

**Report submitted to the  
Québec Minister Responsible for Research,  
Science and Technology**

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## MISSION

To assist the Minister of Research, Science and Technology and the policymakers in Québec's health-care system, including the Ministère de la Santé et des Services sociaux, by means of health technology and intervention modality assessments, specifically, by assessing their efficacy, safety, costs and cost-effectiveness, and their ethical, social and economic implications.

To assist the Minister of Research, Science and Technology in developing and implementing scientific policy.

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## PULSED SIGNAL THERAPY AND THE TREATMENT OF OSTEOARTHRITIS

Osteoarthritis is a slowly and cyclically evolving disease with a high prevalence, especially among the elderly. Most often, it affects the joints in the hip, knee, cervical and lumbar spines, and fingers. Having a noninvasive and nonpharmacologic treatment that is effective in relieving pain and improving joint function is desirable.

Several studies have suggested using pulsed electromagnetic fields as a therapeutic option, one of the applications being pulsed signal therapy (PST). Since the efficacy of these methods is still debated, the Collège des médecins du Québec asked the Agence d'évaluation des technologies et des modes d'intervention en santé (AÉTMIS) to assess PST in the treatment of osteoarthritis. This assessment is essentially based on a critical review of the studies published on the subject.

The results of the studies examined strongly suggest an analgesic effect and improved joint function in osteoarthritis, but these results need to be confirmed by larger, methodologically well-designed studies and by a better understanding of the mechanisms of action at work. The role of this therapy in relation to the other available treatments may then be better defined.

However, it is difficult to consider this technology purely experimental, since it is already being used by physiotherapy clinics, physicians in private practice and private individuals in Québec and elsewhere in the world. Consequently, AÉTMIS believes that the use of pulsed signal therapy cannot be generalized and that research should continue on its efficacy and cost-effectiveness in the treatment of osteoarthritis.

In disseminating this report, AÉTMIS wishes to provide the best possible information to the policymakers concerned at different levels in Québec's health-care system.

Renaldo N. Battista  
President and Chief Executive Officer



## SUMMARY

Pulsed signal therapy (PST) is a therapeutic application of pulsed electromagnetic fields (PEMFs). This noninvasive technique consists in applying an extremely-low-frequency (ELF) magnetic field, either with a ring or cylinder surrounding the affected part of the body, or with electrodes applied on the skin. The most widely known application of pulsed fields is the treatment of nonhealing fractures, i.e., those that do not heal after a few weeks of standard immobilization with a cast. However, there are other possible applications. The purpose of this report, which stems from a request by the Collège des médecins du Québec, is to assess the efficacy of PST in relieving pain and improving joint function in osteoarthritis.

Osteoarthritis is a slowly and cyclically evolving disease with a high prevalence, especially among the elderly. It is characterized, among other things, by the gradual destruction of joint cartilage in pressure areas and by joint deformities. The joints most often affected are those in the hip (coxarthrosis), knee (gonarthrosis), cervical and lumbar spine, and fingers. Having a noninvasive and nonpharmacologic treatment that is effective in relieving pain and improving joint function is desirable.

A literature search revealed seven studies that had investigated the efficacy of pulsed signal therapy in the treatment of osteoarthritis, but only four of them could be used for this assessment. All of these studies have

methodological weaknesses. Furthermore, it is difficult to compare the studies because the outcome measures were different and the PST techniques differed in terms of electromagnetic wave frequency, intensity and shape. Moreover, what the impact of these different parameters was on the results obtained cannot be determined.

The results of the studies examined strongly suggest an analgesic effect and improved joint function in osteoarthritis, but these results need to be confirmed by larger and methodologically well-designed studies and by a better understanding of the mechanisms of action at work. Consequently, AÉTMIS believes that this technology has almost reached the innovative stage, especially since it is already being used by physiotherapy clinics, physicians in private practice and private individuals in Québec and elsewhere in the world and since the user professionals consulted believe that pulsed electromagnetic field therapy may have a role to play in the therapeutic arsenal for osteoarthritis.

However, pulsed signal therapy should not be put into general use until research in the appropriate settings has conclusively demonstrated its beneficial effects. Furthermore, it would be desirable if this research could, as soon as possible, compare this therapy with the alternatives from the standpoint of both efficacy (including the speed of onset of action and adverse effects) and cost-effectiveness. It would then be possible to situate this therapy in relation to all the other therapeutic approaches to osteoarthritis.