



## Neonatal neurological examination of late preterm babies



Domenico M. Romeo<sup>a</sup>, Rita Luciano<sup>b</sup>, Mirta Corsello<sup>b</sup>, Daniela Ricci<sup>a</sup>, Claudia Brogna<sup>a</sup>, Antonio Zuppa<sup>b</sup>, Costantino Romagnoli<sup>b</sup>, Eugenio Mercuri<sup>a,\*</sup>

<sup>a</sup> Paediatric Neurology Unit, Catholic University, Rome, Italy

<sup>b</sup> Neonatal Unit, Catholic University, Rome, Italy

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### ABSTRACT

**Backgrounds:** Healthy late-preterm (LP) infants examined at term equivalent age showed wider median and range of neurological scores than full-term infants; differences between infants born at 34 and those born at 35–36 weeks were also observed.

**Aims:** The aim of this study is to establish the range and frequency distribution of neonatal neurological scores in a cohort of low risk LP infants assessed during the first 3 days from birth.

**Study design and subjects:** 118 low-risk infants born between 34 and 36 weeks of gestational age (GA) were assessed between 48 and 72 h from birth.

**Outcome measures:** The full version of the Hammersmith Neonatal Neurologic Assessment and the screening proforma were used to assess all the infants. The raw scores obtained were compared to those of full-term infants using the same examination.

**Results:** The distribution of neurological scores was similar among the 3 GAs for 26 items, with different median scores among LP infants born at 36 weeks and those born at 34 and 35 in only 2 items.

LP infants showed a wider range of findings for each item than that of full term infants assessed soon after birth. Using the screening proforma, in our cohort, for each item the findings falling outside the 90% level were identical to those found in term-born and very preterm infants assessed at term age.

**Conclusions:** The neurological scores obtained in our cohort could help as reference data when examining LP infants at birth compared to age matched low risk infants.

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### 1. Introduction

The interest for late-preterm (LP) infants, thus infants born at 34.0 to 36.6 weeks of gestational age (GA), has increased in the last ten years with several studies published [1–8]. This population has increased progressively and it actually represents about 70% of the whole preterm population. They are generally considered at relatively low risk of developing neurological abnormalities compared to infants born at lower gestational age, but higher compared to term born infants [1–8]. In recent studies, LP infants showed slight but significant differences in neurological performances at term age compared to both term born and very preterm infants [2,7,8].

So far most of the studies, including our recent work on a screening proforma [9], report the spectrum of neurological findings of preterm infants assessed at term age. This screening proforma consists of 12 items, selected from the original proforma designed for the neurologic screening of full-term infants, and was adapted for preterm infants; the findings identified as ‘warning signs’ in preterm infants

were identical to those found in full-term infants, suggesting that this screening tool could also be used in preterm infants at term age [9]. In clinical practice however low risk late-preterm newborns are often discharged on the third or fourth day after birth and are not seen at term age and it would therefore be important to define the spectrum of neurological findings at the time of discharge.

Therefore the aims of the present study were: a) to establish the range and frequency distribution of neonatal neurological scores in a cohort of low risk late-preterm infants assessed during the first 3 days from birth using the full version of the Dubowitz neurological assessment; b) to assess whether the screening proforma designed for the neurologic screening of term born and preterm infants assessed at term age could be suitable for early assessment of late preterm infants.

### 2. Subjects and methods

Infants were recruited from the Neonatal Unit of the Gemelli Hospital (Rome, Italy) from October 2011 to June 2012.

Infants were consecutively enrolled when

1. they were born between 34.0 and 36.6 weeks of GA according to the first trimester ultrasound scans or, when not available, to the last

\* Corresponding author at: Paediatric Neurology Unit, Catholic University, Largo Gemelli 8, 00168 Rome, Italy. Tel.: +39 0630155340; fax: +39 0630154363.

E-mail address: [mercuri@rm.unicatt.it](mailto:mercuri@rm.unicatt.it) (E. Mercuri).

<b>POSTURE</b>	arms & legs extended or very slightly flexed 	legs slightly flexed 	leg well-flexed but not adducted 	leg well flexed & adducted near abdomen 	abnormal posture: a) opisthotonus a) 
<b>ARM RECOIL</b>	arms do not flex 	arms flex slowly, not always; not completely 	arms flex slowly; more complete 	arms flex quickly and completely 	arms difficult to extend; snap back forcefully 
<b>ARM TRACTION</b>	arms remain straight; no resistance 	arms flex slightly or some resistance felt 	arms flex well till shoulder lifts, then straighten 	arms flex at approx 100° & maintained as shoulder lifts 	flexion of arms <100°; maintained when body lifts up 
<b>LEG RECOIL</b>	No flexion 	incomplete or variable flexion 	complete but slow flexion 	complete fast flexion 	legs difficult to extend; snap back forcefully 
<b>LEG TRACTION</b>	legs straight - no resistance 	legs flex slightly or some resistance felt 	legs flex well till bottom lifts up 	knee flexes remains flexed when bottom up 	flexion stays when back+bottom up 
<b>POPULTEAL ANGLE</b>	 180°	 ≈ 150°	 ≈ 110°	 ≈ 90°	 < 90°
<b>HEAD CONTROL (1)</b>	no attempt to raise head 	infant tries; effort better felt than seen 	raises head but drops forward or back 	raises head; remains vertical; it may wobble 	
<b>HEAD CONTROL (2)</b>	no attempt to raise head 	infant tries; effort better felt than seen 	raises head but drops forward or back 	raises head; remains vertical; it may wobble 	head upright or extended; cannot be passively flexed 
<b>HEAD LAG</b>	head drops & stays back 	tries to lift head but it drops back 	able to lift head slightly 	lifts head in line with body 	head in front of body 
<b>VENTRAL SUSPENSION</b>	back curved, head & limbs hang straight 	back curved, head ↓, limbs slightly flexed 	back slightly curved, limbs flexed 	back straight, head in line, limbs flexed 	back straight, limbs above body 

1	.5	2	.5	3	.5	4	.5	5	
4	0	22	0	56	7	11	0	0	34w
2	0	20	0	59	0	19	0	0	35w
2	0	17	2	64	2	13	0	0	36w
0	0	0	1	20	5	73	0	<1	LP at term*
0	0	0	0	6	3	90	1	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	30	0	37	0	33	0	0	34w
0	0	18	2	52	0	27	0	0	35w
0	0	10	0	72	0	18	0	0	36w
0	0	0	2	24	10	63	1	0	LP at term*
0	0	5	2	22	3	67	1	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	33	0	48	0	19	0	0	34w
0	0	14	2	50	0	34	0	0	35w
0	0	15	2	60	0	23	0	0	36w
<1	<1	6	2	38	7	46	0	0	LP at term*
0	0	1	0	22	8	69	0	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	11	0	41	0	48	0	0	34w
0	0	11	0	53	0	36	0	0	35w
0	0	4	2	43	0	51	0	0	36w
0	0	4	1	34	5	55	<1	<1	LP at term*
0	0	3	1	4	1	91	0	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	11	0	48	0	41	0	0	34w
0	0	12	0	50	0	36	0	2	35w
0	0	2	2	53	2	40	0	0	36w
0	0	3	3	29	1	64	0	0	LP at term*
0	0	0	1	12	12	72	0	3	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	22	0	63	4	11	0	0	34w
2	0	23	5	43	0	25	2	0	35w
0	0	13	0	72	2	13	0	0	36w
0	0	12	2	47	3	36	0	0	LP at term*
0	0	5	5	19	20	51	0	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	22	0	52	0	26	0	0	34w
0	0	14	7	57	0	23	0	0	35w
0	0	23	2	57	2	15	0	0	36w
0	0	5	1	45	10	39	0	0	LP at term*
0	0	0	6	26	12	56	0	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	11	0	59	0	30	0	0	34w
0	0	11	2	59	0	27	0	0	35w
0	0	17	2	62	0	19	0	0	36w
0	0	3	3	49	7	38	0	0	LP at term*
0	0	0	4	29	15	52	0	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	19	0	78	0	4	0	0	34w
0	0	20	7	55	2	16	0	0	35w
0	0	13	2	70	0	15	0	0	36w
1	0	10	3	53	10	23	0	0	LP at term*
0	0	9	4	44	12	31	0	0	Full term

1	.5	2	.5	3	.5	4	.5	5	
0	0	15	0	85	0	0	0	0	34w
0	0	14	2	75	0	9	0	0	35w
0	0	13	4	74	0	9	0	0	36w
<1	0	7	4	53	15	20	0	0	LP at term
0	0	4	5	47	16	28	0	0	Full term

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