Purpose: Clinical studies have shown that rose hip powder (RHP) exerts beneficial effects in OA patients. Thus, substances contained in proprietary RHP should have an effect on parameters involved in disease initiation and progression. Until now only one of its constituents—GOPO—was shown to inhibit the migration of polymorphonuclear leukocytes. In this study various in vitro effects of RHP and GOPO related to inflammatory processes, erosion of cartilage tissue and chondro-protection were evaluated.

Methods: Anti-inflammatory effects were measured in LPS-activated macrophage RAW264.7 cells. Cells were cultured for 4–24 hrs with different doses of RHP or GOPO. Gene expression was quantified by RT-PCR; production of inflammatory mediators like PGE$_2$ was measured by ELISA and nitric oxide determined by the Griess reaction. Substances were tested on primary human chondrocytes (without and with concomitant binding to the increased CD44 in RA cartilage) may effectively protect OA joint destruction by fibronectin fragments like HBFN-f.

Results: Rose hip and GOPO inhibit the production of NO (IC$_{50}$ 81.6±35 mg/L and 37.0±43 mg/L, respectively). We observed weaker effects on PGE$_2$ production (IC$_{50}$ 594±43 mg/L and >50 µmol/L). Expression of inflammatory genes like iNOS, II-1alpha, MMP-9 was significantly reduced by GOPO, but to a lower degree by RHP. In activated chondrocytes, GOPO decreased the expression of catabolic genes (e.g. ADAMTS-4, MMP-1, MMP-13), interleukins or chemokines (IL1-alpha, II-8, CC5), whereas the expression of collagen or aggrecan genes was slightly increased. We observed a GOPO-dependent increased expression level of SOX-5 or SOX-9. RHP had similar although weaker effects. On a stoichiometric basis, however, the GOPO contents of RHP does not fully account for the observed biological effects and thus infers the presence of additional anti-inflammatory and chondro-protective substances in RHP.

Conclusions: The demonstrated anti-inflammatory effects in vitro are consistent with OA-reducing properties of RHP. In addition, its chondro-protective and cartilage-rebuilding activities are at least partially attributed to GOPO, a constituent galactolipid of RHP.

Purpose: This study was aimed to compare the inhibitory effects of hyaluronan (HA) on nitric oxide (NO) production by COOH-terminal heparin-binding fibronectin fragment (HBFN-f) between normal and rheumatoid arthritis (RA) cartilages.

Methods: Articular cartilage slices from RA knee joints or normal hip joints were cultured with HBFN-f with or without pretreatment with 2700 kDa HA. Alternatively, isolated RA chondrocytes in monolayer were incubated with HBFN-f. Secreted NO levels in conditioned media were determined. Induction of inducible nitric oxide synthase (iNOS) was assessed with immunoblotting. Immunofluorescence histochemistry was performed using fluorescein isothiocyanate-conjugated anti-CD44 antibody.

Results: HBFN-f stimulated NO production in a dose-dependent manner in association with iNOS induction in normal and RA cartilages. While CD44 expression was up-regulated in RA cartilage, HA significantly blocked HBFN-f-stimulated NO production in RA cartilage. Compared with normal cartilage, cartilage response to HBFN-f and the blocking effects of HA on HBFN-f action were stronger in RA cartilage.

Conclusions: The present study clearly demonstrated that RA cartilage exhibited stronger response to HBFN-f leading to NO induction. HA binding to the increased CD44 in RA cartilage may effectively protect RA joint destruction by fibronectin fragments like HBFN-f.

Figure 1. Sulf-1 and Sulf-2 mRNA expression in articular cartilage were significantly higher in the OA group (Sulf-1: P = 0.001, Sulf-2: P = 0.019).

Figure 2. The OA middle zone had significantly more Sulf-1 positive cells than the other zones (*: P < 0.01). Sulf-2 expression in normal cartilage was significantly higher than Sulf-1 (P = 0.02).