●论　著

极低出生体质量儿人乳喂养与早产儿视网膜病变发病率关系的 Meta 分析

门光国　王丽丽　姜燕丽　吕勤

【摘要】 **目的**　系统评价人乳喂养对极低出生体质量儿(VLBWI)早产儿视网膜病变(ROP)发病率的影响。**方法**　利用万方、中国知网、PubMed、MEDLINE、EMBASE、CINAHL、Cochrane Central Register of Clinical Trials 等数据库，检索 1990 年后发表的关于出生时胎龄≤28 周和 / 或出生体质量≤1 500g 的 VLBWI 人乳喂养与 ROP 发病率关系的文献，研究设计包括纯人乳(EHM)与早产儿配方奶(EPTF)、部分人乳与 EPTF、高剂量人乳与低剂量人乳喂养婴儿的 ROP 发病率比较，共有 29 篇文献纳入研究。**结果**　2 项随机试验、5 项观察性研究分别报道了 EHM 与 EPTF 喂养 ROP 发病率比较的结果，差异均无统计学意义(均 $P>0.05$)；其中 3 项研究报道了 EHM 与 EPTF 喂养严重 ROP 发病率比较的结果，显示 EHM 喂养能降低严重 ROP 发病率(RR=0.22，RD=−0.08，OR=0.20，$P<0.05$)。6 项观察性研究报道了部分人乳与 EPTF 喂养 ROP 发病率比较的结果，显示差异无统计学意义($P>0.05$)，其中 3 项研究报道了部分人乳与 EPTF 喂养严重 ROP 发病率比较的结果，差异亦无统计学意义($P>0.05$)。4 项随机试验报道了高剂量与低剂量人乳喂养 ROP 发病率比较的结果，显示差异无统计学意义($P>0.05$)；19 项观察性研究报道了高剂量与低剂量人乳喂养 ROP 发病率比较的结果，显示高剂量人乳喂养能降低 ROP 发病率(RR=0.82，RD=−0.03，OR=0.75，$P<0.05$)；其中 13 项研究报道了高剂量与低剂量人乳喂养严重 ROP 发病率比较的结果，显示高剂量人乳喂养能降低严重 ROP 发病率(RR=0.66，RD=−0.02，OR=0.64，$P<0.05$)。**结论**　EHM 或高剂量人乳喂养可能降低 VLBWI 发生 ROP 的风险。

【关键词】 早产儿　人乳　早产儿配方奶　早产儿视网膜病变

Meta-analysis on relationship between human milk feeding and retinopathy of prematurity in very low birth weight infants

MEN Guangguo, WANG Lili, JIANG Yanli, et al. Department of NICU, Ningbo Women and Children's Hospital, Ningbo 315012, China

【Abstract】 **Objective**　To evaluate systematically the effects of human milk feeding on the incidence of retinopathy of prematurity (ROP) in very low birth weight infants (VLBWI). **Methods**　Theliterature published after 1990 was searched from Wanfang, CNKI, PubMed, MEDLINE, EMBASE, CINAHL, Cochrane Central Register of Clinical Trials and other databases. The incidence of ROP in between VLBWIswith exclusive human milk(EHM) and exclusive preterm formula(EPTF) feeding, any human milk and EPTF feeding, high-dose human milk and low-dose human milk feeding was compared. A total of 29 studies were included for analysis. **Results**　Two randomized trials and five observationstudies reported that by comparison of incidence of ROP between EHM and EPTF, the differences were not statistically significant ($P>0.05$); 3 of these studies reported that EHM feeding reduced the incidence of severe ROP (RR=0.22, RD=−0.08, OR=0.20, $P<0.05$). Six observation studies reported the incidence of ROP between any human milk and EPTF feedingwas not significantly different ($P>0.05$); 3 of which reported that the incidence of severe ROP was also not significantly different between any human milk and EPTF feeding ($P>0.05$). Four randomized trials reported that there was no significant difference in the incidence of ROP between high-dose human milk feeding and low-dose human milk feeding ($P>0.05$). Nineteen observation studies reported that high-dose human milk feeding reduced the incidence of ROP (RR=0.82, RD=−0.03, OR=0.75, $P<0.05$). Thirteen studies reported that compared with low-dose human milk feeding, high-dose human milk feeding reduced the incidence of severe ROP (RR=0.66, RD=−0.02, OR=0.64, $P<0.05$). **Conclusion**　EHM or high-dose human milk feeding may reduce the risk of ROP in VLBWI.

DOI：10.12056/j.issn.1006-2785.2019.41.23.2019-2480

基金项目：浙江省医药卫生科技项目(2019KY623)；浙江省公益性技术应用研究计划(2017C35010)

作者单位：315012　宁波市妇女儿童医院 NICU(门光国、吕勤)；山东省东阿县人民医院儿科(王丽丽)；宁波市第七医院儿科(姜燕丽)

通信作者：吕勤，E-mail：qingpingguo911@163.com

【 Key words 】 Preterm infant Human milk Preterm formula milk Retinopathy of prematurity

随着全球早产儿的增加以及早期新生儿管理的进展，最小和最弱新生儿存活率明显升高[1-2]，某些慢性疾病发病率也相应增加[3-4]。如近年来中国[5]、土耳其[6]、美国[2]和瑞典[7]等国家早产儿视网膜病变（ROP）发病率有所增加。ROP 是导致儿童失明的主要原因[8]，主要发生在胎龄＜32 周的新生儿，且胎龄越小则发生 ROP 的风险和严重程度越高。相关研究表明，极低出生体质量儿（VLBWI）的 ROP 发病率为 20%~50%，其中严重 ROP占 4%~19%[8-9]。人乳是早产儿的首选食物。但并非所有母亲都可以提供足够的母乳，因此可适当补充早产儿配方奶（PTF）或捐赠人乳（DHM）。目前建议首选母亲自己的人乳（MOM）。如果 MOM 不足，经适当筛选和巴氏灭菌的 DHM 为仅次于 MOM 的最佳选择[10]。有研究表明，早产儿人乳喂养与 ROP 发病率降低有关[11-13]，且对早产儿包括 ROP 在内的主要疾病具有明显的剂量效应，特别在出生后前 14d[14]。但也有研究表明，未见这种保护作用存在[15-16]。本文就 VLBWI 人乳喂养与 ROP 发病率的关系作一 Meta 分析，以探讨人乳喂养是否对 ROP 有保护作用以及人乳剂量与 ROP 发病的关系，现将结果报道如下。

1 资料和方法

1.1 文献检索 利用万方、中国知网、PubMed、MEDLINE、EMBASE、CINAHL、Cochrane Central Register of Clinical Trials 等数据库，检索时限为 1990 年 1 月 1 日至 2018 年 6 月 30 日。中文检索词包括极低出生体质量儿、人乳、早产儿视网膜病变；英文检索词包括 very low birth weight infants、human milk、retinopathy of prematurity。研究类型包括观察性（队列或病例对照）和实验性研究。纳入标准：（1）研究对象为胎龄≤28 周的早产儿和/或平均出生体质量≤1 500g；（2）研究设计包括纯人乳（EHM）与 EPTF、部分人乳（EHM 或人乳+PTF）与 EPTF、高剂量人乳（EHM 或高剂量人乳+PTF）与低剂量人乳（低剂量人乳+PTF）的比较；（3）结局指标包括 ROP 和严重 ROP。

1.2 文献筛选 由 2 位研究者按标题及摘要独立筛选文献，如遇分歧则通过讨论解决，若结果未达成一致，由第 3 位研究者决定。最终有 29 篇文献纳入研究。

1.3 资料提取 由 2 位研究者提取资料，包括纳入文献的发表年份、作者、国家、研究设计、ROP 诊断标准以及研究对象胎龄、体质量、喂养类型、*OR* 值、危险差（*RD*）、相对危险度（*RR*）及 95%*CI*。

1.4 质量评价 研究者对每项研究的选择或剔除标准、报告偏倚进行评估。同时采用 GRADE 系统评估证据质量和建议强度。无限制的随机试验被认为是高质量的证据，观察性研究被认为是较低质量的证据。基于风险偏倚，不一致性、间接性、不严密和发表偏倚的研究可被降级为一类（严重的问题）或二类（非常严重的问题）。具有较大效应的观察性研究由于具有强有力的协同效应可以被升级，定义为 *RR*≤0.5。最终根据研究设计、报告结果的确定性分别 4 个级别，即非常低、低、中、高。

1.5 统计学处理 应用 RevMan 5.3 统计软件。采用 I^2 评估各项研究的异质性，I^2＞75%表示异质性明显，采用随机效应模型分析。*P*＜0.05 为差异有统计学意义。

2 结果

2.1 纳入文献特征 纳入研究共有 29 项，包括随机试验 6 项[17-22]、时间不连续的序列 4 项[23-26]、病例对照研究 2 项[27-28]和队列研究 17 项[13,15-16,29-42]。29 项研究均报道了 ROP，其中 16 项报道了严重 ROP。除了 4 项研究没有提供 ROP 定义[18-19,25,31]外，其他 25 项研究均采用了 ROP 的国际分类标准[43]；而严重 ROP 的定义各不相同。

2.2 EHM 与 EPTF 喂养 ROP 发病率的比较 共有 2 项随机试验报道了 EHM 与 EPTF 喂养 ROP 发病率比较的结果[19,21]，显示差异无统计学意义（*RR*=1.49，95%*CI*：0.72~3.10；*RD*=0.08，95%*CI*：-0.06~0.22；*OR*=1.67，95%*CI*：0.67~4.16，*P*＞0.05），见图 1-3。共有 5 项观察性研究报道了 EHM 与 EPTF 喂养 ROP 发病率比较的结果[13,25,29,36-37]，显示差异无统计学意义（*RR*=0.66，95%*CI*：0.38~1.12；*RD*=-0.08，95%*CI*：-0.17~0.02；*OR*=0.55，95%*CI*：0.26~1.14，*P*＞0.05），见图 1-3。共有 3 项研究报道了 EHM 与 EPTF 喂养严重 ROP 发病率比较的结果[13,29,37]，显示 EHM 喂养能降低严重 ROP 发病率，差异有统计学意义（*RR*=0.22，95%*CI*：0.08~0.64；*RD*=-0.08，95%*CI*：-0.15~-0.01；*OR*=0.20，95%*CI*：0.07~0.63，*P*＜0.05），见图 4-6。

2.3 部分人乳与 EPTF 喂养 ROP 发病率的比较 共有 6 项观察性研究报道了部分人乳与 EPTF 喂养 ROP 发病率比较的结果[15-16,25,29,37-38]，显示差异无统计学意义（*RR*=1.08，95%*CI*：0.79~1.48；*RD*=0.02，95%*CI*：-0.07~0.10；*OR*=1.11，95%*CI*：0.69~1.79，*P*＞0.05），见图 1-3。

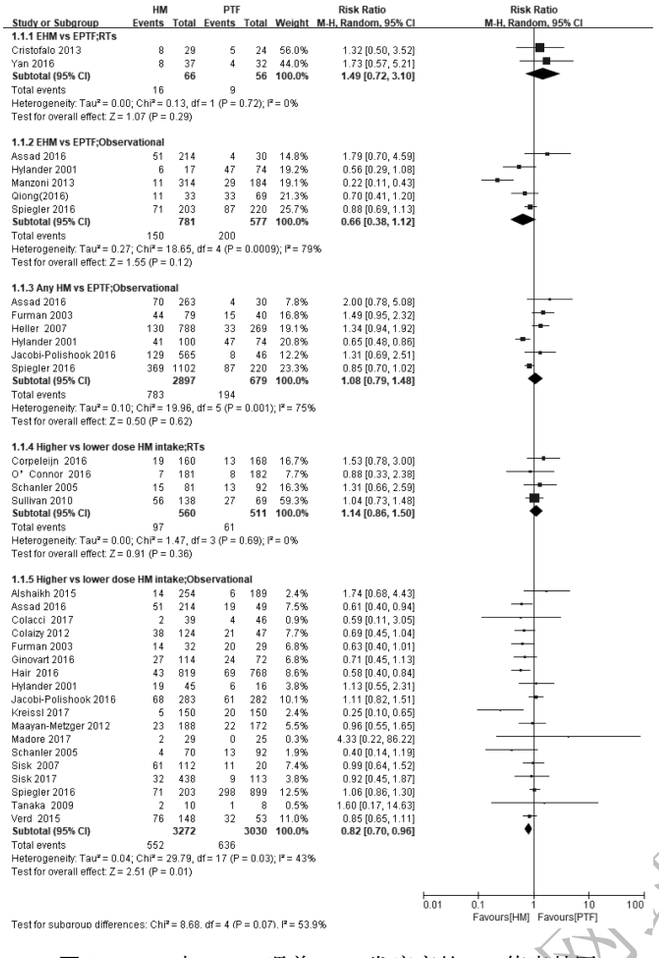

图 1 EHM 与 EPTF 喂养 ROP 发病率的 *RR* 值森林图

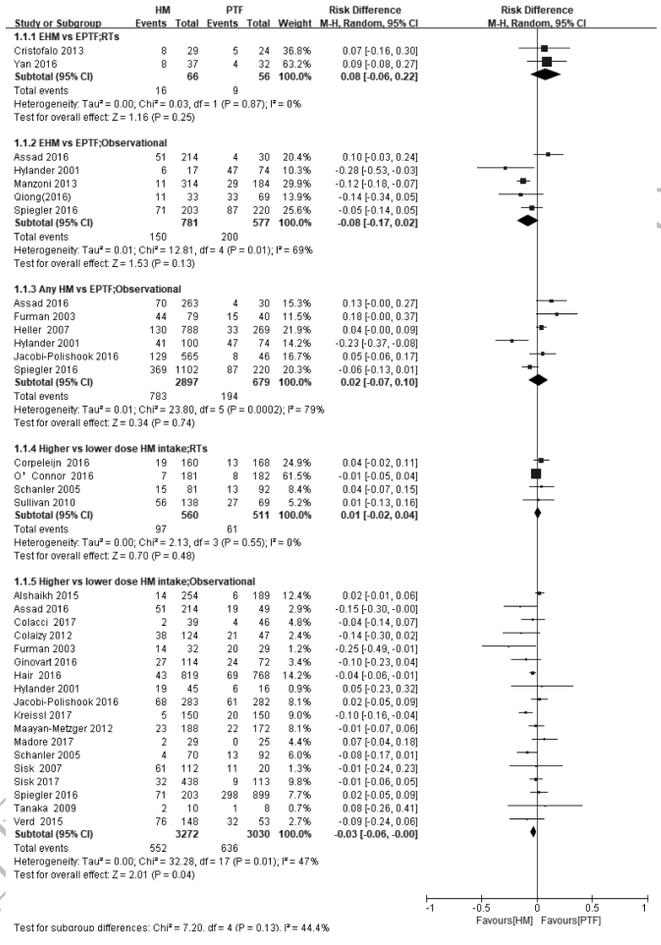

图 2 EHM 与 EPTF 喂养 ROP 发病率的 *RD* 值森林图

共有 3 项研究报道了部分人乳与 EPTF 喂养严重 ROP 发病率比较的结果[16,29,37]，显示差异无统计学意义（*RR*=0.91，95%*CI*：0.51~1.62；*RD*=−0.00，95%*CI*：−0.05~0.05；*OR*=0.91，95%*CI*：0.48~1.71，*P*>0.05），见图 4–6。

2.4 高剂量与低剂量人乳喂养 ROP 发病率的比较 共有 4 项随机试验报道了高剂量与低剂量人乳喂养 ROP 发病率比较的结果[17–18,20,22]，显示差异无统计学意义（*RR*=1.14，95%*CI*：0.86~1.50；*RD*=0.01，95%*CI*：−0.02~0.04；*OR*=1.22，95%*CI*：0.84~1.77，*P*>0.05），见图 1–3。共有 19 项观察性研究报道了高剂量与低剂量人乳喂养 ROP 发病率比较的结果[15,17,23–26,28–33,35,37–42]，显示高剂量人乳喂养能降低 ROP 发病率，差异有统计学意义（*RR*=0.82，95%*CI*：0.70~0.96；*RD*=−0.03，95%*CI*：−0.06~−0.00；*OR*=0.75，95%*CI*：0.59~0.94，*P*<0.05），见图 1–3。共有 13 项研究报道了高剂量与低剂量人乳喂养严重 ROP 发病率比较的结果[17,23–24,26,29–30,33,35,37,39–42]，显示高剂量人乳喂养能降低严重 ROP 发病率，差异有统计学意义（*RR*=0.66，95%*CI*：0.47~0.94；*RD*=−0.02，95%*CI*：−0.05~−0.00；*OR*=0.64，95%*CI*：0.44~0.93，*P*<0.05），见图 4–6。

3 讨论

研究表明，体质量<1 250g 的极低早产儿发生严重 ROP 的概率高达 37%[44]。关于 ROP 的发病原因，主要包括早产、低出生体质量、高浓度氧疗、营养欠佳等。笔者通过检索儿科和眼科学相关期刊最新研究成果，就 VLBWI 人乳喂养与 ROP 发病率的关系进行 Meta 分析，从而探讨人乳喂养是否为 ROP 提供保护。

本项 Meta 分析包括 29 项研究，文献多来自发达国家，反映了现代新生儿重症监护室的做法，使得这些结果可以被推广。本研究结果显示，与 EPTF 相比，无证据证明 EHM 喂养对 ROP 有影响，但可能降低严重 ROP 发病率；与 EPTF 相比，无证据证明部分人乳喂养对 ROP 或严重 ROP 有影响；与低剂量人乳相比，高剂量人乳喂养能降低 ROP 或严重 ROP 发病率。因此，建议在母亲无法满足其婴儿喂养要求时，也要尽量使用 100% 人乳，以免婴儿发生严重 ROP。

此外，笔者还检索了其他 Meta 分析的研究结果。Zhou 等[45]对有限的研究证据进行系统评价，结果显示在

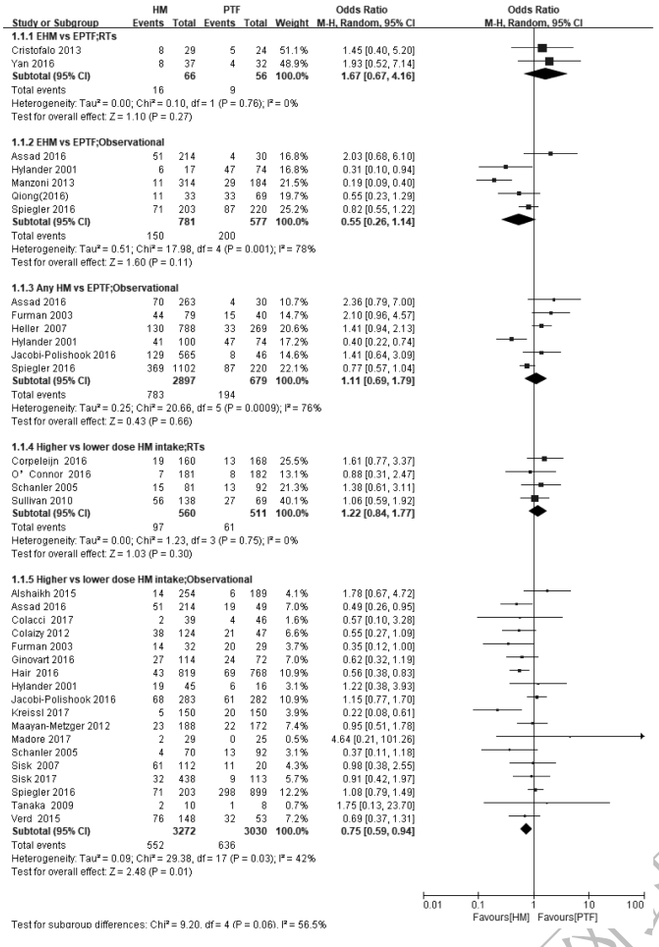

图 3　EHM 与 EPTF 喂养 ROP 发病率的 *OR* 值森林图

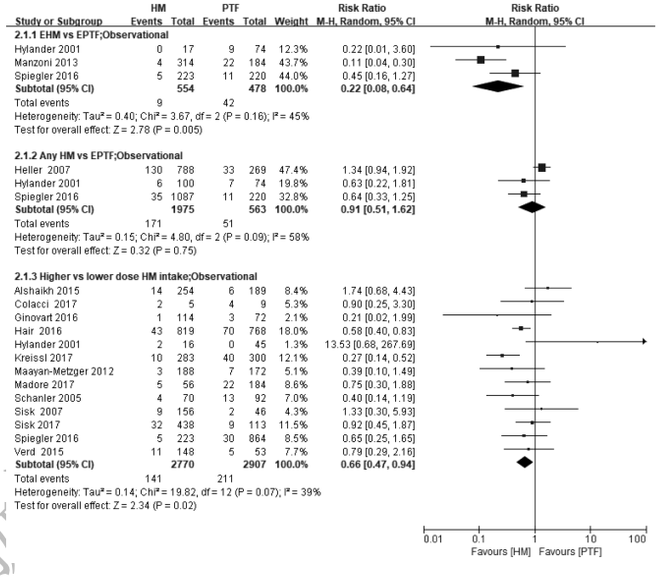

图 4　EHM 与 EPTF 喂养严重 ROP 发病率的 *RR* 值森林图

早产儿中，人乳喂养可能对任何阶段的 ROP 或严重 ROP 起到预防作用。Miller 等[46]对 EHM 或部分人乳与 EPTF 喂养婴儿的 ROP 发病率进行了系统比较，结果显

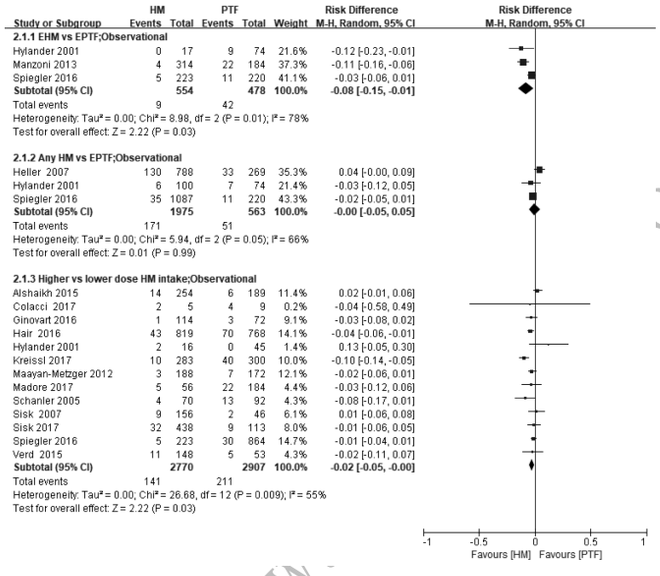

图 5　EHM 与 EPTF 喂养严重 ROP 发病率的 *RD* 值森林图

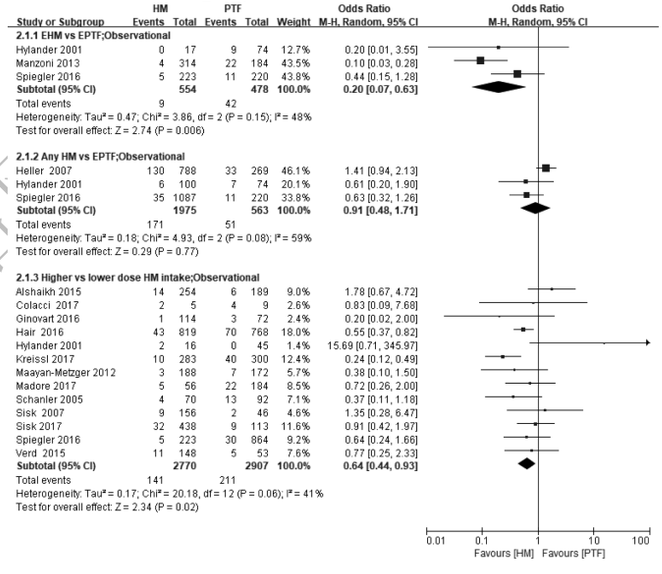

图 6　EHM 与 EPTF 喂养严重 ROP 发病率的 *OR* 值森林图

示与 EPTF 相比，尚无证据证明部分人乳对 ROP 或严重 ROP 的影响，而 EHM 可能降低严重 ROP 发病率。Bharwani 等[14]研究结果发现，任何剂量的人乳喂养都能对 ROP 或严重 ROP 起保护作用。

综上所述，EHM 或高剂量人乳喂养可能降低 VLBWI 发生 ROP 的风险。

4　参考文献

[1] Stevenson DK, Wright LL, Lemons JA, et al. Very low birth weight outcomes of the National Institute of Child Health and Human Development Neonatal Research Network, January 1993 through December 1994[J]. Am J Obstet Gynecol, 1998, 179(6pt1):1632-1639. DOI:10.1016/s0002-9378(98)70037-7.

[2] Stoll BJ, Hansen NI, Bell EF, et al. Neonatal outcomes of extremely preterm infants from the NICHD Neonatal Research Network[J]. Pediatrics, 2010, 126(3):443–456. DOI:10.1542/peds.2009–2959.

[3] Hintz SR, Kendrick DE, Vohr BR, et al. Changes in neurodevelopmental outcomes at 18 to 22 months' corrected age among infants of less than 25 weeks' gestational age born in 1993–1999[J]. Pediatrics, 2005,115(6):1645–1651. DOI:10.1542/peds.2004–2215.

[4] Hartnett ME. Pathophysiology and mechanisms of severe retinopathy of prematurity[J]. Ophthalmology, 2015,122(1): 200–210. DOI:10.1016/j.ophtha.2014.07.050.

[5] Xu Y, Zhou X, Zhang Q, et al. Screening for retinopathy of prematurity in China: a neonatal units–based prospective study[J]. Invest Ophthalmol Vis Sci, 2013, 54(13):8229–8236. DOI:10.1167/iovs.13–12297.

[6] Cerman E, Balci SY, Yenice OS, et al. Screening for retinopathy of prematurity in a tertiary ophthalmology department in Turkey: incidence, outcomes, and risk factors[J]. Ophthalmic Surg Lasers Imaging Retina, 2014, 45(6):550–555. DOI:10.3928/23258160–20141118–10.

[7] Austeng D, Källen K, Hellström A,et al. Regional differences in screening for retinopathy of prematurity in infants born before 27 weeks of gestation in Sweden–the EXPRESS study[J]. Acta Ophthalmol, 2014, 92(4):311–315. DOI:10.1111/aos.12165.

[8] Fierson WM. American Academy of Pediatrics Section on Ophthalmology: American Academy of Ophthalmology: American Association for Pediatric Ophthalmology and Strabismus: American Association of Certified Orthoptists. Screening examination of premature infants for retinopathy of prematurity[J]. Pediatrics, 2013,131(1):189–195. DOI:10.1542/peds.2012–2996.

[9] Holmström G, Larsson E. Outcome of retinopathy of prematurity [J]. Clin Perinatol, 2013, 40(2):311–321.DOI:10.1016/j.clp.2013.02.008.

[10] Committee on Nutrition, Section on Brreastfeeding, Committee on Fetus and Newborn. Donor human milk for the high–risk infant: Preparation, safety, and usage options in the United States [J]. Pediatrics, 2017, 139(1):e20163044. DOI:10.1542/peds.2016–3440.

[11] Kao JS, Dawson JD, Murray JC, et al. Possible roles of bilirubin and breast milk in protection against retinopathy of prematurity [J]. Acta Paediatr, 2011,100(3):347–351. DOI:10.1111/j.1651–2227.2010.02069.x.

[12] Patel AL, Johnson TJ, Engstrom JL, et al. Impact of early human milk on sepsis and health care costs in very low birth weight[J]. J Perinatol, 2013, 33(7):514–519.DOI:10.1038/jp.2013.2.

[13] Manzoni P, Stolfi I, Pedicino R, et al. Human milk feeding prevents retinopathy of prematurity(ROP) in preterm VLBW neonates[J]. Early Hum Dev, 2013, 89(suppl1):S64–S68. DOI:10.1016/S0378–3782(13)70019–7.

[14] Bharwani SK, Green BF, Pezzullo JC, et al. Systematic review and meta–analysis of human milk intake and retinopathy of prematurity: a significant update[J]. Journal of Perinatology Official Journal of the California Perinatal Association, 2016, 36 (11): 913–920. DOI:10.1038/jp.2016.98.

[15] Furman L, Taylor G, Minich N, et al. The effect of maternal milk on neonatal morbidity of very low–birth–weight infants[J]. Arch Pediatr Adolesc Med, 2003, 157(1):66–71. DOI:10.1001/archpedi.157.1.66.

[16] Heller CD, O'Shea M, Yao Q, et al. Human milk intake and retinopathy of prematurity in extremely low birth weight infants [J]. Pediatrics, 2007, 120(1):1–9. DOI:10.1542/peds.2006–1465.

[17] Schanler RJ, Lau C, Hurst NM, et al. Randomized trial of donor human milk versus preterm formula as substitutes for mothers' own milk in the feeding of extremely premature infants[J]. Pediatrics, 2005, 116(2):400–406. DOI:10.1542/peds.2004–1974.

[18] Sullivan S, Schanler RJ, Kim JH, et al. An exclusively human milk–based diet is associated with a lower rate of necrotizing enterocolitis than a diet of human milk and bovine milk–based products[J]. J Pediatr, 2010, 156(4): 562–567. DOI:10.1016/j.jpeds.2009.10.040.

[19] Cristofalo EA, Schanler RJ, Blanco CL, et al. Randomized trial of exclusive human milk versus preterm formula diets in extremely premature infants[J]. J Pediatr, 2013,163(6):1592–1595. DOI:10.1016/j.jpeds.2013.07.011.

[20] O'Connor DL, Gibbins S, Kiss A, et al. Effect of supplemental donor human milk compared with preterm formula on neurodevelopment of very low–birth–weight infants at 18 months: A randomized clinical trial[J]. JAMA, 2016, 316(18):1897–1905.DOI:10.1001/jama.2016.16144.

[21] Wu Y, Zhong XY, Jiang J, et al. Prospective and controlled study on effect of fortified human milk feeding on infants with extremely and very low birth weight during hospital stay[J]. Journal of Peking University(Health Sciences), 2016, 48(1):143–148. DOI:10.3969/j.issn.1671–167X.2016.01.026.

[22] Corpeleijn WE, De Waard M, Christmann V, et al. Effect of donor milk on severe infections and mortality in very low–birth–weight infants: The early nutrition study randomized clinical trial[J]. JAMA Pediatr, 2016, 170(7):654–661. DOI:10.1001/jamapediatrics.2016.0183.

[23] Alshaikh B, Kostecky L, Blachly N, et al. Effect of a quality improvement project to use exclusive mother's own milk on rate of necrotizing enterocolitis in preterm infants[J]. Breastfeed Med, 2015, 10(7):355–361. DOI:10.1089/bfm.2015.0042.

[24] Hair AB, Peluso AM, Hawthorne KM, et al. Beyond necrotizing enterocolitis prevention: Improving outcomes with an exclusive human milk–based diet[J]. Breastfeed Med, 2016, 11(2):70–74. DOI:10.1089/bfm.2015.0134.

[25] Assad M, Elliott MJ, Abraham JH. Decreased cost and improved feeding tolerance in VLBW infants fed an exclusive human milk diet[J]. J Perinatol, 2016, 36(3):216–220. DOI:10.1038/jp.2015.168.

[26] Kreissl A, Sauerzapf E, Repa A, et al. Starting enteral nutrition with preterm single donor milk instead of formula affects time to full enteral feeding in very low birth weight infants[J]. Acta Pae–

diatr, 2017, 106(9):1460–1467. DOI:10.1111/apa.13914.

[27] Okamoto T, Shirai M, Kokubo M, et al. Human milk reduces the risk of retinal detachment in extremely low–birthweight infants[J]. Pediatr Int, 2007, 49(6):894–897. DOI:10.1111/j.1442–200X.2007.02483.x.

[28] Porcelli PJ, Weaver RG Jr. The influence of early postnatal nutrition on retinopathy of prematurity in extremely low birth weight infants[J]. Early Hum Dev, 2010, 86(6):391–396. DOI:10.1016/j.earlhumdev.2010.05.015.

[29] Hylander MA, Strobino DM, Pezzullo JC, et al. Association of human milk feedings with a reduction in retinopathy of prematurity among very low birthweight infants[J]. J Perinatol, 2001, 21(6):356–362. DOI:10.1038/sj.jp.7210548.

[30] Sisk PM, Lovelady CA, Dillard RG, et al. Early human milk feeding is associated with a lower risk of necrotizing enterocolitis in very low birth weight infants[J]. J Perinatol, 2007, 27(7):428–433. DOI:10.1038/sj.jp.7211758.

[31] Tanaka K, Kon N, Ohkawa N, et al. Does breastfeeding in the neonatal period influence the cognitive function of very–low–birth–weight infants at 5 years of age?[J]. Brain Dev, 2009, 31(4):288–293.DOI:10.1016/j.braindev.2008.05.011.

[32] Colaizy TT, Carlson S, Saftlas AF, et al. Growth in VLBW infants fed predominantly fortified maternal and donor human milk diets: A retrospective cohort study[J]. BMC Pediatr, 2012, 12:124.DOI:10.1186/1471–2431–12–124.

[33] Maayan–Metzger A, Avivi S, Schushan–Eisen I, et al. Human milk versus formula feeding among preterm infants: Short–term outcomes[J]. Am J Perinatol, 2012, 29(2):121–126. DOI:10.1055/s–0031–1295652.

[34] Huston RK, Markell AM, McCulley EA, et al. Decreasing necrotizing enterocolitis and gastrointestinal bleeding in the neonatal intensive care unit: The role of donor human milk and exclusive human milk diets in infants ≤1500g birth weight. Infant Child Adolesc[J]. Nutr, 2014, 6(2):86–93. DOI:10.1177/1941406413519267.

[35] Verd S, Porta R, Botet F, et al. Hospital outcomes of extremely low birth weight infants after introduction of donor milk to supplement mother's milk[J]. Breastfeed Med, 2015, 10(3):150–155. DOI:10.1089/bfm.2014.0138.

[36] Zhang Q, Gao XR, Zhuang Y, et al. Effect and follow–up observation of different feeding methods on clinical prognosis of very low birth weight infants[J]. Journal of Chinese Physician, 2016, 18(7):1050–1053. DOI: 10.3760/cma.j.issn.1008–1372.2016.07.026.

[37] Spiegler J, Preus M, Gebauer C, et al. On Behalf of the German Neonatal Network. Does breastmilk influence the development of bronchopulmonary dysplasia?[J]. J Pediatr, 2016, 169, 76–80. DOI:10.1016/j.jpeds.2015.10.080.

[38] Jacobi–Polishook T, Collins CT, Sullivan TR, et al. Human milk intake in preterm infants and neurodevelopment at 18 months corrected age[J]. Pediatr Res, 2016, 80(4):486–492. DOI:10.1038/pr.2016.114.

[39] Ginovart G, Gich I, Verd S. Human milk feeding protects very low–birth–weight infants from retinopathy of prematurity: A pre–post cohort analysis[J]. J Matern–Fetal Neonatal Med, 2016, 29(23):3790–3795. DOI:10.3109/14767058.2016.1145648.

[40] Sisk PM, Lambeth TM, Rojas MA, et al. Necrotizing enterocolitis and growth in preterm infants fed predominantly maternal milk, pasteurized donor milk, or preterm formula: A retrospective study[J]. Am JPerinatol, 2017, 34(7):676–683. DOI:10.1055/s–0036–1597326.

[41] Madore LS, Bora S, Erdei C, et al. Effects of donor breastmilk feeding on growth and early neurodevelopmental outcomes in preterm infants: An observational study[J]. Clin Ther, 2017, 39(6):1210–1220.DOI:10.1016/j.clinthera.2017.05.341.

[42] Colacci M, Murthy K, Deregnier RAO, et al. Growth and development in extremely low birth weight infants after the introduction of exclusive human milk feedings[J]. Am J Perinatol, 2017, 34(2):130–137. DOI:10.1055/s–0036–1584520.

[43] The Committee for the Classification of Retinopathy of Prematurity. An international classification of retinopathy of prematurity [J]. Arch Ophthalmol, 1984,102(8):1130–1134. DOI:10.1001/archopht.1984.01040030908011.

[44] Good WV, Hardy RJ, Dobson V, et al. Early Treatment for Retinopathy of Prematurity Cooperative Group. The incidence and course of retinopathy of prematurity: findings from the early treatment for retinopathy of prematurity study[J]. Pediatrics, 2005, 116(1):15–23. DOI:10.1542/peds.2004–1413.

[45] Zhou J, Shukla VV, John D, et al. Human Milk Feeding as a Protective Factor for Retinopathy of Prematurity: A Meta–analysis[J]. Pediatrics, 2015, 136(6):1576–1586. DOI:10.1542/peds.2015–2372.

[46] Miller J, Tonkin E, Damarell RA, et al. A Systematic Review and Meta–Analysis of Human Milk Feeding and Morbidity in Very Low Birth Weight Infants[J]. Nutrients, 2018, 10(6):707. DOI:10.3390/nu10060707.

（收稿日期：2019–08–21）

（本文编辑：陈丹）