Muthiah Manoharan

List of Publications by Year
in descending order

107	18,644	44069 48	24982 109
papers	citations	h-index	g-index

113	113	113	13604
all docs	docs citations	times ranked	citing authors

#	Article	IF	Citations
1	Therapeutic silencing of an endogenous gene by systemic administration of modified siRNAs. Nature, 2004, 432, 173-178.	27.8	2,039
2	Rational design of cationic lipids for siRNA delivery. Nature Biotechnology, 2010, 28, 172-176.	17.5	1,366
3	RNAi-mediated gene silencing in non-human primates. Nature, 2006, 441, 111-114.	27.8	1,275
4	Sequence-specific potent induction of IFN-Î± by short interfering RNA in plasmacytoid dendritic cells through TLR7. Nature Medicine, 2005, 11, 263-270.	30.7	1,153
5	A combinatorial library of lipid-like materials for delivery of RNAi therapeutics. Nature Biotechnology, 2008, 26, 561-569.	17.5	1,076
6	RNAi therapeutics: a potential new class of pharmaceutical drugs. Nature Chemical Biology, 2006, 2, 711-719.	8.0	968
7	Mechanisms and optimization of in vivo delivery of lipophilic siRNAs. Nature Biotechnology, 2007, 25, 1149-1157.	17.5	854
8	Maximizing the Potency of siRNA Lipid Nanoparticles for Hepatic Gene Silencing Inâ€…Vivo**. Angewandte Chemie - International Edition, 2012, 51, 8529-8533.	13.8	843
9	Targeted Delivery of RNAi Therapeutics With Endogenous and Exogenous Ligand-Based Mechanisms. Molecular Therapy, 2010, 18, 1357-1364.	8.2	831
10	Multivalent N-Acetylgalactosamine-Conjugated siRNA Localizes in Hepatocytes and Elicits Robust RNAi-Mediated Gene Silencing. Journal of the American Chemical Society, 2014, 136, 16958-16961.	13.7	825
11	The Onpattro story and the clinical translation of nanomedicines containing nucleic acid-based drugs. Nature Nanotechnology, 2019, 14, 1084-1087.	31.5	814
12	Visualizing lipid-formulated siRNA release from endosomes and target gene knockdown. Nature Biotechnology, 2015, 33, 870-876.	17.5	424
13	Biodegradable Lipids Enabling Rapidly Eliminated Lipid Nanoparticles for Systemic Delivery of RNAi Therapeutics. Molecular Therapy, 2013, 21, 1570-1578.	8.2	392
14	RNA interference and chemically modified small interfering RNAs. Current Opinion in Chemical Biology, 2004, 8, 570-579.	6.1	337
15	Development of Lipidoidâ€“siRNA Formulations for Systemic Delivery to the Liver. Molecular Therapy, 2009, 17, 872-879.	8.2	312
16	2â€²-Carbohydrate modifications in antisense oligonucleotide therapy: importance of conformation, configuration and conjugation. Biochimica Et Biophysica Acta Gene Regulatory Mechanisms, 1999, 1489, 117-130.	2.4	294
17	An RNAi therapeutic targeting antithrombin to rebalance the coagulation system and promote hemostasis in hemophilia. Nature Medicine, 2015, 21, 492-497.	30.7	247
18	Advanced siRNA Designs Further Improve InÂVivo Performance of GalNAc-siRNA Conjugates. Molecular Therapy, 2018, 26, 708-717.	8.2	202

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19	Influenza A virus-generated small RNAs regulate the switch from transcription to replication. Proceedings of the National Academy of Sciences of the United States of America, 2010, 107, 11525-11530.	7.1	186
20	Impact of enhanced metabolic stability on pharmacokinetics and pharmacodynamics of GalNAcâ€“siRNA conjugates. Nucleic Acids Research, 2017, 45, 10969-10977.	14.5	179
21	siRNA Conjugates Carrying Sequentially Assembled Trivalent N-Acetylgalactosamine Linked Through Nucleosides Elicit Robust Gene Silencing In Vivo in Hepatocytes. ACS Chemical Biology, 2015, 10, 1181-1187.	3.4	173
22	Selection of GalNAc-conjugated siRNAs with limited off-target-driven rat hepatotoxicity. Nature Communications, 2018, 9, 723.	12.8	173
23	Oligonucleotide Conjugates as Potential Antisense Drugs with Improved Uptake, Biodistribution, Targeted Delivery, and Mechanism of Action. Oligonucleotides, 2002, 12, 103-128.	4.3	170
24	Crystal structure and improved antisense properties of 2'-O-(2-methoxyethyl)-RNA. Nature Structural Biology, 1999, 6, 535-539.	9.7	155
25	Unexpected origins of the enhanced pairing affinity of 2â€²-fluoro-modified RNA. Nucleic Acids Research, 2011, 39, 3482-3495.	14.5	153
26	Hepatocyteâ€Specific Delivery of siRNAs Conjugated to Novel Nonâ€nucleosidic Trivalent Nâ€Acetylgalactosamine Elicits Robust Gene Silencing in Vivo. ChemBioChem, 2015, 16, 903-908.	2.6	151
27	Unique Geneâ€Silencing and Structural Properties of 2â€²â€Fluoroâ€Modified siRNAs. Angewandte Chemie - International Edition, 2011, 50, 2284-2288.	13.8	147
28	Effective RNAi-mediated gene silencing without interruption of the endogenous microRNA pathway. Nature, 2007, 449, 745-747.	27.8	145
29	Investigating the pharmacodynamic durability of GalNAcâ€“siRNA conjugates. Nucleic Acids Research, 2020, 48, 11827-11844.	14.5	137
30	X-ray crystallographic analysis of the hydration of A- and B-form DNA at atomic resolution. Biopolymers, 1998, 48, 234.	2.4	120
31	Crystal structure of Middle East respiratory syndrome coronavirus helicase. PLoS Pathogens, 2017, 13, e1006474.	4.7	113
32	Preclinical Development of a Subcutaneous ALAS1 RNAi Therapeutic for Treatment of Hepatic Porphyrias Using Circulating RNA Quantification. Molecular Therapy - Nucleic Acids, 2015, 4, e263.	5.1	107
33	Re-Engineering RNA Molecules into Therapeutic Agents. Accounts of Chemical Research, 2019, 52, 1036-1047.	15.6	106
34	Probing the Influence of Stereoelectronic Effects on the Biophysical Properties of Oligonucleotides:â€‰ Comprehensive Analysis of the RNA Affinity, Nuclease Resistance, and Crystal Structure of Ten 2â€²-O-Ribonucleic Acid Modifications,. Biochemistry, 2005, 44, 9045-9057.	2.5	104
35	5â€²â€(E)â€Vinylphosphonate: A Stable Phosphate Mimic Can Improve the RNAi Activity of siRNAâ€“GalNAc Conjugates. ChemBioChem, 2016, 17, 985-989.	2.6	95
36	Gene Silencing Activity of siRNAs with a Ribo-difluorotoluyl Nucleotide. ACS Chemical Biology, 2006, 1, 176-183.	3.4	81

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37	Expanding RNAi therapeutics to extrahepatic tissues with lipophilic conjugates. Nature Biotechnology, 2022, 40, 1500-1508.	17.5	79
38	Non-Nucleoside Building Blocks for Copper-Assisted and Copper-Free Click Chemistry for the Efficient Synthesis of RNA Conjugates. Organic Letters, 2010, 12, 5410-5413.	4.6	75
39	2â€²â€Fluoro RNA Shows Increased Watsonâ€“Crick Hâ€Bonding Strength and Stacking Relative to RNA: Evidence from NMR and Thermodynamic Data. Angewandte Chemie - International Edition, 2012, 51, 11863-11866.	13.8	73
40	Chirality Dependent Potency Enhancement and Structural Impact of Glycol Nucleic Acid Modification on siRNA. Journal of the American Chemical Society, 2017, 139, 8537-8546.	13.7	64
41	Lipophilic siRNAs mediate efficient gene silencing in oligodendrocytes with direct CNS delivery. Journal of Controlled Release, 2010, 144, 227-232.	9.9	62
42	siRNA carrying an (E)-vinylphosphonate moiety at the 5Î„ end of the guide strand augments gene silencing by enhanced binding to human Argonaute-2. Nucleic Acids Research, 2017, 45, 3528-3536.	14.5	59
43	Reversal of siRNA-mediated gene silencing in vivo. Nature Biotechnology, 2018, 36, 509-511.	17.5	58
44	Modulation of thermal stability can enhance the potency of siRNA. Nucleic Acids Research, 2010, 38, 7320-7331.	14.5	57
45	Efficient Solid-Phase Chemical Synthesis of 5â€²-Triphosphates of DNA, RNA, and their Analogues. Organic Letters, 2010, 12, 2190-2193.	4.6	56
46	Safety evaluation of 2â€²-deoxy-2â€²-fluoro nucleotides in GalNAc-siRNA conjugates. Nucleic Acids Research, 2019, 47, 3306-3320.	14.5	54
47	4â€²-C-Methoxy-2â€²-deoxy-2â€²-fluoro Modified Ribonucleotides Improve Metabolic Stability and Elicit Efficient RNAi-Mediated Gene Silencing. Journal of the American Chemical Society, 2017, 139, 14542-14555.	13.7	49
48	Crystal structure, stability and in vitro RNAi activity of oligoribonucleotides containing the ribo-difluorotoluyl nucleotide: insights into substrate requirements by the human RISC Ago2 enzyme. Nucleic Acids Research, 2007, 35, 6424-6438.	14.5	48
49	Allyl Group as a Protecting Group for Internucleotide Phosphate and Thiophosphate Linkages in Oligonucleotide Synthesis:â€‰ Facile Oxidation and Deprotection Conditions. Organic Letters, 2000, 2, 243-246.	4.6	45
50	The Nonclinical Disposition and Pharmacokinetic/Pharmacodynamic Properties of N-Acetylgalactosamineâ€“Conjugated Small Interfering RNA Are Highly Predictable and Build Confidence in Translation to Human. Drug Metabolism and Disposition, 2022, 50, 781-797.	3.3	44
51	Zwitterionic oligonucleotides with 2â€²-O-[3-(N,N-dimethylamino)propyl]-RNA modification: synthesis and properties. Tetrahedron Letters, 2000, 41, 4855-4859.	1.4	42
52	Lipid Nanoparticles Improve Activity of Single-Stranded siRNA and Gapmer Antisense Oligonucleotides in Animals. ACS Chemical Biology, 2013, 8, 1402-1406.	3.4	41
53	Effect of chemical modifications on modulation of gene expression by duplex antigene RNAs that are complementary to non-coding transcripts at gene promoters. Nucleic Acids Research, 2010, 38, 5242-5259.	14.5	39
54	N-(2-Cyanoethoxycarbonyloxy)succinimide:Â A New Reagent for Protection of Amino Groups in Oligonucleotides. Journal of Organic Chemistry, 1999, 64, 6468-6472.	3.2	38

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55	Structural Basis of Duplex Thermodynamic Stability and Enhanced Nuclease Resistance of 5â€²-C-Methyl Pyrimidine-Modified Oligonucleotides. Journal of Organic Chemistry, 2016, 81, 2261-2279.	3.2	36
56	Facile Synthesis, Geometry, and 2â€²-Substituent-Dependent in Vivo Activity of 5â€²-(E)- and 5â€²-(Z)-Vinylphosphonate-Modified siRNA Conjugates. Journal of Medicinal Chemistry, 2018, 61, 734-744.	6.4	36
57	The RNA-binding protein vigilin regulates VLDL secretion through modulation of Apob mRNA translation. Nature Communications, 2016, 7, 12848.	12.8	34
58	2â€˜-O-[2-(Methylthio)ethyl]-Modified Oligonucleotide:Â An Analogue of 2â€˜-O-[2-(Methoxy)-ethyl]-Modified Oligonucleotide with Improved Protein Binding Properties and High Binding Affinity to Target RNAâ€. Biochemistry, 2002, 41, 11642-11648.	2.5	33
59	Structural basis for the synergy of 4â€²- and 2â€²-modifications on siRNA nuclease resistance, thermal stability and RNAi activity. Nucleic Acids Research, 2018, 46, 8090-8104.	14.5	32
60	Chirality matters: stereo-defined phosphorothioate linkages at the termini of small interfering RNAs improve pharmacology in vivo. Nucleic Acids Research, 2022, 50, 1221-1240.	14.5	29
61	Challenges and Opportunities for Nucleic Acid Therapeutics. Nucleic Acid Therapeutics, 2022, 32, 8-13.	3.6	29
62	From bench to bedside: Improving the clinical safety of GalNAcâ€“siRNA conjugates using seed-pairing destabilization. Nucleic Acids Research, 2022, 50, 6656-6670.	14.5	28
63	Chimeric siRNAs with chemically modified pentofuranose and hexopyranose nucleotides: altritol-nucleotide (ANA) containing GalNAcâ€“siRNA conjugates: in vitro and in vivo RNAi activity and resistance to 5â€²-exonuclease. Nucleic Acids Research, 2020, 48, 4028-4040.	14.5	27
64	Synthesis of 2â€˜-O-[2-[(N,N-Dimethylamino)oxy]ethyl] Modified Nucleosides and Oligonucleotides. Journal of Organic Chemistry, 2002, 67, 357-369.	3.2	24
65	Synthesis of Chimeric Oligonucleotides Containing Phosphodiester, Phosphorothioate, and Phosphoramidate Linkages. Organic Letters, 2000, 2, 1819-1822.	4.6	23
66	Stabilizing contributions of sulfur-modified nucleotides: crystal structure of a DNA duplex with 2'-O-[2-(methoxy)ethyl]-2-thiothymidines. Nucleic Acids Research, 2005, 33, 5297-5307.	14.5	23
67	Synthesis, hybridization, and nuclease resistance properties of 2â€²-O-aminooxyethyl (2â€²-O-AOE) modified oligonucleotides. Tetrahedron Letters, 1999, 40, 661-664.	1.4	22
68	Structural Basis for Recognition of Guanosine by a Synthetic Tricyclic Cytosine Analogue: Guanidinium G-Clamp. Helvetica Chimica Acta, 2003, 86, 966-978.	1.6	22
69	Synthesis and characterization of oligonucleotides containing conformationally constrained bicyclo[3.1.0]hexane pseudosugar analogs. Nucleic Acids Research, 2004, 32, 3642-3650.	14.5	22
70	2'-O-[2-[(N,N-dimethylamino)oxy]ethyl]-modified oligonucleotides inhibit expression of mRNA in vitro and in vivo. Nucleic Acids Research, 2004, 32, 828-833.	14.5	22
71	5â€²-Morpholino modification of the sense strand of an siRNA makes it a more effective passenger. Chemical Communications, 2019, 55, 5139-5142.	4.1	21
72	A conformational transition in the structure of a 2â€²-thiomethyl-modified DNA visualized at high resolution. Chemical Communications, 2009, , 2017.	4.1	19

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73	Solidâ€Phase Chemical Synthesis of 5â€²â€Triphosphate DNA, RNA, and Chemically Modified Oligonucleotides. Current Protocols in Nucleic Acid Chemistry, 2012, 50, Unit1.28.	0.5	19
74	5â€²-C-Malonyl RNA: Small Interfering RNAs Modified with 5â€²-Monophosphate Bioisostere Demonstrate Gene Silencing Activity. ACS Chemical Biology, 2016, 11, 953-960.	3.4	19
75	Receptor-Specific Delivery of Peptide Nucleic Acids Conjugated to Three Sequentially Linked N-Acetyl Galactosamine Moieties into Hepatocytes. Journal of Organic Chemistry, 2020, 85, 8812-8824.	3.2	19
76	RNA interference and chemically modified siRNAs. Nucleic Acids Symposium Series, 2003, 3, 115-116.	0.3	17
77	Automated parallel synthesis of 5â€²-triphosphate oligonucleotides and preparation of chemically modified 5â€²-triphosphate small interfering RNA. Bioorganic and Medicinal Chemistry, 2013, 21, 722-732.	3.0	17
78	Reversed-phase high-performance liquid chromatography method for simultaneous analysis of two liposome-formulated short interfering RNA duplexes. Analytical Biochemistry, 2010, 401, 61-67.	2.4	15
79	An efficient deprotection method for 5â€²-[O,O-bis(pivaloyloxymethyl)]-(E)-vinylphosphonate containing oligonucleotides. Tetrahedron, 2018, 74, 6182-6186.	1.9	15
80	Synthesis, chirality-dependent conformational and biological properties of siRNAs containing 5â€²-(R)- and 5â€²-(S)-C-methyl-guanosine. Nucleic Acids Research, 2020, 48, 10101-10124.	14.5	15
81	Synthesis and Biophysical Characterization of RNAs Containing 2â€²-Fluorinated Northern Methanocarbacyclic Nucleotides. Organic Letters, 2019, 21, 1963-1967.	4.6	14
82	2â€˜-O-{2-[N,N-(Dialkyl)aminooxy]ethyl}- Modified Antisense Oligonucleotides. Organic Letters, 2000, 2, 3995-3998.	4.6	13
83	Overcoming GNA/RNA base-pairing limitations using isonucleotides improves the pharmacodynamic activity of ESC+ÂGalNAc-siRNAs. Nucleic Acids Research, 2021, 49, 10851-10867.	14.5	13
84	siRNAs containing 2â€²-fluorinated Northern-methanocarbacyclic (2â€²-F-NMC) nucleotides: in vitro and in vivo RNAi activity and inability of mitochondrial polymerases to incorporate 2â€²-F-NMCÂNTPs. Nucleic Acids Research, 2021, 49, 2435-2449.	14.5	12
85	Synthesis of 2â€²-O-[2-[(N,N-dialkylamino)oxy]ethyl]-modified oligonucleotides: hybridization affinity, resistance to nuclease, and protein binding characteristics. Tetrahedron, 2003, 59, 7413-7422.	1.9	11
86	Improving Antisense Oligonucleotide Binding to Human Serum Albumin: Dramatic Effect of Ibuprofen Conjugation. ChemBioChem, 2002, 3, 1257-1260.	2.6	10
87	An immobilized and reusable Cu(i) catalyst for metal ion-free conjugation of ligands to fully deprotected oligonucleotides through click reaction. Chemical Communications, 2013, 49, 184-186.	4.1	10
88	2â€²- and 3â€²- Cholesterol-Conjugated Adenosine and Cytosine Nucleoside Building Blocks: Synthesis of Lipidic Nucleic Acids. Nucleosides & Nucleotides, 1997, 16, 1141-1143.	0.5	9
89	Molecular dynamics correctly models the unusual major conformation of the GAGU RNA internal loop and with NMR reveals an unusual minor conformation. Rna, 2018, 24, 656-672.	3.5	9
90	2â€²-DMAOE RNA: Emerging Oligonucleotides with Promising Antisense Properties. Nucleosides & Nucleotides, 1999, 18, 1381-1382.	0.5	8

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91	Selective Phosphate Protection:â€‰ A Novel Synthesis of Double-Labeled Oligonucleotides. Organic Letters, 2001, 3, 3071-3074.	4.6	8
92	Small circular interfering RNAs (sciRNAs) as a potent therapeutic platform for gene-silencing. Nucleic Acids Research, 2021, 49, 10250-10264.	14.5	7
93	Carbohydrate Modifications in Antisense Oligonucleotide Therapy: New Kids on the Block. Nucleosides & Nucleotides, 1999, 18, 1737-1746.	0.5	6
94	Incorporating a Thiophosphate Modification into a Common RNA Tetraloop Motif Causes an Unanticipated Stability Boost. Biochemistry, 2020, 59, 4627-4637.	2.5	6
95	Liver-targeted RNAi Therapeutics: Principles and Applications. RSC Drug Discovery Series, 2019, , 233-265.	0.3	5
96	A NOVEL PROTECTING STRATEGY FOR INTERNUCLEOSIDIC PHOSPHATE AND PHOSPHOROTHIOATE GROUPS. Nucleosides, Nucleotides and Nucleic Acids, 2001, 20, 1011-1014.	1.1	4
97	CHIMERIC RNA WITH MODIFIED BACKBONES: ALTERNATING METHYLENE(METHYLIMINO) LINKED PHOSPHODIESTER BACKBONE OLIGONUCLEOTIDES WITH 2â€²-OH AND 2â€²-OMe GROUPS. Nucleosides, Nucleotides and Nucleic Acids, 2001, 20, 995-997.	1.1	4
98	Aminooxy Click Chemistry as a Tool for Bis-homo and Bis-hetero Ligand Conjugation to Nucleic Acids. Organic Letters, 0, , .	4.6	4
99	A New Protecting Group Strategy for Amino Groups in Oligonucleotide Chemistry: CEOC Group. Nucleosides & Nucleotides, 1999, 18, 1199-1201.	0.5	3
100	RNAs Containing Carbocyclic Ribonucleotides. Organic Letters, 2022, 24, 525-530.	4.6	3
101	Use of [4,6-Di-¹⁴C]-5â€²-DMT-thymidine Phosphoramidite Reagent for the Radiolabeling of Synthetic Oligonucleotides. Nucleosides & Nucleotides, 1999, 18, 1389-1390.	0.5	1
102	NMI Linkage Modification Increases Potency and Stability of H-RASAntisense Oligonucleotides. Nucleosides & Nucleotides, 1999, 18, 1383-1384.	0.5	1
103	Synthesis of Oligonucleotide Conjugates with the Aid ofN-Chloroacetamidohexyl Phosphoramidite Reagent. Nucleosides & Nucleotides, 1999, 18, 1455-1456.	0.5	1
104	SYNTHESIS OF CHIMERIC OLIGONUCLEOTIDES CONTAINING INTERNUCLEOSIDIC PHOSPHODIESTER ANDSâ€“PIVALOYLTHIOETHYL PHOSPHOTRIESTER RESIDUES. Nucleosides, Nucleotides and Nucleic Acids, 2001, 20, 1015-1018.	1.1	1
105	Properties of Parallel Tetramolecular G-Quadruplex Carrying N-Acetylgalactosamine as Potential Enhancer for Oligonucleotide Delivery to Hepatocytes. Molecules, 2022, 27, 3944.	3.8	1
106	EFFICIENT SYNTHESIS OF OLIGONUCLEOTIDE-PEPTIDE CONJUGATES ON LARGE SCALE. Nucleosides, Nucleotides and Nucleic Acids, 2001, 20, 1007-1010.	1.1	0
107	Synthesis of 2â€²â€²Fluorinated Northern Methanocarbacyclic (2â€²â€²Fâ€NMC) Nucleosides and Their Incorporation Into Oligonucleotides. Current Protocols in Nucleic Acid Chemistry, 2020, 80, e103.	0.5	0