Cell-based treatment increases Quality of Life and reduces amount of Knee Replacement Surgeries compared to current standard of care for knee osteoarthritis patients

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Table 1: Study results

		Societal perspective		Hospital perspective			
Treatment arm	QALYs per person over 40 years	Costs per person over 40 years (€)	**ICER (compared to SoC) (€)**	Costs per person over 40 years (€)	**ICER (compared to SoC) (€)**	**TKR**	**TKRR**
hiMSC automated	22.796	175,023.42	-68,870.58	35,569.25	-10,982.10	426	19
hiMSC manual	22.796	176,324.82	-67,280.27	36,870.66	-9,301.79	426	19
HiMSC and EV automated	22.796	173,467.71	-70,771.65	34,013.54	-12,793.17	426	19
HiMSC and EV manual	22.796	174,118.41	-69,976.50	34,664.25	-11,998.02	426	19
Standard of care	21.978	231,392.41		44,482.61		609	30

Cell based treatments show dominance over SoC, irrespective of how they are produced and the perspective of the analysis.

The number of surgeries is expected to be reduced.

Hospital perspective / Societal perspective: hiMSC treatment for OA **vs.** Standard of care **vs.** hiMSC and EV treatment for OA

Figure 1: Study aim

Background

Osteoarthritis (OA) is a leading cause of disability worldwide, resulting in pain, structural changes in the bone and joint space, and limitation of motion [1]. Cell and cell-based therapies, targeting the disease, are being developed for the treatment of OA by the AutoCRAT project. The aim of this study was to assess the cost-effectiveness of AutoCRAT's mesenchymal stromal cells (MSC) and extracellular vesicles (EV) treatments compared to standard of care (SoC) for patients with Kellgren-Lawrence (KL) stage II knee OA in the Netherlands over a period of 40 years, from a societal and hospital perspective.

Methods

A Markov model with 8 health states was developed to calculate the difference in health outcomes (i.e., quality adjusted life year (QALYs)), amount of total knee replacement (TKR) surgery and TKR revision (TKRR) surgery over 40 years. Knee OA health states were based on the KL scale. The eight health states are Healthy, KL I, KL II, KL III, KLIV, TKR, TKRR and Death. Input parameters were derived from literature [2, 4-9]. Outcomes were discounted [3].

AutoCRAT project

Automated Cellular Robot-Assisted Technologies for translation of discovery-led research in Osteoarthritis (AutoCRAT) is a Horizon2020 project (Nr. 874671) focused on delivering new cell and cell-based therapies for OA and joint repair using sustainable sources of cells and developing a closed, scalable and regulatory-compliant automated system to enable future production of therapeutic products.

Results

From the health economic model used in this study, it was found that hiMSC and EV treatments produced by the AutoCRAT production process have been shown to be dominant over standard care for patients with KL stage II knee OA in the Netherlands over a period of 40 years from both a societal and hospital perspective. Also, the amount of surgeries was expected to be lowered. This hypothesis held for the performed scenario analyses.

Table 2: Performed scenario analyses

SCENARIO 1	Patients can only receive cell-based treatment once instead of every time they enter stage KL II
SCENARIO 2	Lower transition probability from Healthy state to KL I state
SCENARIO 3	Effect of cell-based treatments derived from the results of AutoCRAT's large-animal studies
SCENARIO 4	People receiving a cell-based treatment regress to state KL I instead of the Healthy state

Conclusions

The results of this study imply that the novel treatments should be considered for reimbursement in the Netherlands. The model can be used to study cost-effectiveness in other settings.

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