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(54) **STABALIZED GLYCOSAMINOGLYCAN PREPARATIONS AND RELATED METHODS**

(71) Applicant: **S.K. Pharmaceuticals**, San Juan Capistrano, CA (US)

(72) Inventors: **Hampar Karageozian**, San Juan Capistrano, CA (US); **John Park**, Santa Ana, CA (US)

(73) Assignee: **S.K. Pharmaceuticals, Inc.**, San Juan Capistrano, CA (US)

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(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,073,545	A	12/1991	Arima et al.
5,141,741	A	8/1992	Ishida et al.
5,273,056	A	12/1993	McLaughlin et al.
5,633,001	A	5/1997	Agerup
5,846,228	A	12/1998	Alexander
6,372,755	B2	4/2002	Hanamura et al.
2002/0127196	A1	9/2002	Avila et al.
2004/0137079	A1	7/2004	Cook et al.
2004/0191284	A1	9/2004	Yu et al.
2005/0152948	A1	7/2005	Hunter et al.
2006/0204471	A1	9/2006	Lacharriere et al.
2006/0258698	A1	11/2006	Mudumba et al.

FOREIGN PATENT DOCUMENTS

EP	0 705 095	B1	11/1997
GB	2160097	A	12/1985
JP	5170641	A	7/1993
JP	92-27385	A	9/1997
JP	10-72376	A	3/1998
JP	10-290830	A	11/1998
JP	2001-19611	A	1/2001
JP	2002-193815	A	7/2002
JP	2002-370966	A	12/2002
JP	2003-530136	A	10/2003
JP	2003-342197	A	12/2003
WO	WO00/59516	A1	10/2000
WO	WO03/061626	A1	7/2003

OTHER PUBLICATIONS

Bhat, S. V. (2002) Biomaterials in Ophthalmology. In Biomaterials (pp. 163-170). Springer Netherlands.*

Steckel et al., International Journal of Pharmaceutics (2003), vol. 257, pp. 181-194.

USPTO Office Action dated Jul. 23, 2008 in related U.S. Appl. No. 11/126,075, filed May 9, 2005, now U.S. Pat. No. 7,544,671.

USPTO Office Action dated Aug. 21, 2007 in related U.S. Appl. No. 11/126,075, filed May 9, 2005, now U.S. Pat. No. 7,544,671.

Lindenhayn et al. Journal of Biomedical Materials Research (1999), vol. 44, pp. 149-155.

Gutowska et al. The Anatomical Record (2001), vol. 263, pp. 342-349.

International Search Report and Written Opinion in related PCT Application No. US2008/081542. International Filing Date Oct. 29, 2008.

(Continued)

Primary Examiner — Patrick Lewis

(74) *Attorney, Agent, or Firm* — Robert D. Buyan; Stout, Uxa & Buyan, LLP

(57) **ABSTRACT**

Compositions comprising a glycosaminoglycan (e.g., a hyaluronan, hyaluronic acid, hyaluronate, sodium hyaluronate, dermatan sulfate, karatan sulfate, chondroitin 6-sulfate, heparin, etc.) in combination with at least one component selected from; i) polyglycols (e.g., polyethylene glycol), ii) long chain hydroxy polyanionic polysaccharides (e.g., dextran, sodium alginate, alginic acid, propylene glycol alginate, carboxymethyl cellulose and carboxyethyl cellulose, hydroxyl ethyl starch, hydroxyl propyl methyl cellulose, hydroxy propyl ethyl cellulose, hydroxy propyl cellulose, methyl cellulose, polylysine, polyhistidine, polyhydroxy proline, poly ornithine, polyvinyl pyrolidone, polyvinyl alcohol, chitosan, etc.) and iii) long chain Nitrogen containing polymers (e.g., Polylysine, Polyvinylpyrrolidone, and polyvinyl alcohol). The invention also includes methods for using such compositions (e.g., as substance delivery materials, tissue fillers or bulking agents, as moistening or hydrating agents, etc.)

4 Claims, 4 Drawing Sheets