Detecting mRNA-Technology in patent applications

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In the following, we shortly outline how we identify patent applications related to the mRNA-technology. We consider all patent applications published by the USPTO via the PatentsView platform from January 2012 to September 2021. Within these patents, we took all those who have been filed between 2012 and 2020.[1] We then perform a key-word search within the title, abstract, and claims section of each of the published application document. This approach is commonly used in the literature to analyze technological developments (see, for example, Bloom et al., 2021; Martin and Lowery, 2020).

We prepare each document by deleting common stop-words, punctuation and numbers, lowercase all terms, and apply the Snowball-stemming algorithm to all words. Afterwards, we tokenize each document and create uni- and bigrams, i.e. sequences of one or two adjacent elements. Using these constructs allows us to check whether some mRNA-related keywords occur within an application. The following table shows our list of stemmed key-words used for this identification task. If at least one of the keywords appears in a patent application, we assign the respective patent application to the mRNA technology.

Topic	Key word (stemmed)
mRNA	mrna*
mRNA	messeng*_ribonucl*
mRNA	messeng*_rna*
mRNA	rna_*
mRNA	ribonucl*_acid*

Notes: The selected key words are taken from Martin and Lowery (2020). RNA stands for ribonucleic acid and mRNA for messenger ribonucleic acid.

It is important to note that we only consider USPTO applications, as we only have document texts for them. This could possibly lead to distortions between different countries if, for example, European companies or universities file relatively more patents at the EPO than US ones.

References

Bloom, N., Davis, S.J., Zhestkova, Y., 2021. Covid-19 shifted patent applications toward technologies that support working from home. AEA Papers and Proceedings 111, 263–66.

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[1] One should be aware that a time lag between filing and publication of a patent application may exist. This means that, for example, some patent applications published in 2020 (and, thus, available to the public and scientific community) may have been filed in 2019 or even in 2018. This is possible to occur because the legal deadline for publishing a patent application is 18 months after it has been filed, for more information please visit The United States Patent and Trademark Office.

Martin, C., Lowery, D., 2020. Mrna vaccines: intellectual property landscape. Nature Reviews Drug Discovery 19, 578–579.