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SUPPLEMENTARY INFORMATION

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mRNA vaccines: intellectual property landscape

Cecilia Martin and Drew Lowery

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Supplementary Material

mRNA vaccines: intellectual property landscape

METHODS

The intellectual property landscape covered English-language US, European, and international (covered by the Patent Cooperation Treaty (PCT)) granted patents and applications published from January 1, 2010 to April 1, 2020. The patent documents were retrieved from Derwent Innovation database using the following keyword search strategy and all search terms were required to be in the Title, Abstract, or Claims of the document.

Search Strategy:

(ribonucleic acid or RNA or messenger ribonucleic acid or mRNA or messenger RNA) NEAR5 (vaccin*)

The search strategy identified 816 publications and were collapsed to 302 International Patent Documentation (INPADOC) families. One representative member per INPADOC family was selected based in authority and document type and ranked as follows: US granted patent, EP granted patent, US application, international application, or EP application.

RESULTS

Data set were manually reviewed and identified 113 relevant documents (Table 1) limited to filings containing claims restricted to vaccines encoded by mRNA. The relevant documents were sorted by indication: 1) infectious diseases, 2) cancer, and 3) platforms (unspecified antigen). The 113 relevant documents were also indexed by methods of optimization including mRNA delivery (delivered by carrier), nucleoside-modified, sequence or codon optimized, CAP or poly(A) tail-modified and self-amplifying mRNA. The mRNA delivery contains a sub-category to identify documents with claims covering specifically the use of lipid nanoparticles in the formulation.

The data analysis was performed using Excel Pivot tables to evaluate patent filing activity that was plotted by filing year for both the indication focus and methods of optimization. The assignee information was manually corrected for misspellings and variations of the assignee

name. The assignees were categorized as research institution, industry and independent inventors. Publicly traded companies were identified using EDGAR, a database provided by the Securities and Exchange Commission (SEC).

Documents disclosing other vaccine platforms such as DNA vaccine, virus-like particle, peptide, viral vector (replicating and non-replicating), recombinant protein, live attenuated virus and inactivated virus approaches were outside of the scope of this landscape.

Table 1. List of patent number

US8288090B2	US20160166668A1	US20190343942A1	WO2019016680A1
US8476419B2	US20160166711A1	US20190345205A1	WO2019035066A1
US8846348B2	US20160367651A1	US20190351044A1	WO2019036670A2
US8858962B2	US20170106070A1	US20190351048A1	WO2019038332A1
US9295717B2	US20170166978A1	US20190358315A1	WO2019053003A1
US9403884B2	US20170209558A1	US20190375833A1	WO2019092153A1
US9421255B2	US20170233761A1	US20200016274A1	WO2019094868A1
US9486519B2	US20170246207A1	US20200030432A1	WO2019103993A1
US9617562B2	US20180135006A1	US20200038499A1	WO2019110481A1
US9623095B2	US20180155403A1	US20200054737A1	WO2019121803A1
US9636388B2	US20180243225A1	US20200069793A1	WO2019143606A1
US9737595B2	US20190015491A1	US20200069794A1	WO2019148101A1
US9821044B2	US20190030147A1	US20200085852A1	WO2019154985A1
US9872900B2	US20190040378A1	US20200085944A1	WO2019169120A1
US9974845B2	US20190076460A1	WO2014188212A2	WO2019183117A1
EP2680881B1	US20190099481A1	WO2015056850A1	WO2019185615A1
EP2714071B1	US20190111070A1	WO2016005099A1	WO2019193183A2
EP3035955B1	US20190125850A1	WO2017015457A1	WO2019202035A1
EP3337902B1	US20190134184A1	WO2017083356A1	WO2019208995A1
US10064934B2	US20190175727A1	WO2017098281A1	WO2019213550A1
US10138507B2	US20190184006A1	WO2017191258A1	WO2020002525A1
US10155031B2	US20190192646A1	WO2018078053A1	WO2020006242A1
US10307472B2	US20190239937A1	WO2018170245A1	WO2020020444A1
US10449244B2	US20190240340A1	WO2018170256A1	WO2020047399A1
US10494436B2	US20190275139A1	WO2018170260A1	WO2020056161A1
US10588959B2	US20190307703A1	WO2018194890A1	WO2020061457A1
US20140242152A1	US20190314493A1	WO2018200975A1	
US20160101170A1	US20190328769A1	WO2018222711A2	
US20160129098A1	US20190336595A1	WO2018231974A1	