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# Chronic pain

## From the study of student attitudes and preferences to the *in vitro* investigation of a novel treatment strategy

**Linda Rankin**

Akademisk avhandling

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Fakultetsopponent: Docent, Emmanuel Bäckryd, Institutionen för hälsa, medicin och vård, Linköpings universitet, Linköping, Sverige.

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## Author
Linda Rankin

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## Abstract
Chronic pain will affect one in five adults during their lifetime, and it exerts a heavy burden on society with major physiological, psychological, social, and economic impacts. The current chronic pain curriculum taught to medical students in most settings is fragmented, inconsistent and inadequate and a vast majority of general practitioners considered their undergraduate training in chronic pain incomplete. Attitudes and beliefs amongst health care personnel are important and have shown to have impact on clinical management. There is currently a knowledge gap that needs to be addressed in this matter.
In this thesis, through an online survey, the attitudes and beliefs of medical students in Sweden and Australia were surveyed. Additionally, we explored which factors influence chronic pain management amongst medical students in Sweden and Australia and Swedish general practitioners.

We found that Swedish final year students have a more positive attitude towards chronic pain patients compared to Australian students. Both student cohorts perceived chronic pain management education in need of improvement. Furthermore, we found that the relative importance of factors that influence treatment decisions are formed early during undergraduate training, which further underlines the importance of improving pain curricula during undergraduate medical education in order to give the emerging workforce appropriate tools to manage chronic pain.

Management of chronic pain urgently requires novel, well-tolerated pharmacological treatment strategies. Palmitoylethanolamide (PEA) is a potential candidate for managing chronic pain. Its analgesic and anti-inflammatory effects have been observed in a range of experimental animal models and clinical trials. However, questions remain as to how PEA exerts its effects and how levels of PEA and its congeners are changed in states of pain and inflammatory disorders in humans.

Treatment with PEA decreases cyclooxygenase 2 (COX-2) activity in animal models, but we found that PEA did not have direct effects upon the kinetic properties of COX-2 in a cell free system. However, COX-2 derived eicosanoid levels were reduced by PEA in lipopolysaccharide and interferon-g-stimulated RAW264.7 cells. With respect to changes in PEA levels in a chronic inflammatory disorder, we investigated PEA levels, in addition to its synthesizing and hydrolysing enzymes in biopsies from patients with oral lichen planus (OLP). We found that the ratio of prostaglandins to PEA was increased in the OLP biopsy samples. Furthermore, *PTGS2* mRNA levels (coding for COX-2) were increased in OLP-patients compared to controls relative to *NAPEPLD* mRNA levels (coding for a key enzyme in the synthesis of PEA). These results suggest that there is a relative deficit of PEA in OLP, raising the possibility that PEA might be useful for the treatment of this disorder.

## Keywords
Chronic pain, prolonged pain, chronic pain education, chronic pain management, medical students, attitudes, HC-PAIRS, best-worst scaling, palmitoylethanolamide, oral lichen planus, cyclooxygenase-2, *N*-acylethanolamines.

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