

**Abstract Presented at the American College of Rheumatology Annual Meeting  
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**Title:** The Efficacy of Glucosamine and Chondroitin Sulfate in Patients with Painful Knee Osteoarthritis (OA): The **Glucosamine/chondroitin Arthritis Intervention Trial (GAIT)**

**Category:** 7. Osteoarthritis—clinical aspects

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**PURPOSE:** Glucosamine (G) and chondroitin sulfate (CS) are widely promoted to “reduce joint pain and provide support for healthy cartilage and joint function.” GAIT was designed to rigorously assess the efficacy and safety of these agents alone and in combination. G and CS were required to meet pharmaceutical standards as GAIT was conducted under an Investigational New Drug application.

**METHODS:** Patients were ≥40 years of age with knee pain (WOMAC Pain 125-400 mm) of at least 6 months duration and x-ray evidence of knee OA [Kellgren-Lawrence (KL) Grades 2 or 3]. Patients were randomly assigned double-blind to placebo (P); G(Glucosamine HCl 500 mg) tid; Sodium CS 400 mg tid; G+CS at the above doses tid; or celecoxib (CE) 200 mg daily. All patients were allowed up to 4000 mg daily of acetaminophen (APAP) as rescue analgesia, except within 24 hours of study visits. Allocation was stratified by Center and by WOMAC Pain severity (125-300mm and 301-400mm). Patients were evaluated at baseline and weeks 4, 8, 16 and 24. The primary outcome measure was a 20% improvement from baseline in WOMAC Pain at week 24. Adverse events were documented at each visit. Analysis was based on intention-to-treat.

**RESULTS:** 3238 patients were screened at 16 US academic rheumatology centers. 1583 were randomized and 1258 (80%) completed the study. Baseline characteristics were: mean age 58.6 years, BMI 31.7 kg/m<sup>2</sup>, OA symptoms 10 years, 64% female, summed mean WOMAC Pain 236±73mm (206mm for 125-300mm stratum, 341mm for 301-400mm stratum), 59% KL Grade 2, and 78% were in the 125-300mm WOMAC Pain stratum and were evenly distributed across all arms.

The response rate for CE (70.1%) was higher than the response rate for P (60.1%) in the primary outcome analysis of all patients (p=0.008). In the 301-400 mm WOMAC pain stratum, the response rate for G+CS (79.2%) was higher than P (54.3%) (p=0.002). Secondary outcomes in the 301-400 mm stratum, including 50% WOMAC Pain response, WOMAC Stiffness, WOMAC Function, HAQ, patient assessments, and use of rescue APAP all demonstrated changes consistent with the primary outcome. Adverse events were generally mild and evenly distributed among the groups.

**Response Rates by Treatment Group and Pain Stratum**

	All patients	WOMAC Pain 301-400mm	WOMAC Pain 125-300mm
P	60.1%	54.3%	61.7%
CE	70.1%**	69.4%¶	70.3%*
G	64.0%	65.7%	63.6%
CS	65.4%	61.4%	66.5%
G+CS	66.6% <sup>+</sup>	79.2%#	62.9%
	** p= 0.008 CE vs. P <sup>+</sup> p= 0.09 G+CS vs. P	¶p = 0.06 CE vs. P # p = 0.002 G+CS vs. P	* p= 0.04 CE vs. P

**CONCLUSIONS:** Combination G+CS is effective in treating moderate to severe knee pain due to OA. The lack of response in patients with mild pain may be due to a floor effect, limiting ability to detect response. All study agents were well tolerated.