INTRODUCTION
Low Field Magnetic Stimulation (LFMS), a neuromodulation and non-invasive therapy, has shown to produce rapid mood improvement in patients with major depressive disorder. Research showed that static magnetic field stimulation enhances oligodendrocyte differentiation by secreting neurotrophic factors (2). A study showed that increased levels of brain-derived neurotrophic factor and NT-3 are critical for cell proliferation. Transforming growth factor β, TGF-β, known as a multi-functional growth factor, participates in many essential functions, including cell cycle control, regulation of early development and differentiation, neuron survival and glial differentiation. The underlying molecular mechanisms by which LFMS exerts are remained unclear. Our present data showed that LFMS increased TGF-β1 secretion and together with the enhanced differentiation of progenitor cells into oligodendrocytes.

OBJECTIVES
1) Determine effects of LFMS on proliferation and differentiation of CG4 cells, a bi-potential oligodendrocyte-type-2 astrocyte (O-2A) progenitor cell line, capable of differentiating into either oligodendrocytes or type 2-astrocytes. 2) Investigate mechanisms to explain the differentiation promoting properties of LFMS.

MATERIALS AND METHODS
1. Cell culture and treatment: LFMS: 20 min/day at RT with 40Hz daily; Sham: 20 min/day at RT with no magnetic daily; 2. MTT and WST to measure cell proliferation; 3. ICC to locate the cell lineage markers; 4. ELISA to measure the cytokine levels in culture medium; 5. Western blot to show the expression levels of cell lineage markers.

RESULTS

Conclusions:
The present data suggested that: 1) LFMS could preferentially promote differentiation of CG4 (OPCs) cells into oligodendrocyte lineage; 2) LFMS increased TGF-β1 secretion, when most cells were in astrocyte lineage, TGF-β1 secretion was decreased, when cells differentiated to oligodendrocyte lineage. Further work will explore the involvement of TGF-β Smad or non-Smad pathways with LFMS treatment.

References
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Acknowledgement: The authors are grateful for the funding provided by the college of Medicine, University of Saskatchewan start-up fund; Saskatchewan Health Research Fund (SHRF) Establishment grant and Iver and Joyce Graham Indiana Small Professorship.