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Intra-articular gold micro particles and hyaluronic acid improve osteoarthritic pain and social function -A pilot study

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Background and aims

Many patients suffering from osteoarthritis (OA) do not get adequate pain relieve. Evidence suggest an inflammatory component in OA pain. Animal studies prove the effect of gold implantation in arthritic joints and a stimulation of the immune system.

Animal studies indicate gold ions have a long-acting effect on OA pain. The immuno-modulatory effect of gold ions have for more than 50 years a known anti-inflammatory effect in the treatment of rheumatic arthritis. Gold ions alter the function of macrophages by inhibiting lysosomal enzymes and lowering production of pro-inflammatory cytokines (1-2).

Dissolucytotic metallic gold (DMG) ions have an immune-suppressive effect in laboratory testing (3-6) (Figure 1 - 4). Animal studies prove the effect of gold implantation in arthritic joints (7-10). Injection of DMG in animal models stimulate the immune system (11-12). The carrier for injecting the DMG micro particles is hyaluronic acid (13-14).

The present open pilot study aimed to investigate if gold ions released from intraarticular gold micro particles have a role in different joint OA.

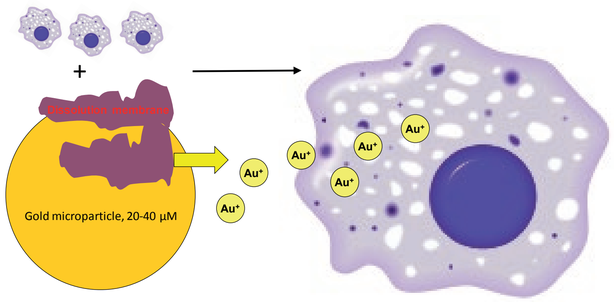

Figure 1. Macrophages controls the dissolution membrane which liberate the gold ions by oxidation of the surface. Once the ions are liberated, most likely as Au(CN) , they are free to diffuse through the immediate microenvironment. The gold-loaded molecules are taken up into the cells, primarily macrophages, mastcells and histocytes.

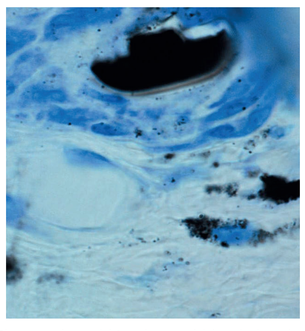

Figure 2. Close to the gold implant gold-loaded molecular clusters are located outside cells. The two loaded cells are believed to be macrophages loaded with gold ions. The gold ions accumulate primarily in the lysosymes (3).

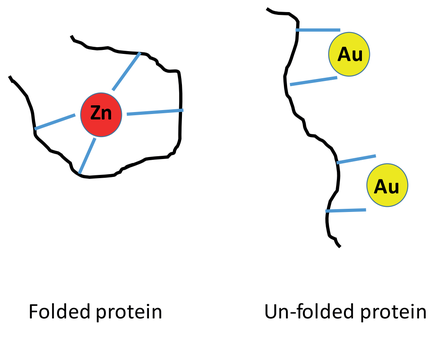

Figure 3. Once in the intercellular fluid and the intracellular compartments, the gold ions act in the same ways that have been demonstrated for systemically administered gold ions. The effect is related to the ability of the gold ions to unfold the protein structures.

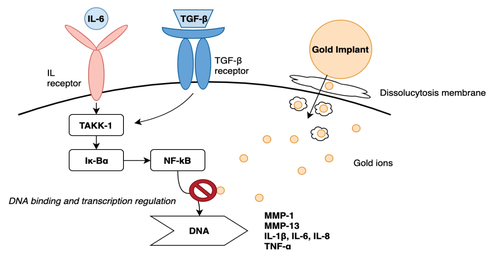

Figure 4. Gold ions suppress inflammation locally by affecting certain signalling molecules and binding enzymes essential for the inflammatory process. The DNA binding activity and transcription regulation of NF-kB is abolished when AU- ions replace Zn2+ ions. (4)

Methods

A cohort of 39 patients, aged 58 (37-78) years, pain ≥ 3 months, and Kellgren-Lawrence OA grade 3-4 were included. Metallic gold 20 mg, 72.000 pieces, 20-40 µ-meter (Berlock-Micro-Implants, HumanGoldInject) (13-14) were injected into the joints using 1-2 mL hyaluronic acid as the carrier. The primary outcome measure was change in pain at 8 weeks. The secondary outcome measures was change in social outcome assessed by a Danish 8 point version of the Glasgow Outcome Scale at 8 weeks.

Results

This study includes 31 knee, 6 hip, 4 shoulder, 4 ankle, 2 wrist and 10 small joints. Pain or social outcome was improved in 34/39 patients (95% CI 72.6 – 95.7 %). Pain was reduced in 44/57 joints (95 % CI 61 – 89 %). Social outcome was improved for 42/57 joints (95 % CI 57.2 – 86.5 %) (P < 0.001).

	Before	8 weeks
Dead		
Vegetative		
Dependent in daily life activities	9	1
Independent and cannot resume normal activity	7	2
Previous activity at lower level	19	10
Normal activity with deficit	20	18
Normal activity with minor deficits or complaints	2	19
No signs or symptoms		7

Table 1. Short category description and results of the Danish eight-point version of the Glasgow Outcome Scale.

Conclusions

The significant improvements in pain and social outcome caused by the intraarticular gold micro particles and hyaluronic acid indicate an inhibition of inflammation.

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