Abstract OP0059 – Figure 1 Mean change from baseline in cartilage thickness (by qMRI) over 3 years in: a) and b)

Conclusions: The 3 year results of the FORWARD study are consistent with the 2 year results: although cartilage thickness declined in all treatment groups between Year 2 and 3, the difference at Year 2 with sprifermin 100 µg vs PBO was maintained up to Year 3. Based on qMRI sprifermin is effective at increasing cartilage thickness in a dose-dependent manner in knee OA patients, and has an acceptable safety profile.

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OP0060 KNEE JOINT DISTRACTION COMPARED WITH HIGH TIBIAL OSTEOTOMY AND TOTAL KNEE ARTHROPLASTY: TWO-YEAR CLINICAL, STRUCTURAL, AND BIOMARKER OUTCOMES

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Background: Knee joint distraction (KJD) is a new joint-preserving surgery technique that, like high tibial osteotomy (HTO), aims to delay total knee arthroplasty (TKA) especially in younger patients with knee osteoarthritis (OA). One year after treatment, KJD demonstrated similar beneficial outcomes compared to HTO and compared to TKA.^{1,2}

Objectives: To compare radiographic joint space width and clinical outcome over two-years for KJD vs TKA and for KJD vs HTO and to additionally study KJD cartilage repair by evaluation of systemic collagen type II markers.

Methods: End-stage knee OA patients considered for TKA were randomised to KJD (n=20; KJD_{TKA}) or TKA (n=40). Medial compartmental knee OA patients with a varus deviation of <10° considered for opening wedge HTO were randomised to KJD (n=23; KJD_{HTO}) or HTO (n=46). Distraction surgery was performed by use of

two external fixators with built in springs, placed lateral and medial of the knee joint. The knee was distracted 5 mm for 6 weeks and weight-bearing was encouraged.

WOMAC questionnaires (100 best) and VAS pain scores (0 best) were assessed at baseline (0), 3, 6, 12, 18 and 24 months. In the KJD groups, serum PIIANP and urine CTXII levels, as markers for collagen type II synthesis and breakdown, were determined over time. Normalised Z-indexes were calculated ($Z_{\text{index}} = Z_{\text{PIIANP}} - Z_{\text{CTXII}}$) to express net collagen type II synthesis. The minimum and mean joint space width (JSW) of the most affected compartment (MAC) were measured with KIDA software on standardised radiographs taken at 0, 12 and 24 months.

Results: Of the 129 included patients, 1, 6, 3, and 5 patients were lost in the KJD_{TKA}, TKA, KJD_{HTO}, and HTO group respectively, for various reasons. One-year structural and clinical outcomes were statistically significantly improved as reported before, and these beneficial effects sustained for at least two years after treatment when compared to baseline (figure 1A-C).

At 24 months, there were no significant differences between the KJD_{HTO} and HTO groups (all p>0.25) and between the KJD_{TKA} and TKA group, except for VAS pain score in favour of TKA at 24 months (p=0.037; figure 1B).

Compared to baseline, the ratio of synthesis over breakdown of collagen type II biomarkers (figure 1D) was significantly decreased at 3 months (-0.45±0.20; p=0.032) after which this reversed towards an increase over time (at 24 months +0.59±0.19; p=0.004).

Abstract OP0060 – Figure 1 Change in A) total WOMAC score and B) VAS pain score after treatment with knee joint distraction (KJD), total knee arthroplasty (TKA) and high tibial osteotomy (HTO). KJD patients are divided in KJD_{TKA} (from the trial including patients for KJD and TKA) and KJD_{HTO} (from the trial including patients for HTO and TKA). C) change in minimum joint space width (JSW) measured on radiographs after KJD and HTO. D) change in biomarker Z-index changes for all KJD patients (KJD_{TKA} and KJD_{HTO} combined) after treatment. $Z_{\text{index}} = Z_{\text{PIIANP}} - Z_{\text{CTXII}}$, where the Z-values for both biomarkers are relative to baseline and (*) indicates statistically significant changes compared to baseline. In all graphs, the mean values ±SEM are given.

Conclusions: Sustained improvement of clinical benefit and increase in JSW after KJD is demonstrated for over 2 years of follow-up in case of treatment of patients with medial compartmental knee OA indicated for HTO or patients with end-stage knee OA indicated for TKA. The structural cartilage repair observed on radiographs is supported by a beneficial change in systemic biomarkers for collagen type II. For the HTO-indicated population, results of KJD patients were similar to those of HTO. For the TKA-indicated patients, TKA appeared to result in a slightly better clinical outcome, however at the expense of the native knee joint.

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OP0061 TREATMENT OF KNEE OSTEOARTHRITIS WITH SM04690 IMPROVED WOMAC A1 'PAIN ON WALKING' – RESULTS FROM A 52 WEEK, RANDOMISED, DOUBLE-BLIND, PLACEBO-CONTROLLED, PHASE 2 STUDY OF A NOVEL, INTRA-ARTICULAR, WNT PATHWAY INHIBITOR

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Background: Knee osteoarthritis (OA) is characterised by pain, disability and joint deformity due to articular cartilage degradation and bone remodelling. Wnt

signalling is involved in these cellular processes. SM04690, a small molecule, intra-articular (IA), Wnt pathway inhibitor, is in development for treatment of knee OA as a potential disease modifying drug.

Objectives: A phase 2, multicenter, 52 week, randomised, double-blind, placebo-controlled (PBO) trial of SM04690 was conducted. Safety and efficacy outcomes including the Western Ontario and McMaster Universities Arthritis Index (WOMAC) question A1 were evaluated.

Methods: Subjects with ACR-defined knee OA, Kellgren-Lawrence (KL) grades 2–3, received a single 2 mL IA injection of SM04690 (0.03, 0.07 or 0.23 mg) or PBO in the target (most painful) knee. WOMAC was assessed at baseline and 4, 13, 26, 39 and 52 weeks post-injection. WOMAC question A1, ('how much pain have you had when walking on a flat surface?'), was analysed as an exploratory outcome. Analysis of covariance adjusted for WOMAC A1 baseline in the intent-to-treat (ITT) population was conducted. Two subgroups identified in the primary analysis¹ were also explored: 1) subjects with unilateral symptomatic knee OA (pre-specified) and 2) subjects with unilateral symptomatic knee OA without widespread pain or comorbid symptoms (Widespread Pain Index ≤ 4 and Symptom Severity ≤ 2 [WP-], post-hoc).

Abstract OP0061 – Figure 1. Change and ladder plots depicting average WOMAC A1 improvement in SM04690 over placebo adjusted for baseline WOMAC A1. *Minimal clinically improvement difference (MCID) defined as 10% of WOMAC A1.

Results: 455 subjects, mean age 60.3 [±8.7] years, BMI 29.9 [±4.6] kg/m², female 58.9%, KL 3 [64.1%], with unilateral symptomatic OA [36.0%] were enrolled (n=402 [88.4%] completers). No safety signals were observed.

For WOMAC A1, in the ITT population, no statistically significant differences between treatment groups and PBO were seen, although the 0.07 mg dose demonstrated improvements compared to PBO at all timepoints (figure 1). In unilateral symptomatic subjects, 0.07 mg showed statistically significant improvements in WOMAC A1 compared to PBO at Weeks 39 (-1.2, 95% CI: [-2.3 to -0.0], p=0.043) and 52 (-1.1, 95% CI: -2.0 to -0.1, p=0.027).

In unilateral symptomatic WP- subjects, the 0.07 mg dose showed statistically significant improvements in WOMAC A1 compared to PBO at Week 26 (-1.2, 95% CI: -2.1 to -0.2, p=0.015), through Weeks 39 (-1.8, 95% CI: -3.0 to -0.6, p=0.004) and 52 (-1.4, 95% CI: -2.5 to -0.4, p=0.010).

Conclusions: In this phase 2 study, improvements compared to PBO in WOMAC A1 were seen in clinically relevant unilateral symptomatic and unilateral symptomatic WP- subgroups. The improvements seen in this combined, multi-dimensional outcome of pain and function suggested SM04690 has a potential role in the treatment of signs and symptoms of knee OA.

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Pharma AG, Plexikon, Pfizer, Proximagen, Regeneron, Samumed, LLC, Thera-logix LLC

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LB0002 BIOMECHANICAL THERAPY FOR OSTEOARTHRITIS OF THE KNEE: A RANDOMISED CONTROLLED TRIAL (BIOTOK)

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Background: Biomechanics plays an important role in knee osteoarthritis (OA). A new biomechanical footwear system aims at altering knee loading patterns and retraining neuromuscular control of the lower extremities. It consists of shoes with two adjustable convex pods at the soles, which are adjusted based on gait analysis, with the hypothesis that adjustments of the location of the pods will alter limb biomechanics so as to unload diseased compartments of the knee and that walking on the convex pods will facilitate muscular retraining.

Objectives: The aim of this trial was to compare the efficacy and safety of the new biomechanical footwear with an identical appearing shoe with flat pods (the sham device) in relieving pain and improving physical function in patients with knee OA.

Methods: In this randomised sham-controlled trial, patients with radiological knee OA (Kellgren-Lawrence grade ≥ 2), knee pain lasting for ≥ 6 months, and moderate pain on the WOMAC pain subscale (≥ 3 on a standardised scale from 0 to 10) were randomly assigned 1:1 to the biomechanical footwear or the sham device. The same shoe or device was provided for bilateral use. Patients in both groups were instructed to use the footwear for 30 minutes/day during the first week, and to increase use by 10 minutes/day each week to a maximum of 5 hours/day at 24 weeks. After 4, 8, 12, and 16 weeks, each patient's footwear

Abstract LB0002 – Figure 1