

Ergo»sling™ surface electromyography study

The following study was conducted at the Australian Sonographer's Association Conference, Adelaide 30 May – 1 June 2003.

Procedure:

1. Volunteer Sonographers were seated on a height adjustable stool beside an electric height adjustable bed. A 'Resus-Annie' dummy was positioned on the bed.
2. An ultrasound machine was positioned in the usual position for scanning at the head end of the bed.
3. Volunteers were asked to adjust the stool, bed and ultrasound machine to the positions that they preferred.
4. Surface electrodes were placed on the right upper trapezius and the right middle deltoid. Care was taken that these electrodes were not moved or disrupted during the test scans (e.g. clothing, strap pressure).
5. The sonographer was asked to scan for 2 x 60 second periods; one period using the Ergo»sling and one without. Scanning was to be within a 100mm circular shape on the left upper abdomen of the dummy.
6. Sonographers alternated whether their first 60 second scanning period was with the Ergo»sling and the second 60 second period was without or vice versa.
7. When scanning using the Ergo»sling Sonographers were instructed to rest their arm in the sling and scan in the usual way.

8. The counterweight balance was adjusted so that the sonographer reported that they felt that the arm was given adequate support but not being lifted too high.

Results:

- Graphs on the following pages show the average microvolt measurements for each muscle test – with the Ergo»sling and without.
- Every participant displayed a reduced level of muscle activity when using the sling.
- The results were assessed as statistically significant by **Professor Karen Grimmer, University of South Australia**. (See spreadsheet on last page).

Brief discussion:

- These results support the idea that the Ergo»sling reduces the muscle load on shoulder girdle muscles.
- The results from these studies are similar to other studies researching arm support from overhead suspension.
- Further electromyography assessment of experienced Ergo-sling users show that these Sonographers can achieve far greater muscle relaxation due to their better ability to relax muscles in the sling.
- Muscles working with lower activity are more relaxed with less tension on ligaments, tendons and other soft tissues.
- This results in reduced risk for shoulder overuse injury.

Examples of Electromyography graphs

Upper Trapezius

Fig. 1 At rest

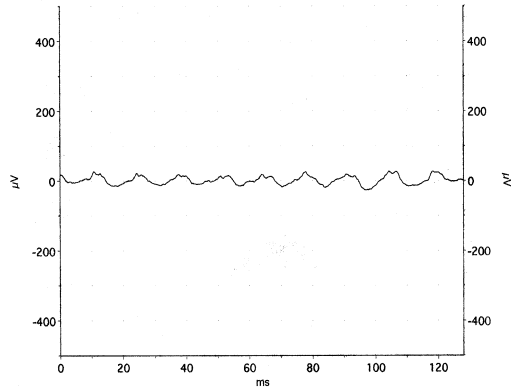


Fig. 2 While scanning – unassisted

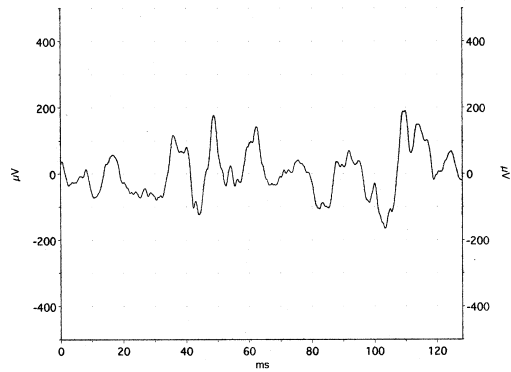
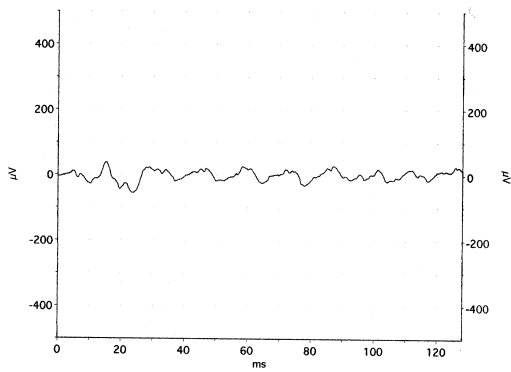


Fig. 3 While scanning - using sling



Deltoid

Fig. 4 At rest

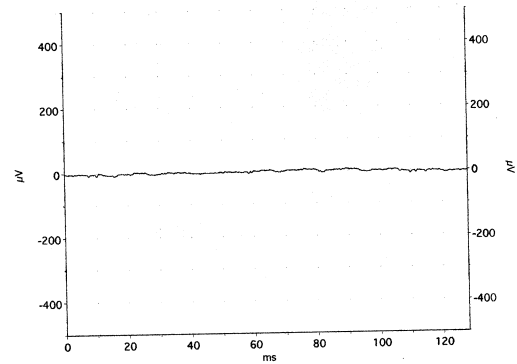


Fig. 5 While scanning – unassisted

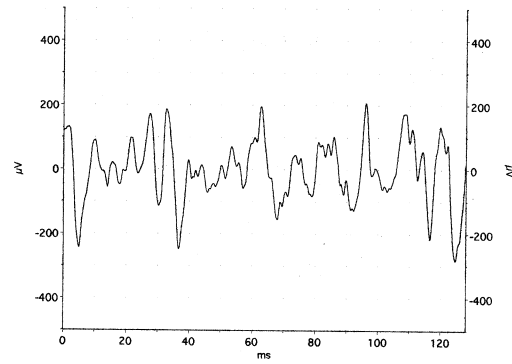
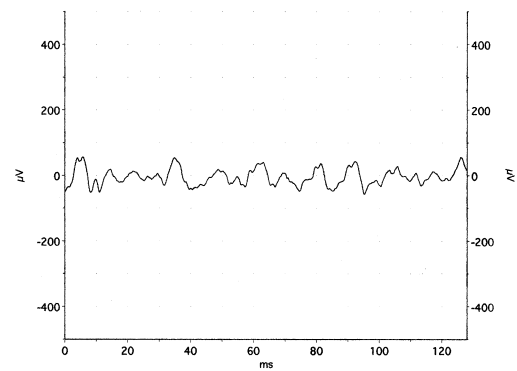
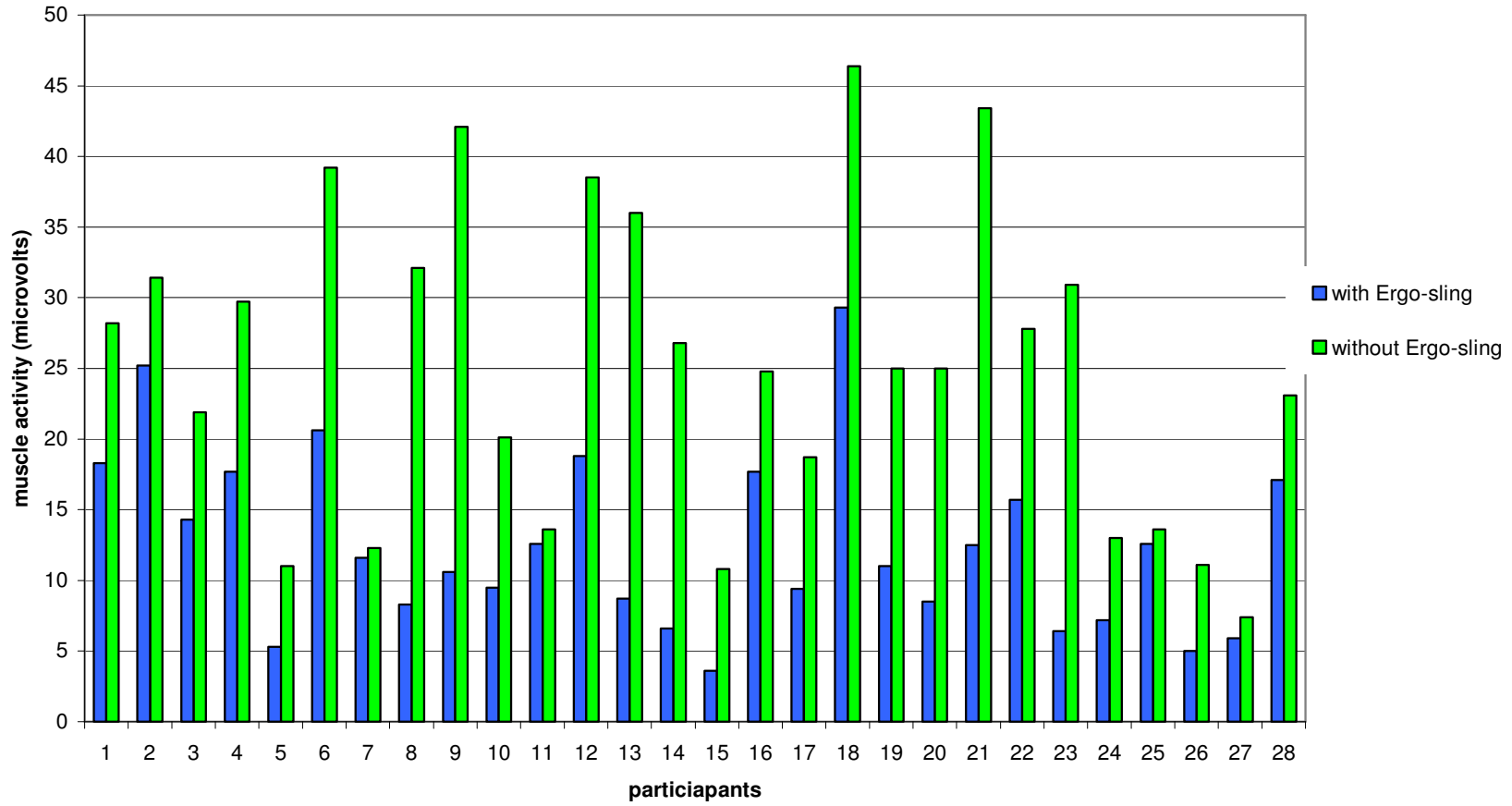


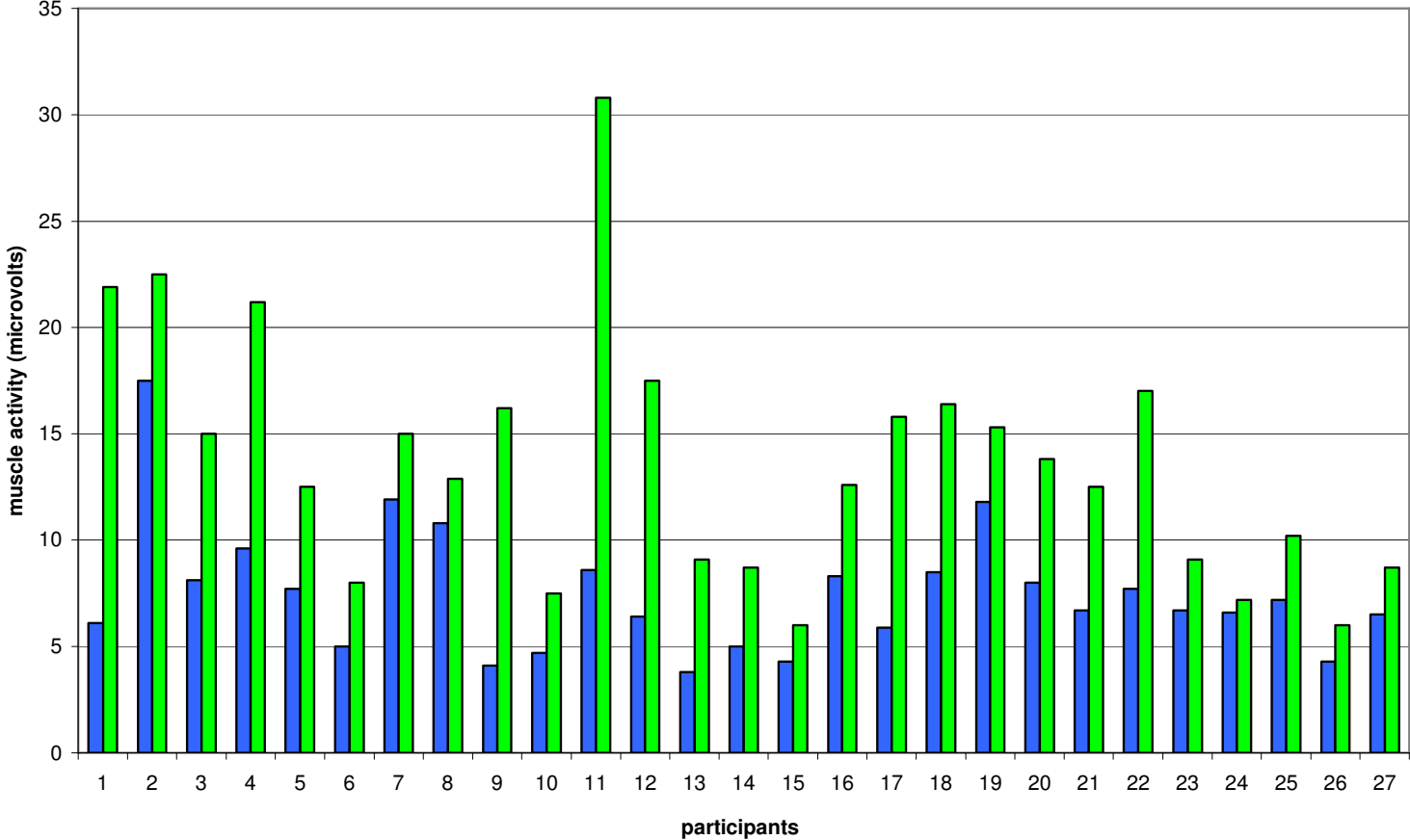
Fig. 6 While scanning – using sling



DELTOID EMG ASSESSMENT - AVERAGES



UPPER TRAPEZIUS EMG ASSESSMENT - AVERAGES



UPPER TRAPEZIUS - CHANNEL A						DELTOID - CHANNEL B					
with Ergo-sling			NO SLING			with Ergo-sling			NO SLING		
Average	Peak	Minimum	Average	Peak	Minimum	Average	Peak	Minimum	Average	Peak	Minimum
6.1	10.3	3.3	21.9	40.9	8.2	18.3	29	9	28.2	51.5	15.2
17.5	41.9	3.5	22.5	58.2	4.2	25.2	48.1	11.9	31.4	74.5	7.7
8.1	15.4	3.5	15	30.8	4.8	14.3	27.9	5	21.9	40.4	6.3
9.6	15	6.1	21.2	37.1	12.7	17.7	26	11.6	29.7	61.9	9
7.7	17.9	3.2	12.5	21.5	7.6	5.3	10.7	1.7	11	22	5.8
5	8.8	2.3	8	15.4	3.4	20.6	44.8	9.1	39.2	79.1	19.6
11.9	22.2	4.3	15	30.4	5.3	11.6	22.1	4	12.3	27.7	3
10.8	24.2	2.7	12.9	30	4.3	8.3	29.2	1.3	32.1	85.4	9.3
4.1	10.6	1.7	16.2	30.6	7.8	10.6	27.5	2.6	42.1	74.1	16.8
4.7	7.1	3	7.5	10.2	5	9.5	15.1	5.3	20.1	30.3	12
8.6	27.5	3.8	30.8	54.8	12.5	12.6	24	10.1	13.6	16.3	11.8
6.4	12.5	3.4	17.5	40	7.6	18.8	38.5	6.5	38.5	95.4	2.8
3.8	8.3	1.6	9.1	29.3	3.3	8.7	27.3	1.3	36	79.5	7.8
5	9.8	2.3	8.7	16.9	5.1	6.6	19	2.1	26.8	58.4	12.5
4.3	10.4	1.5	6	12.5	1.7	3.6	7.9	1.8	10.8	23.2	2.8
15.9	16.1	8.1	10.7	23	2.8	17.7	29.8	6.8	24.8	40.6	9.6
8.3	29.2	2.7	12.6	28.1	2.4	9.4	25.5	3.9	18.7	61.4	4.7
5.9	12.6	2.8	15.8	27.7	6.1	29.3	51.7	8.4	46.4	81.7	18.6
8.5	22.7	1.7	16.4	35.8	2.8	11	39.4	1.5	25	57.3	2.6
11.8	18.8	6.2	15.3	24	9.9	8.5	16.8	2.9	25	43	12.1
8	24	2	13.8	29.9	4.8	12.5	30.4	1.1	43.4	12.7	8.5
6.7	12.3	3.1	12.5	20.4	6.1	15.7	30.9	5.7	27.8	54.4	13.3
7.7	57.5	2.7	17	29.4	8.5	6.4	34.8	2.5	30.9	58.8	12.3
6.7	14	2.9	9.1	21.6	5.3	7.2	14.7	1.8	13	30.1	3.3
6.6	20.9	3.3	7.2	15.9	2.8	12.6	31.5	4.8	13.6	34.9	4
7.2	16.5	2.3	10.2	26.7	1.7	5	15.8	1	11.1	24	2.2
4.3	12.5	1.5	6	15.7	2	5.9	13.9	0.8	7.4	18.6	1.7
6.5	9.4	3.8	8.7	17.6	4.7	17.1	28.7	9.1	23.1	50.4	12.4
217.7	508.4	89.3	380.1	774.4	153.4	350	761	133.6	703.9	1387.6	247.7
7.78	18.16	3.19	13.11	26.70	5.29	12.07	26.24	4.61	24.27	47.85	8.54
3.33	10.95	1.51	5.75	11.45	2.97	6.31	10.90	3.50	11.06	23.68	5.21

4.16124E-06 0.000171 0.000151

6.16349E-08 5.38E-07 0.000127