

Trichinellosis

Annual Epidemiological Report for 2019

Key facts

- Trichinellosis is a rare but serious human disease in the EU/EEA.
- In 2019, 12 EU/EEA countries reported 96 confirmed cases of trichinellosis.
- Bulgaria, Italy and Spain accounted for 79.2% of all confirmed cases.
- The overall EU/EEA notification rate was 0.02 cases per 100 000 population in 2019.
- Consumption of undercooked meat from pigs raised under non-controlled housing conditions or hunted wild boar constitutes the highest risk for acquiring trichinellosis in the EU/EEA.

Methods

This report is based on data for 2019 retrieved from The European Surveillance System (TESSy) on 4 November 2021. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1]. An overview of the national surveillance systems is available online [2]. A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

Twenty-eight EU/EEA countries reported data for 2019, fifteen of which reported zero cases. Seven countries reported data according to the current EU case definition for trichinellosis (published in 2018), eight countries used the 2012 case definition, eight countries used the 2008 case definition, and one country (Luxembourg) used the 2002 case definition. France, Germany Italy and Sweden used another case definition.

Twenty-six countries had a compulsory notification system and France used a voluntary system. All countries had comprehensive surveillance of trichinellosis. For 2019, Belgium did not report data. No surveillance system for trichinellosis exists in Denmark [3]. Surveillance systems for trichinellosis had national coverage in all reporting Member States. Nineteen countries have surveillance systems that integrate laboratory and epidemiological data from physicians or hospitals.

Epidemiology

For 2019, 12 EU/EEA countries reported 141 cases of trichinellosis, of which 97 were confirmed and 44 were probable (Table 1, Figure 1). The EU/EEA notification rate was 0.02 cases per 100 000 population.

Bulgaria, Italy and Spain accounted for 79.4% of confirmed cases reported at the EU/EEA level in 2019. Bulgaria reported the highest notification rate in the EU/EEA at 0.79 cases per 100 000 population.

Fourteen Member States reported zero cases in 2019, including four (Cyprus, Finland, Luxembourg and Malta) that had never reported any trichinellosis cases to TESSy.

In 2019, 26 cases (27.1%) of confirmed trichinellosis with known travel status and with known country of infection were reported as acquired in the EU. Four countries reported five travel-associated trichinellosis cases, of which two were infected outside the EU and one was infected within the EU. For 66 confirmed cases (68.8%), travel information was not reported.

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Table 1. Distribution of confirmed trichinellosis cases and rates per 100 000 population by country and year, EU/EEA, 2015–2019

Country	2015		2016		2017		2018		2019			
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Reported cases	Confirmed cases	Rate	ASR
Austria	0	0.00	2	0.02	3	0.03	2	0.02	1	1	0.01	0.01
Belgium	0	-	0	-	0	-	0	-	-	-	-	-
Bulgaria	22	0.31	35	0.49	55	0.77	45	0.64	55	55	0.79	0.84
Croatia	3	0.07	5	0.12	21	0.51	0	0.00	3	3	0.07	0.08
Cyprus	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Czechia	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Denmark	.	.	.	.	.	.	.	.	.	.	.	.
Estonia	2	0.15	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Finland	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
France	3	0.00	3	0.00	8	0.01	0	0.00	3	2	0.00	0.00
Germany	3	0.00	4	0.00	2	0.00	0	0.00	3	3	0.00	0.00
Greece	0	0.00	0	0.00	1	0.01	0	0.00	0	0	0.00	0.00
Hungary	0	0.00	0	0.00	0	0.00	2	0.02	0	0	0.00	0.00
Iceland	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Ireland	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Italy	36	0.06	5	0.01	4	0.01	2	0.00	10	10	0.02	0.01
Latvia	4	0.20	1	0.05	1	0.05	1	0.05	1	1	0.05	0.05
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.
Lithuania	21	0.72	1	0.03	9	0.32	0	0.00	0	0	0.00	0.00
Luxembourg	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Malta	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Netherlands	0	0.00	0	0.00	0	0.00	0	0.00	1	1	0.01	0.01
Norway	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Poland	1	0.00	4	0.01	9	0.02	2	0.01	2	2	0.01	0.01
Portugal	0	0.00	0	0.00	1	0.01	0	0.00	1	1	0.01	0.01
Romania	55	0.28	26	0.13	48	0.24	10	0.05	21	6	0.03	0.03
Slovakia	1	0.02	1	0.02	1	0.02	0	0.00	0	0	0.00	0.00
Slovenia	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
Spain	3	0.01	12	0.03	5	0.01	2	0.00	40	12	0.03	0.02
Sweden	1	0.01	2	0.02	0	0.00	0	0.00	0	0	0.00	0.00
UK	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0.00	0.00
EU/EEA	155	0.03	101	0.02	168	0.03	66	0.01	141	97	0.02	0.02

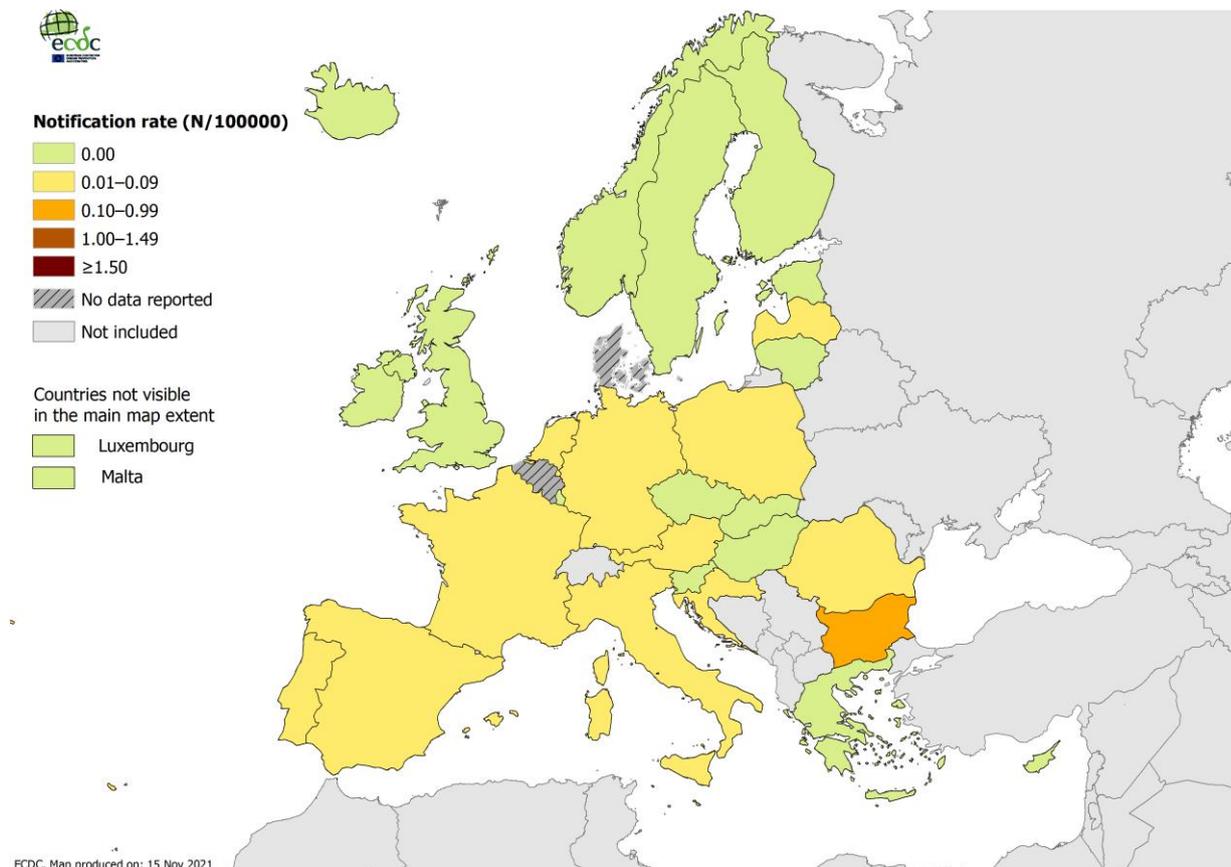
Source: Country reports.

ASR: age-standardised rate.

..: no data reported.

-.: no rate calculated.

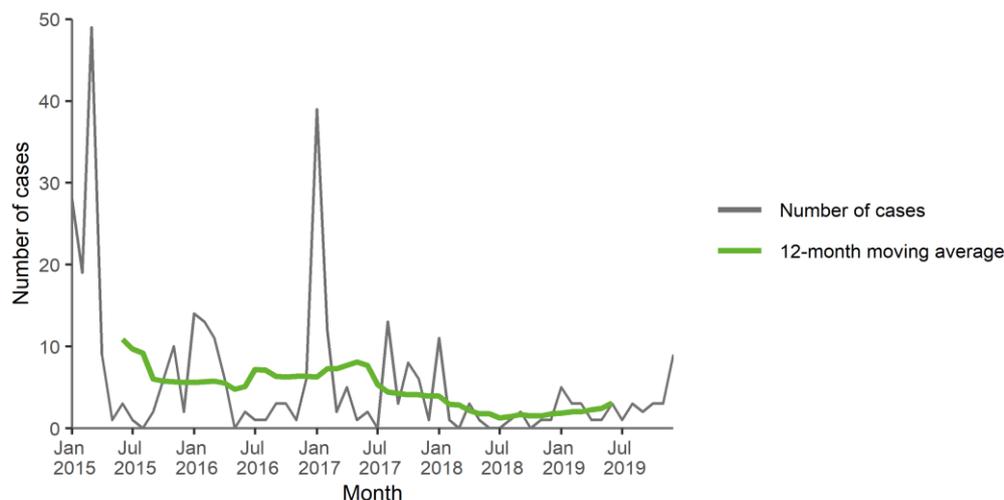
Figure 1. Distribution of confirmed trichinellosis cases per 100 000 population by country, EU/EEA, 2019



Source: Country reports from Austria, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

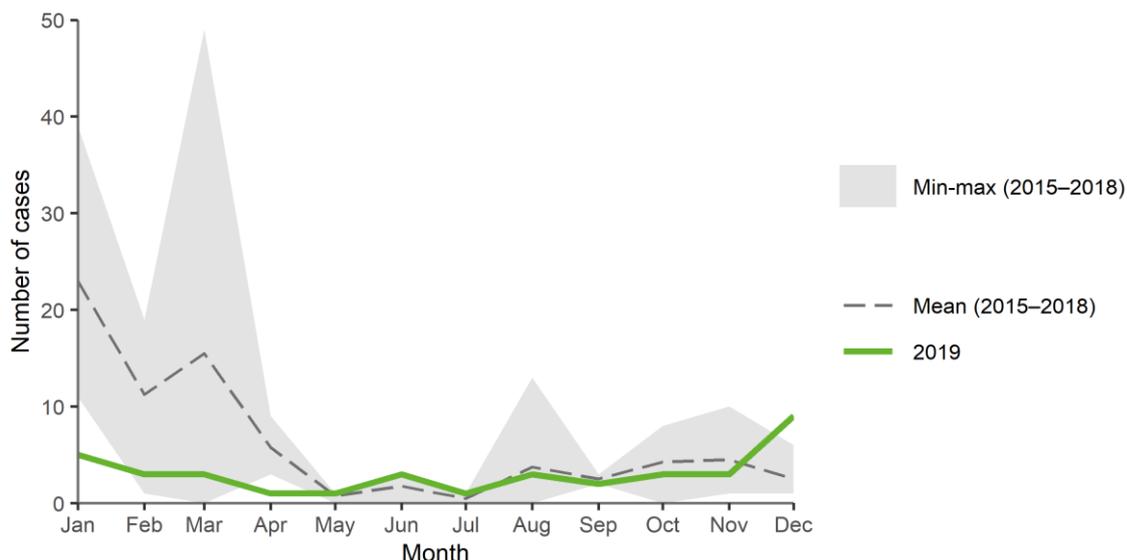
Trichinellosis in the EU/EEA follows a seasonal pattern, with case numbers typically peaking between January and February (Figures 2,3). In 2019, a peak in December was also observed; this was due to a food-borne outbreak in Italy caused by *Trichinella britovi* [4]. The 12-month moving average case notification trend significantly declined between 2015 and 2019 [4]. Romania reported a decreasing trend and no countries observed a significantly increasing trend during this period [4]. Bulgaria, which reported the majority of cases and had the highest notification rate in the EU/EEA in 2019, was not included in the EU/EEA trend analyses as monthly data were not available.

Figure 2. Distribution of confirmed trichinellosis cases by month, EU/EEA, 2015–2019



Source: Country reports from Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

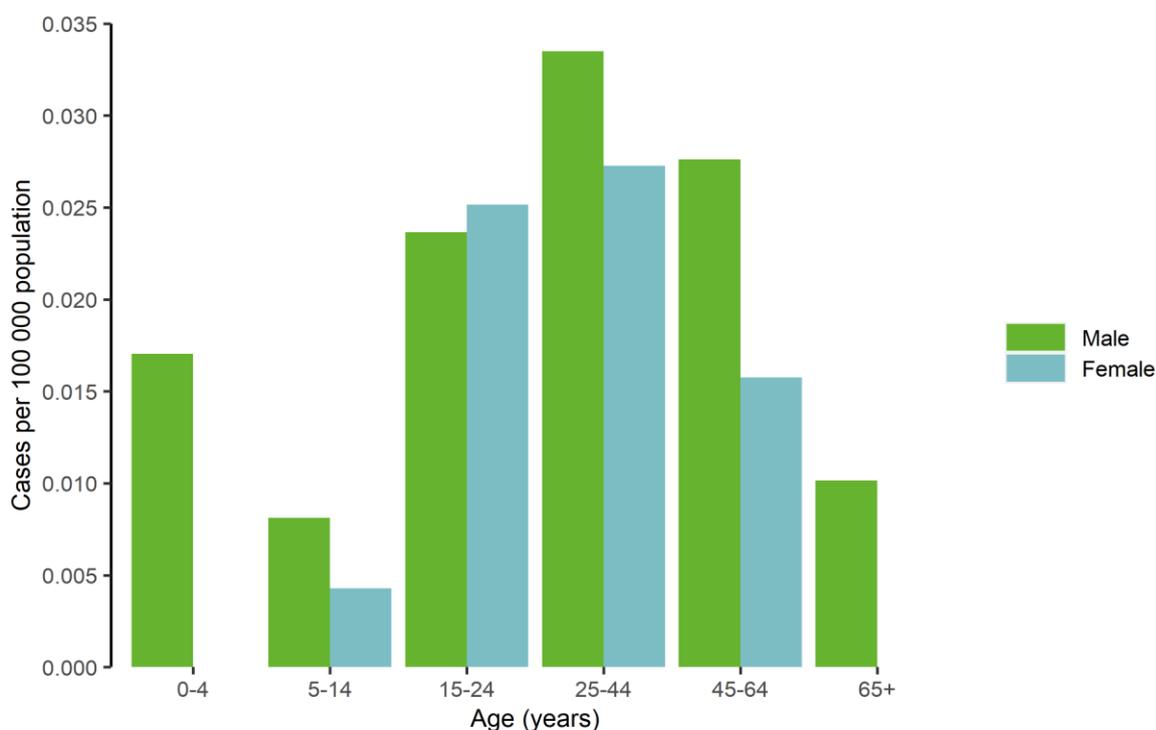
Figure 3. Distribution of confirmed trichinellosis cases by month, EU/EEA, 2019 and 2015–2018



Source: Country reports from Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

The highest notification rate in 2019 was in males in the age-group 25 to 44 years, at 0.03 cases per 100 000 population (Figure 4). Higher rates in males than females were observed in five of the six age groups. The overall male-to-female ratio was 1.3:1. Bulgaria was the only country to report cases in the age group 0 to 4 years, of which all cases (n = 2) were male. Cases in the age group 65 years and older were also in males only; these were reported by Bulgaria, France, Italy and Spain.

Figure 4. Distribution of confirmed trichinellosis cases per 100 000 population, by age and sex, EU/EEA, 2019



Discussion

In the EU/EEA, trichinellosis is a rare but serious human disease. The EU/EEA trichinellosis notification rate in 2019 almost doubled compared to 2018. This was mainly due to an increase in the number of cases reported by Bulgaria, Italy and Spain, with Bulgaria accounting for the majority (57%) of confirmed trichinellosis cases in 2019.

Despite this, the majority (16/28 countries; 57%) of EU/EEA countries reported zero cases, including four (Cyprus, Finland, Luxembourg and Malta) that have never reported any trichinellosis case since the beginning of the EU/EEA-level surveillance in 2007. The five-year trend for the EU/EEA from 2015 to 2019 was declining. Further, the number of confirmed trichinellosis cases in 2019 was lower than the five-year average in the EU/EEA [4]. In 2018, the lowest rate (0.01) was reported since the beginning of the EU/EEA-level surveillance in 2007. The number of human cases and the EU/EEA notification rate remained low between 2015 and 2019, with the highest rate (0.03) reported in 2017 and 2015. It is possible that an increase in the number of pigs raised under controlled housing conditions and in slaughter controls for pigs not raised under controlled housing conditions – in combination with activities that raised awareness about trichinellosis and improved farmers' knowledge – may have contributed to a reduction of the parasite biomass in the domestic habitat and the probability of infection in humans [4].

In 2019, four Member States reported five trichinellosis outbreaks (Bulgaria (two), Croatia (one), Italy (one) and Romania (one)) to the European Food Safety Authority [4]. The two food-borne outbreaks reported by Bulgaria were caused by unspecified *Trichinella* species and involved 27 people, including one person who required hospitalisation. *Trichinella spiralis* was implicated in the two outbreaks reported by Croatia and Romania; these outbreaks involved three and five human cases, respectively, all of which required hospitalisation. The food-borne outbreak reported by Italy was caused by *T. britovi* and three out of nine people were hospitalised; wild boar meat products were the implicated vehicle of transmission. The four outbreaks reported by Bulgaria (two), Croatia (one) and Romania (one) were associated with pig meat and products thereof (including wild boar). The outbreak reported by Italy was associated with other or mixed red meat and products thereof [4].

Similar to 2018, in 2019 six Member States (Bulgaria, Croatia, France, Poland, Romania and Spain), reported positive infections in domestic pigs not raised under controlled housing conditions. No positive findings were found in farmed wild boars or in pigs reared under controlled housing conditions in the EU/EEA [4]. The Commission Implementing Regulation (EU) 2015/1375 requires tests for *Trichinella* in all slaughtered pigs, wild boars, horses and other farmed or wild animal species susceptible to *Trichinella* infestation from holdings not officially recognised as applying controlled housing conditions [5]. Animals slaughtered for home consumption are not included in the regulation and national rules differ [4]. For carcasses of animals raised under controlled housing conditions, only 10% must be examined for *Trichinella* and if no autochthonous *Trichinella* infestations have been detected in domestic swine kept under these conditions in the last three years, *Trichinella* examinations are not required [5]. The World Organisation for Animal Health no longer recognises negligible risk status for a whole country or region in an international context. Instead, such recognition is linked to compartments of one or more holdings if specific controlled housing conditions are applied. Belgium and Denmark are the only exceptions, as they achieved negligible risk status before the new regulation was implemented [4].

The recurring peak in trichinellosis cases in January and February may reflect the consumption of various pork products during the Christmas period and the wild boar hunting season [4]. *Trichinella* is commonly detected in wildlife [4] and cases related to hunting may account for higher notification rates observed among adult males. Investigations into domestic pig *Trichinella* infections in Member States identified direct (free-range pigs) and indirect (e.g. farmers who hunted) contact with wild animals, which are reservoirs of these zoonotic nematodes, as sources of domestic pig infections [6].

In Lithuania, consumption of infected and uninspected pork from small farms accounted for 19 out of 33 human trichinellosis outbreaks from 2008 to 2017, and consumption of infected wild boar accounted for 11 out of 33 outbreaks. For the remainder, the source was unknown [7]. In Bulgaria, the consumption of infected wild boar was the main cause of outbreaks in 2013 and 2014, followed by the consumption of infected domestic pig meat [8].

There is a relationship between the lack of awareness and low-income of consumers living in rural areas, an inadequacy of local veterinary meat inspection services, and the occurrence of *Trichinella* in domestic animals in EU and non-EU countries [6]. The increasing number of wild boar and red foxes in Europe, in addition to the spread of the raccoon dog population from eastern to western Europe and the jackal from south-eastern to north-western Europe, may increase the prevalence of *Trichinella* circulating among wild animals in Europe [4].

Public health implications

Products derived from pig and wild boar meat remain the most important sources of human trichinellosis in the EU/EEA. Consuming undercooked meat from pigs or hunted wild boar that have not been tested for *Trichinella* is a major risk factor for trichinellosis [4] and it is vital that relevant information reaches such consumers.

References

1. European Centre for Disease Prevention and Control. Introduction to the Annual Epidemiological Report. In: ECDC. Annual epidemiological report. Stockholm: ECDC; 2020. Available from: <https://ecdc.europa.eu/annual-epidemiological-reports/methods>
2. European Centre for Disease Prevention and Control. Surveillance systems overview. Stockholm: ECDC; 2021. Available from: <https://www.ecdc.europa.eu/en/publications-data/surveillance-systems-overview-2019>
3. European Centre for Disease Prevention and Control. Surveillance atlas of infectious diseases. Stockholm: ECDC; 2020. Available from: <https://atlas.ecdc.europa.eu>
4. European Food Safety Authority and European Centre for Disease Prevention and Control. The European Union One Health 2019 Zoonoses Report. EFSA Journal. 2021;19(2):6406. Available from: <https://doi.org/10.2903/j.efsa.2021.6406>
5. European Commission. Commission implementing regulation (EU) 2015/1375 of 10 August 2015 laying down specific rules on official controls for *Trichinella* in meat – (Codification) – (Text with EEA relevance). Brussels: European Commission; 2015. Available from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015R1375>
6. Pozio E. Searching for *Trichinella*: not all pigs are created equal. Trends Parasitol. 2014 Jan;30(1):4-11.
7. Caplinskas S, Bartuliene A, Zagrebneviene, G. Human Trichinellosis: Epidemiological Situation in Lithuania, 2008-2017. Immunochem Immunopathol. 2018 Feb 5;4:1. Available from: http://www.ulac.lt/uploads/downloads/leidiniai/leidiniai_2018/human_trichinellosis.pdf
8. Rainova I, Harizanov R, Kaftandjiev I, Tsvetkova N, Mikov O, Kaneva E. Human Parasitic Diseases in Bulgaria in Between 2013-2014. Balkan Med J. 2018 Jan 20;35:61-7. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5820449/>