accuracy using two blood collection tube types. *Pathology* 2017;49: 757-764.
26. Legler TJ, Lynen, R., Maas, J. H., Pindur, G., Kulenkampff, D., Suren, A., Osmers, R., Kohler, M. Prediction of fetal Rh D and Rh CcEe phenotype from maternal plasma with real-time polymerase chain reaction. *Transfus Apheresis Sci* 2002;27: 217-23.
27. Minon JM, Gerard C, Senterre JM, Schaaps JP, Foidart JM. Routine fetal RHD genotyping with maternal plasma: a four-year experience in Belgium. *Transfusion* 2008;48: 373-381.
28. Müller SP, Bartels I, Stein W, Emons G, Guttensohn K, Köhler M, Legler TJ. The determination of the fetal D status from maternal plasma for decision making on Rh prophylaxis is feasible. *Transfusion* 2008;48: 2292-2301.
29. Nelson M, Eagle, C., Langshaw, M., Popp, H., Kronenberg, H. Genotyping fetal DNA by non-invasive means: extraction from maternal plasma. *Vox Sang* 2001;80: 112-6.
30. Randen I, Hauge, R., Kjeldsen-Kragh, J., Fagerhol, M. K. Prenatal genotyping of RHD and SRY using maternal blood. *Vox Sang* 2003;85: 300-6.
31. Soothill PW, Fanning K, Latham T, Wreford-Bush T, Ford J, Daniels G. Use ofcffDNA to avoid administration of anti-D to pregnant women when the fetus is RhD-negative: implementation in the NHS. *BJOG* 2015;122: 1682-6.
32. Turner MJ, Martin CM, O'Leary JJ. Detection of fetal Rhesus D gene in whole blood of women booking for routine antenatal care. *Eur J Obstet Gynecol Reprod Biol* 2003;108: 29-32.
33. Van der Schoot CE, Soussan AA, Koelewijn J, Bonsel G, Paget-Christiaens LGC, de Haas M. Non-invasive antenatal RHD typing. *Transfusion Clinique et Biologique* 2006;13: 53-57.
34. Zhang J, Fidler C, Murphy MF, Chamberlain PF, Sargent IL, Redman CW, Hjelm NM, Wainscoat JS, Lo YM. Determination of fetal RhD status by maternal plasma DNA analysis. *Ann N Y Acad Sci* 2000;906: 153-5.
35. Zhu YJ, Zheng YR, Li L, Zhou H, Liao X, Guo JX, Yi P. Diagnostic accuracy of non-invasive fetal RhD genotyping using cell-free fetal DNA: a meta analysis. *J Matern Fetal Neonatal Med* 2014;27: 1839-44.
36. Fanning KM, Martin PG, Soothill PW, Avent ND. Prediction of fetal D status from maternal plasma: introduction of a new noninvasive fetal RHD genotyping service. *Transfusion* 2002;42: 1079-85.
37. Doescher A, Petershofen EK, Wagner FF, Schunter M, Muller TH. Evaluation of single-nucleotide polymorphisms as internal controls in prenatal diagnosis of fetal blood groups. *Transfusion* 2013;53: 353-62.
38. Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen. Nicht invasive Bestimmung des fetalen Rhesusfaktors zur Vermeidung einer mütterlichen Rhesus- Sensibilisierung. IQWiG-Berichte – Nr. 607 2018.
39. Richtlinie zur Gewinnung von Blut- und Blutbestandteilen und zur Anwendung von Blutprodukten (Richtlinie Hämotherapie), Gesamtnovelle 2017 Bundesärztekammer (Hrsg) im Einvernehmen mit dem Paul-Ehrlich Institut: Deutscher Ärzteverlag, Köln, 2017.
40. Steger F, Wiethoff C, Schochow M. Die kontaminierte Anti-D-Prophylaxe in der DDR 1978/1979 und ihre Folgen. Mitteldeutscher Verlag, 2016.
41. Leger T, Bein G, Bugert P. Validierung von Testverfahren zur Bestimmung des fetalen RHD-Status aus dem Blut D-negativer Frauen in der Schwangerschaft. *Transfusionsmedizin* 2020;10: 50-54.
42. Doescher A, Wagner FF. Anti-D-Antikörper bei einer Schwangerschaft mit einer Deletion im Exon 1 des maternalen RHD-Gens. *Transfusionsmedizin* 2014;4: 1-4.