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(54) **APTAMERS TO PDGF AND VEGF AND THEIR USE IN TREATING PDGF AND VEGF MEDIATED CONDITIONS**

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(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,711,955	A	12/1987	Ward
4,737,453	A	4/1988	Primus et al.
4,752,566	A	6/1988	Collins et al.
5,270,163	A	12/1993	Gold et al.
5,412,087	A	5/1995	McGall et al.
5,580,972	A	12/1996	Tu
5,582,981	A	12/1996	Toole et al.
5,599,720	A	2/1997	Ekins et al.
5,674,685	A	10/1997	Janjic et al.
5,719,273	A	2/1998	Tu et al.
5,723,594	A	3/1998	Janjic et al.
5,731,144	A	3/1998	Toothman et al.
5,731,424	A	3/1998	Toothman et al.
5,811,533	A	9/1998	Gold et al.
5,840,867	A	11/1998	Toole et al.
5,849,479	A	12/1998	Janjic et al.
5,859,228	A	1/1999	Janjic et al.
5,874,218	A	2/1999	Drolet et al.
5,945,527	A	8/1999	Tu et al.
6,051,698	A	4/2000	Janjic et al.
6,124,449	A	9/2000	Gold et al.
6,168,788	B1	1/2001	Wortham et al.
6,207,816	B1	3/2001	Gold et al.
6,229,002	B1	5/2001	Janjic et al.
6,762,290	B1	7/2004	Janjic et al.
7,855,054	B2	12/2010	Schneider et al.
7,947,447	B2	5/2011	Zichi et al.
8,816,056	B2 *	8/2014	Swayze C07H 21/00 536/23.1
8,975,388	B2	3/2015	Zichi et al.
9,125,930	B2	9/2015	De Franciscis et al.
2003/0054360	A1	3/2003	Gold et al.
2004/0180360	A1	9/2004	Wilson et al.
2005/0096290	A1	5/2005	Adamis et al.
2006/0057573	A1	3/2006	Gold et al.
2007/0166741	A1	7/2007	Heil et al.
2009/0004667	A1	1/2009	Zichi et al.
2009/0042206	A1	2/2009	Schneider et al.
2010/0317120	A1	12/2010	Heil et al.
2011/0136099	A1	6/2011	Schneider et al.
2014/0249043	A1	9/2014	Schneider et al.

FOREIGN PATENT DOCUMENTS

CN	1934255	B	7/2012
EP	2483408	A2	8/2012
WO	WO 91/16901	A1	11/1991
WO	WO 92/11389	A1	7/1992
WO	WO 96/27604		9/1996

(Continued)

OTHER PUBLICATIONS

EP Search Report issued in EP 13767724.1 on Sep. 28, 2015.
Nobuo et al. (Jun. 2006) American Journal of Pathology 168(6):2036-2053, "Inhibition of platelet-derived growth factor B signaling enhances the efficacy of anti-vascular endothelial growth factor therapy in multiple models of ocular neovascularization".
Ohuchi et al. (2006) Biochimie 88:897-904, "Selection of RNA aptamers against recombinant transforming growth factor-β type III receptor displayed in cell surface".
DiDonato (2006) "Dissertation. Part II. Synthesis and Evaluation of Modified Nucleotides for DNA Aptamer Selection" University of North Carolina, Raleigh 30-53.

(Continued)

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(57) **ABSTRACT**

Aptamers that bind PDGF and aptamers that bind VEGF are provided. In addition, aptamer constructs comprising a PDGF aptamer and a VEGF aptamer are provided. Pharmaceutical compositions comprising the aptamers and aptamer constructs are provided, as well as methods of treating conditions using the aptamers and aptamer constructs.

24 Claims, 29 Drawing Sheets