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Premarket Registration Full Evaluation Route
Summary Assessment Report for
CELLONTECH CartiZol Collagen Joint Supplement

Listing number	MDPR260105W0010
Date of approval	06/01/2026
Product owner	CELLONTECH Co., Ltd.
Registrant	PLATINUM MEDICAL PTE. LTD.
Risk Class	Class D
Intended use / Indications of use	CartiZol™ improves knee joint activity by reducing pain and discomfort around damaged knee cartilage. CartiZol™ can also be used to protect tissue around the knee joint from damage by forming a membrane coating with type I collagen. CartiZol™ can be used to treat pain in the knee joint caused by osteoarthritis with Kellgren Lawrence (KL) grade 1 – 3.

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1. Device description

CartiZol™ is a collagen filler for intra-articular injection. It contains dispersed porcine-derived type I atelocollagen that has undergone a manufacturing process to minimise its antigenicity by removing telopeptide at both ends of the collagen molecule.

Atelocollagen of CartiZol™ is biocompatible collagen derived from porcine skin with minimal immunogenicity due to an authentic triple- helix structure and the removal of antigen at the terminal telopeptide. Collagen fibrils within the scaffold form a refined network with surrounding tissues, guiding cells and other molecules to the defect area and strengthening the natural healing process of articular cartilage. As the scaffold is resorbed by the body, atelocollagen in CartiZol™ integrates and merges with joint tissue as well as metabolised according to the natural cycle of tissue turnover.

CartiZol™ improves knee joint function by reducing pain and discomfort around damaged cartilage. It can also protect tissue around the knee joint from damage by forming a membrane coating with type I collagen. The product provides collagen as an organic supplement to cartilage, with an additional effect of coating lamina splendens (the outmost type I collagen layer of articular cartilage) and soft tissues. Injected CartiZol™ offers several additional benefits: lubrication of joint movement, prevention of cell damage, stable securing of tissue molecule, and protection to mechanical and chemical stimuli.

CartiZol™ should only be administered by authorised physician or medical professional who is familiar with intra-articular injection techniques. Additional contraindications, warnings and precautions can be found in the product labelling.

2. List of standards applied

Standards	Title
EN ISO 14971	Medical devices — Application of risk management to medical devices
EN ISO 10993	Biological evaluation of medical devices
EN ISO 13408	Aseptic processing of health care products
EN ISO 14155	Clinical investigation of medical devices for human subjects — Good clinical practice
EN ISO 15223	Medical devices — Symbols to be used with information to be supplied by the manufacturer
EN 62366-1	Medical devices Part 1: Application of usability engineering to medical devices
EN ISO 11737	Sterilisation of health care products — Microbiological methods
EN ISO 11135	Sterilisation of health-care products — Ethylene oxide — Requirements for the development, validation and routine control of a sterilisation process for medical devices
EN ISO 11137	Sterilisation of health care products — Radiation
EN ISO 11607	Packaging for terminally sterilised medical devices
EN 1041	Information supplied by the manufacturer of medical devices
EN ISO 14630	Non-active surgical implants — General requirements
EN ISO 14644	Cleanrooms and associated controlled environments
EN ISO 22442	Medical devices utilising animal tissues and their derivatives

3. Pre-clinical assessment

(i) Summary of biocompatibility studies:
Atelocollagen: Cytotoxicity, Sensitisation, Intracutaneous reactivity, Systemic toxicity (acute), Material-mediated pyrogenicity, Subacute & subchronic toxicity, Genotoxicity, Implantation were done in accordance with ISO 10993 and passed the acceptance criteria

Following a comprehensive evaluation aligned with ISO 10993 standards, it was concluded that additional testing of the atelocollagen for chronic systemic toxicity, carcinogenicity, and biodegradability was not required.

Syringe: Cytotoxicity, Sensitisation, Intracutaneous reactivity were done in accordance with ISO 10993 and passed the acceptance criteria.

(ii) **Atelocollagen** is sterilised by aseptic filtration in accordance with ISO 13408 and met sterility assurance level of $10^{-3.}$

Syringe is sterilised with ethylene oxide in accordance with ISO 11135 and ISO 10993-7 and met sterility assurance level of $10^{-6.}$

(iii) Studies (functional and packaging) provided supported shelf life of 36 months. Parameters tested include visual appearance of device, pH, sterility, endotoxin, collagen content, presence of residue on ignition, heavy metals, collagenase/ trypsin resistance, packaging leak test.

(iv) Efficacy of CartiZol™ in treatment of articular cartilage lesion was demonstrated in 12-weeks animal model studies, where cartilage regeneration was successful in animals treated with CartiZol™ post 12-weeks surgery, with histological score superior to the control group.

Long-term efficacy of atelocollagen was demonstrated in 12-month mouse study using an equivalent device which was well-retained in the mice, and its chemical composition and structure were not changed during the study period. Neighbouring cells/ tissues were shown to have migrated into the graft and led to revascularisation.

4. Clinical assessment

(i) Literature review:

Summary:
The overall quality of the literature review is acceptable in terms of study design and sample size. In summary, the literature review is adequate and provides objective clinical benefits on collagen-based intra-articular injection in alleviating pain in knee osteoarthritis. The literature data demonstrated that the equivalent and subject devices were comparable to the current gold standard treatment in terms of safety and performance.

(ii) Evaluation of Clinical Investigations

Title	A double-blind, randomised, post-marketing clinical trial to evaluate the efficacy by comparing intra-articular collagen injection with normal saline injection in patients with knee joint pain
Study Design	Multicenter, double-blind, randomised
Sample Size	200 patients
Follow-Up Period	Day 0 (pre-injection screening); 4, 12 and 24 weeks post-injection
Study Endpoints	Efficacy endpoints: • 100mm Visual analogue scale (VAS) • Western Ontario and McMaster Universitities Arthritis Index (WOMAC) • SF-36 • Physical examination Safety endpoints: Occurrence of adverse events
Study Device	CartiZol 6% atelocollagen
Efficacy results	**100mm Visual analogue scale (VAS)** At 24 weeks post-injection, the VAS score was significantly lower in the experimental group than control group (injected with saline). **Western Ontario and McMaster Universitities Arthritis Index (WOMAC)** WOMAC total score was significantly lower at 24 weeks post-injection than at pre-injection timepoint. **SF-36** While changes at 24 weeks post-injection did not reach statistical significance, significant improvements were observed at both 4 and 12 weeks, highlighting notable early and intermediate improvements. **Physical examination** The analysis of the X-ray findings, including anteroposterior alignment, joint space narrowing, osteophytes, and patellar position patellar subluxation/ dislocation, did not show a statistically significant difference between the experimental group and the control group (P>0.0500).

Safety results	26 adverse events related to the medical device occurred (Experimental Group: 15 cases; Control Group: 11 cases), with no statistically significant difference between experimental and control groups. No serious adverse device reactions occurred in the experimental group.
EO's assessment	The overall quality of the clinical study is acceptable in terms of design and sample size, and the findings demonstrate efficacy of the subject device in reducing knee joint pain compared with the saline control. Statistically significant improvements were observed at early and intermediate time points, and sustained benefits were reflected in the WOMAC total score at 24 weeks. Radiographic analyses did not reveal differences between groups, supporting consistency in structural outcomes. From a safety perspective, no new risks were identified, and the safety profile of the subject device was comparable to that of the control group, with no serious adverse device reactions reported for CartiZol.

Clinical experience (GMD):

All potential device-related adverse events, particularly serious adverse events identified are expected and covered by the risk analysis and information for use (IFU). The frequency and severity of these adverse events are considered acceptable. No new hazards were identified or field safety corrective actions associated with the use of device were reported in post-market surveillance assessment.

5. Assessment of device quality

Device components are manufactured in Korea and Singapore, at CELLONTECH CO., LTD. and BECTON DICKINSON MEDICAL (S) PTE LTD respectively. Both manufacturing sites conform to the ISO 13485:2016 quality management system.

6. Conclusion

The device demonstrates acceptable safety and efficacy for its intended use in improving knee joint activity by reducing pain and discomfort around damaged knee cartilage. All foreseeable risks have been identified and reasonably mitigated through appropriate design controls, labelling and user instructions. The comprehensive pre-clinical and clinical data support the device's safety and effectiveness for the intended patient population.