ALGOMETER FOR ASSESSING PRESSURE PAIN_THRESHOLDS

Susana C. Domenech¹; Noé G. Borges Jr.¹; Daniela J. S. Mattos¹; Andrea F. Motta; Lucas Borges¹, Luana Bendo²; Valdir Soldi²; Valtencir Zucolotto³; Luiz H. C. Mattoso⁴

¹LABIN, CEFID, Universidade do Estado de Santa Catarina, Florianópolis, Brazil
²POLIMAT, Universidade Federal de Santa Catarina, Florianópolis, Brazil
³Grupo de Polímeros, Inst. de Física, Univ. de São Paulo, São Carlos, Brazil
⁴Embrapa Instrumentação Agropecuária, São Carlos, Brazil

KEY WORDS: biomechanics, instrumentation, algometry, pressure pain threshold

INTRODUCTION: Muscular and joint injuries and localized pain can be occasioned during sports practice. Although the reliability of palpation techniques (to evaluate muscle and joint tenderness) has improved and algometers have been developed¹, they do not simulate the palpation technique and real time measurements are not possible. A new pressure algometer to determine pressure pain thresholds in real time has been developed, to be used in diagnosis and injury treatment evaluation of athletes.

METHOD: The sensor element: is a cast composite film prepared with rubber (DSM Co.), a conducting filler (Eeonix Co.) and crosslinker (Hoechst). The sensor system (Fig. 1A): the “top” is a rounded retractile point and the “base”, a nylon cylinder in which aluminum parts and the composite film connect a two-point electrical circuit. The whole system is a handheld “pen” device (Fig.1B). The data conditioning system is a common-emitter transistorized amplifier. The software was programmed in C++ language (data acq.: 10 kHz). Five calibration experiments were conducted using a reference load cell. Each dynamic experiment consisted of six cycles of compression/decompression in a stress-strain machine (EMIC, DL 3000). The potential difference produced in the sensor by the applied force was acquired with a PCMCIA PC CARD, DAS 16/16 – AO - Computer Boards® A/D converter (16 bits, 16 channels, bipolar input: ± 1.25V - ± 10V).

RESULTS AND DISCUSSION: Linearity of the load cell: r² = 0.99999. The sensor response is similar to the reference (Fig.1C), even at different acquisition rates and at several cycles.

CONCLUSION: The sensor prototype showed a nearly linear dynamic response, compared to a reference system. Validity and reliability of the system is still in progress.

REFERENCES:

Acknowledgement
The authors thank Eeonix Corp. and DSM elastomers of Brazil, for supplying the reagents. Financial support from CNPq and an undergraduate fellowship from UDESC are gratefully acknowledged.