

Abstract Sifter user guide

Nancy C. Baker, Thomas Knudsen, Antony Williams

Availability: The Abstract Sifter and documentation is freely available for download at ftp://newftp.epa.gov/COMPTOX/Sustainable_Chemistry_Data/Chemistry_Dashboard/Abstract_Sifter/.

Contact: baker.nancy@epa.gov

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Abstract Sifter user guide

This user guide describes the functionality of the PubMed Abstract Sifter version 1.0. The reader is invited to download the tool from the freely accessible ftp site and follow along:

ftp://newftp.epa.gov/COMPTOX/Sustainable_Chemistry_Data/Chemistry_Dashboard/Abstract_Sifter/

This document will illustrate the use of the tool through a series of screen shots walking through a few simple tasks. First open the Abstract Sifter file AbstractSifter_v1.xlsm. A security warning may appear. If so, be sure to enable content as shown in Figure 1.

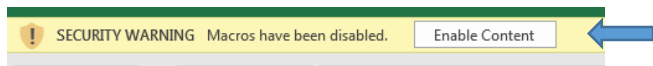


Figure 1. Enable macros upon opening

The Abstract Sifter Excel file consists of seven sheets. We'll start this documentation on the Main sheet. The Main sheet is where the basic functionality takes place, including functions we call "sifting". To use the Abstract Sifter, the end-user clicks on the *Query PubMed* button at the top of the screen. A form is displayed in which the end-user types a PubMed query of interest (Figure 2). In the example, we are showing a very simple query: "chlorpyrifos", but these queries can be more complex. The text that the user enters into the box is sent to PubMed, so all PubMed syntax rules apply.

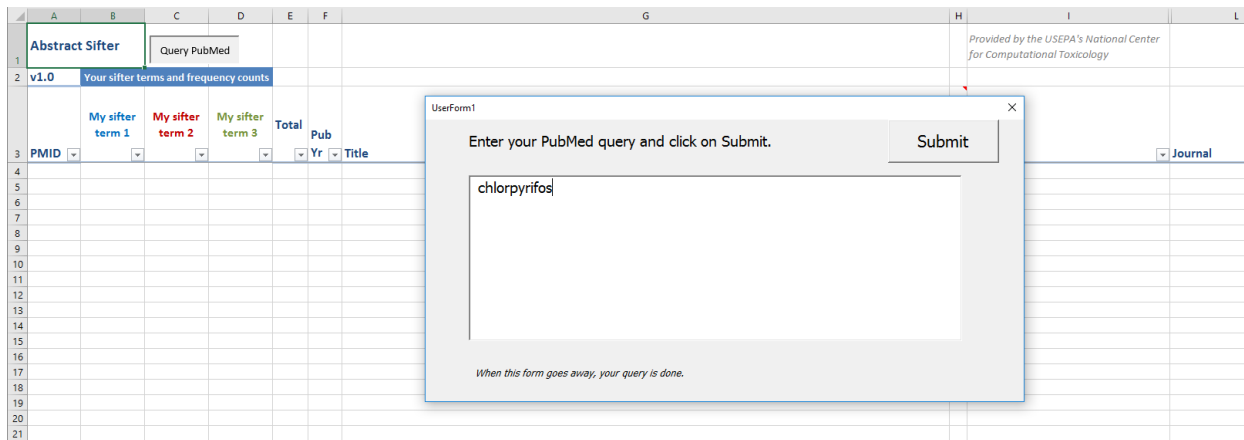


Figure 2. Running a PubMed query

When finished entering the query, the user clicks on *Submit* and the query is packaged by VBA into an e-utility command that is passed to the NCBI (National Center for Biotechnology Information) web services. (Note that using Sifter Query PubMed capability requires internet access.) The first response returned by the utility is the number of articles found. (Figure 3) This number is displayed, and the user is asked if he/she want to continue. If the number of articles is over 5,000, the query will not be run and the user is encouraged to refine the query to return fewer records.

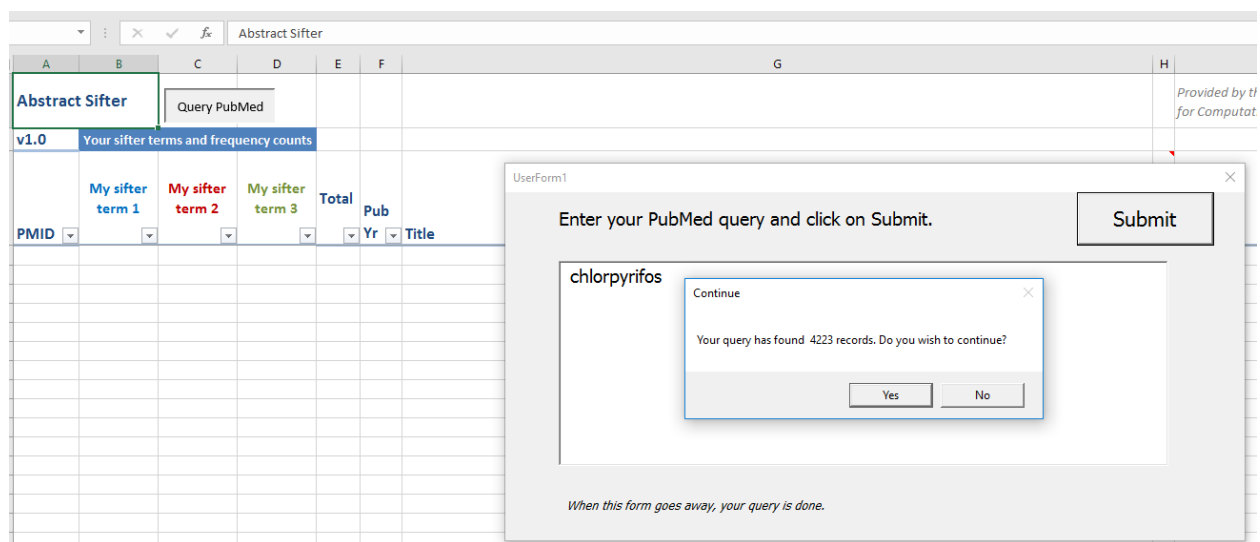


Figure 3. Responding to PubMed

If the returned results are fewer than 5,000 and the user indicates he/she wants to continue, the articles are downloaded from NCBI by Excel, and regular expressions are used to parse the citations for title, abstract, authors, publication year, journal, and PubMed identifier. Each record returned is inserted into a row in the Main sheet. Any rows in the Main sheet from a previous query are deleted.

Abstract Sifter											
Query run: chlorpyrifos											
Provided by the USEPA's National Center for Computational Toxicology											
v1.0 Your sifter terms and frequency counts											
<div> <div>My sifter term 1</div> <div>My sifter term 2</div> <div>My sifter term 3</div> <div>Total</div> <div>Pub</div> </div> <div>Take Group Notes</div> <div>Highlight Noted</div> <div>Review</div>											
<div> <div>PMID</div> <div>Yr</div> <div>Title</div> <div>Authors</div> <div>Journal</div> </div>											
4	28831109	0	0	0	0	2017	Exposure to agricultural pesticide impairs visual lateralization in a larval coral reef fish.	Besson, Gache, Bertucci, Brooker, Roux, Ja	Scientific reports		
5	28821307	0	0	0	0	2017	Determination of Residues of Diazinon and Chlorpyrifos in Lavender and Rosemary Leaves by Gas Chromatography.	Rezk, Abd El-Aleem, Khalile, El-Naggar	Journal of AOAC International		
6	28820005	0	0	0	0	2017	Inhibition of Endocannabinoid-Metabolizing Enzymes in Peripheral Tissues Following Developmental Chlorpyrifos Expos	Buntyn, Aligubelly, Hybart, Mohammed, H	International journal of toxicolo		
7	28802139	0	0	0	0	2017	Analysis of neurobehavioral data by chemometric methods in ecotoxicological studies.	Gómez-Canela, Prats, Tauler, Raldúa	Ecotoxicology and environment		
8	28799107	0	0	0	0	2017	Determination of selected neurotoxic insecticides in small amounts of animal tissue utilizing a newly constructed mini-	Seifertová, Čechová, Llánsola, Felipo, Vykl	Analytical and bioanalytical che		
9	28791202	0	0	0	0	2017	Developmental neurotoxicity of the organophosphorus insecticide chlorpyrifos: from clinical findings to preclinical mode	Burke, Todd, Lumsden, Mullins, Mamczar,	Journal of neurochemistry		
10	28782362	0	0	0	0	2017	Emission Factors for Selected Semivolatile Organic Chemicals from Burning of Tropical Biomass Fuels and Estimation of A	Wang, Meyer, Reisen, Keywood, Thai, Haw	Environmental science & techn		
11	28780760	0	0	0	0	2017	Pesticide dissipation and microbial community changes in a bioremediation system: influence of the rhizosphere.	Diez, Elgueta, Rubilar, Tortella, Schalchli, B	Biodegradation		
12	28780449	0	0	0	0	2017	The impact of six insecticides commonly used in control of agricultural pests on the generalist predator Hippodamia conv	Santos, Zanuzo Zanardi, de Moraes, Jacob, C	Chemosphere		
13	28778749	0	0	0	0	2017	Exposure of amateur gardeners to pesticides via the non-gloved skin per day.	Beránková, Hojerová, Melegová	Food and chemical toxicology :		
14	28778031	0	0	0	0	2017	Transformation from gold nanoclusters to plasmonic nanoparticles: A general strategy towards selective detection of org	Lu, Zhou, Wang, Gong, Liu	Biosensors & bioelectronics		
15	28774531	0	0	0	0	2017	24-Epibrassinolide alleviates organic pollutants-retarded root elongation by promoting redox homeostasis and secondar	Ahammed, He, Qian, Zhou, Shi, Zhou, Yu, X	Environmental pollution (Barki		
16	28772184	0	0	0	0	2017	Assessing the ecotoxicity of potentially neurotoxic substances - Evaluation of a behavioural parameter in the embryogen	Weichert, Floeter, Meza Artmann, Kamma	Chemosphere		
17	28769805	0	0	0	0	2017	The Mechanism by Which Dodecyl Dimethyl Benzyl Ammonium Chloride Increased the Toxicity of Chlorpyrifos to Spodop	Cui, Yuan, Yang, Rui, Mu	Frontiers in pharmacology		
18	28768160	0	0	0	0	2017	Cytochrome P450 genes from the aquatic midge Chironomus tentans: Atrazine-induced up-regulation of CYP6EX3 enha	Tang, Yao, Li, He, Zhu, Zhang, Zhu	Chemosphere		
19	28766927	0	0	0	0	2017	Combining Hyperspectral Imaging and Chemometrics to Assess and Interpret the Effects of Environmental Stressors on th	Olmos, Marro, Loza-Alvarez, Raldúa, Prats,	Journal of biophotonics		
20	28757570	0	0	0	0	2017	Monitoring of Pesticide Residues in Commonly Used Fruits and Vegetables in Kuwait.	Jallow, Awadh, Albaho, Devi, Ahmad	International journal of environ		
21	28756254	0	0	0	0	2017	Evaluation of chlorpyrifos effects, alone and combined with lipopolysaccharide stress, on DNA integrity and immune res	Marchand, Porcher, Turies, Chadili, Palluel	Ecotoxicology and environment		
22	28755498	0	0	0	0	2017	Effects of Deltamethrin, Dimethoate, and Chlorpyrifos on Survival and Reproduction of the Collembolan Folsomia candid	Jaabiri Kamoun, Jegede, Owojori, Bouzid, I	Integrated environmental asse		
23	28753233	0	0	0	0	2017	Knockout of a P-glycoprotein gene increases susceptibility to abamectin and emamectin benzoate in Spodoptera exigua.	Zuo, Huang, Wang, Feng, Han, Wu, Yang	Insect molecular biology		
24	28748436	0	0	0	0	2017	Organophosphorus pesticide mixture removal from environmental matrices by a soil Streptomyces mixed culture.	Briceño, Vergara, Schalchli, Palma, Tortella	Environmental science and poll		
25	28747262	0	0	0	0	2017	Identification and characterization of ace1-type acetylcholinesterase in insecticide-resistant and -susceptible Propylaea	Wang, Xing, Ni, Wu	Bulletin of entomological resea		
26	28745304	0	0	0	0	2017	Multi-class chemical exposure in rural Peru using silicone wristbands.	Bergmann, North, Vasquez, Bello, Del Carri	Journal of exposure science &		
27	28741215	0	0	0	0	2017	Acute toxicity of chlorpyrifos and carbosulfan to glochidia of the freshwater mussel Hyriopsis bialata Simpson, 1900.	Sangsawang, Kovitvadih, Clearwater, Kovit	Environmental science and poll		

Figure 4. Results from PubMed query - before sifting

At this point the results of the query are stored in the Main sheet and can be browsed like any other data in a spreadsheet (Figure 4); however, the most effective way to find an articles of interest is to use the innovative sifter functionality. To demonstrate this functionality, we will continue to use our example of chlorpyrifos.

Let us suppose at this point that we are looking for dose studies of chlorpyrifos in rats. We type the term “mg/kg” in cell B3, “rat” in C3, and “brain” in D3. As we finish typing and move to the next cell, the Abstract Sifter will count the occurrences of the terms in the title and abstract combined. The citations can be sorted by these counts, either individually or by the total. Figure 5 shows what the Sifter looks like when these terms have been entered into B3, C3, and D3 and then the entries sorted by occurrence counts of “mg/kg” in descending order. PubMed 16472551 has 12 occurrences of “mg/kg”, 22 of “rat”, and two of “brain”. This article indeed describes a dose-response study in rats.

	A	B	C	D	E	F	G	H	I	L	M
1	Abstract Sifter		Query PubMed				Query run: chlorpyrifos		Provided by the USEPA's National Center for Computational Toxicology		
2	v1.0	Your sifter terms and frequency counts									
		mg/kg	rat	brain	Total	Pub					
3	PMID				Yr	Title		Take Group Notes	Highlight Noted	Review	
4	16472551	13	22	2	36	2006 Effect of chlorpyrifos-methyl on steroid and thyroid hormones in rat F0- and F1-generations.					
5	10653531	11	9	3	23	2000 Lack of carcinogenicity of chlorpyrifos insecticide in a high-dose, 2-year dietary toxicity study in Fischer 344 rats.					
6	94259	11	10	1	21	1979 Efficiency and safety of methidathion applied as a pour-on systemic insecticide for control of cattle lice.					
7	28260687	10	7	0	17	2017 Temperature influences the toxicity of deltamethrin, chlorpyrifos and dimethoate to the predatory mite Hypoaspis acule					
8	12521673	9	6	0	15	2003 Influence of gender on thermoregulation and cholinesterase inhibition in the long-evans rat exposed to diazinon.					
9	11829414	9	0	0	9	2001 Striatal dopaminergic pathways as a target for the insecticides permethrin and chlorpyrifos.					
10	3989223	9	1	0	10	1985 Toxicity of organophosphorus esters to laying hens after oral and dermal administration.					
11	17454568	8	8	0	16	2007 Differential sensitivity to anticholinesterase insecticides in the juvenile rat: effects on thermoregulation.					
12	12830919	8	5	0	13	2003 Rapid multi-residue method for the determination of azinphos methyl, bromopropylate, chlorpyrifos, dimethoate, parat					
13	9588346	8	9	0	17	1998 Effects of the pesticides carbofuran, chlorpyrifos, dimethoate, lindane, triallate, trifluralin, 2,4-D, and pentachloropheno					
14	2017753	8	1	0	9	1991 Promotion of organophosphate-induced delayed polyneuropathy by phenylmethanesulfonyl fluoride.					
15	6201092	8	0	0	8	1984 Oral intubation of dogs with combinations of fertilizer, herbicide, and insecticide chemicals commonly used on lawns.					
16	28280510	7	3	0	10	2017 Determination of Levels of Organochlorine, Organophosphorus, and Pyrethroid Pesticide Residues in Vegetables from M					
17	26642910	7	7	1	15	2017 Decreased anxiety in juvenile rats following exposure to low levels of chlorpyrifos during development.					
18	24609615	7	1	0	8	2014 Organophosphorus pesticide residues in vegetables from farms, markets, and a supermarket around Kwan Phayao Lake c					
19	22504667	7	5	5	17	2012 Cholinesterase inhibition and toxicokinetics in immature and adult rats after acute or repeated exposures to chlorpyrifos					
20	16777161	7	5	1	13	2006 Effects of acute chlorpyrifos exposure on in vivo acetylcholine accumulation in rat striatum.					
21	10543028	7	6	7	20	1999 Changes in rat brain cholinesterase activity and muscarinic receptor density during and after repeated oral exposure to cl					
22	28373059	6	6	4	16	2017 Protective properties of 6-gingerol-rich fraction from Zingiber officinale (Ginger) on chlorpyrifos-induced oxidative dam					
23	25182558	6	10	3	19	2014 Effects of melatonin on changes in cognitive performances and brain malondialdehyde concentration induced by sub-chr					
24	24394474	6	7	2	15	2014 Taurine mitigates cognitive impairment induced by chronic co-exposure of male Wistar rats to chlorpyrifos and lead acet					
25	23624379	6	3	0	9	2013 Oxidative damage induced by chlorpyrifos in the hepatic and renal tissue of Kunming mice and the antioxidant role of vit					
26	21687644	6	11	0	17	2011 Ameliorative effect of vitamin C on alterations in thyroid hormones concentrations induced by subchronic coadministration					
27	20691718	6	3	4	13	2010 Dose-related gene expression changes in forebrain following acute, low-level chlorpyrifos exposure in neonatal rats.					
28	20524109	6	1	0	7	2010 Studies on relative toxicities of six insecticides on epigeic earthworm, Perionyx excavatus.					
29	20162264	6	8	0	14	2010 Multipesticide residue assessment of agricultural soil and water in major farming areas in Benguet, Philippines.					
30	19850121	6	2	2	10	2010 Chlorpyrifos induced reproductive toxicity in male mice.					

Figure 5. After sifter terms entered into cells B3, C3, D3 and sorting on B3

To see the abstract, we can either click on the PubMed ID hyperlink to be taken to PubMed, or we can double-click on any other cell in the row for this article. This action brings us to the Abstract sheet where the abstract is displayed along with other article meta-data like title (Figure 6).

	A	B	D	E	F
1	Abstract with highlights				
2	Article:	16472551	PubYr	Authors	Journal
4	Title:	Effect of chlorpyrifos-methyl on steroid and thyroid hormones in rat F0- and F1-generations.	2006	Jeong, Kim, Kang, Ku, Cho	Toxicology
5	Title and Abstract:	Effect of chlorpyrifos-methyl on steroid and thyroid hormones in rat F0- and F1-generations. Abstract: Chlorpyrifos-methyl (CPM) suppressed androgenic activity in Hershberger assay using castrated rats . Acute oral lowest-observed-adverse-effect-level (LOAEL) and no-observed-adverse-effect-level (NOAEL) was evaluated as 12 and 0.1 mg/kg bw , respectively, based on its major effect of cholinesterase inhibition. Also, repeated oral NOAEL was 0.1 mg/kg bw/day based on adrenal damage in rats . We investigated one-generation reproductive toxicity of CPM focusing on endocrine-disrupting effects by the administration of 1, 10 and 100 mg/kg bw/day CPM to mature SD rats (F0) through pre-mating, mating, gestation and lactation period and to their offspring (F1) until 13 weeks age via gavage. A group treated with corn oil served as vehicle control. In F0 rats , the most affected organs were adrenal glands as increased in weight at all doses of CPM in males and at 10 and 100 mg/kg CPM in females and adrenal vacuolation at CPM 10 and 100 mg/kg . The relative and absolute ovaries and the absolute seminal vesicle weights were decreased but the weights of liver, spleen or kidneys were increased at 100 mg/kg CPM . Parameters representing reproductive performances as mating ratio , gestation length and delivery index were not affected, except for decreased fertility index and numbers of implantation and born pups and a higher male sex ratio of pups at CPM 100 mg/kg . F1 pups exposed to CPM 100 mg/kg in utero and via maternal milk showed lower body weight with changes of absolute or relative weights of brain, ovary, liver, spleen and epididymis and decreased absolute not relative anogenital distance at weaning time. The time of vaginal patency and preputial separation and estrous cycling pattern of F1 rats were not impacted by CPM. After further 10 weeks oral administration until 13 weeks old, adrenal glands, brain, liver, spleen or kidneys tended to be increased, while thyroid gland, testes and ventral prostate of F1 male rats were decreased at CPM 10 or 100 mg/kg . Histopathologically, necrosis or vacuolation of thyroid follicular epithelial cells and adrenal cortical cells were observed at all doses of CPM. Serum levels of estradiol, testosterone, T4 and T3 were significantly lower while TSH and cholesterol were higher in both F1 female and male rats treated with CPM though dose-responsiveness was not clear in F1 females. Decreased sperm were counted in F1 rats at CPM 100 mg/kg . As a whole, LOAEL and NOAEL was evaluated as 10 and 1 mg/kg bw , respectively, based on decreased estradiol and T4 and increased TSH in serum of F1 male rats , and when considering histopathological alteration of adrenal and thyroid glands, LOAEL assumed to be lower than 1 mg/kg bw . This study elucidates that CPM exhibit weak			
6					

Figure 6. An abstract with highlighted sifter terms.

There are several aspects of the Abstract sheet that are important to note. First, the sifter terms are highlighted. The font colors reflect the colors of the fonts in cells B3, C3, and D3. This highlighting makes the reading process easier and draws attention to sections of the abstract that might be of most

interest. It is also interesting to note that the counts and highlighting for “rat” also picked up “administration”. Putting a space before (“ rat”) would eliminate some of these occurrences.

Sifting the results through specifying sifter terms in B3, C3, and D3 can be repeated as many times as the user wishes. Similarly, new PubMed queries can be run, altered, rerun. There are no restrictions on either of these activities other than the 5000 record return limit. Go for it!

Taking notes

Particularly given the dynamic nature of the sifter, many users find it helpful to be able to make notes on articles that they want to keep track of. There are two ways using the Sifter to take notes, one way through the Main page and the other way starting at the Abstract page. To return to our case study, let us say that we have found a set of articles on the Main page that we know we need to read in depth or to ask the library to get. We can select these articles and then click on the *Take Group Notes* button. A form appears where we can enter information into fields called Tag and Notes. These elements are self-defined. We can also click on *yes*, *no*, or *maybe*. This set of a variable is a quick way to associate articles with a note. Notice that these choices each come with a color (yes-green, no-red, and maybe-yellow). Entering any of these fields is optional. (Figures 7 and 8.) When we click on the *OK* button, each article selected will be inserted into the Notes page with the corresponding information. (Figure 9)

The screenshot displays the 'Abstract Sifter' web application. At the top, there's a 'Query PubMed' button and a text input field containing 'chlorpyrifos'. Below this is a table with columns: PMID, mg/kg, rat, brain, Total, Pub, and Title. The table lists 25 search results, each with a color-coded background (green, red, or yellow) indicating a status. A blue circle highlights the first three rows of the table. Overlaid on the table is a 'GroupNotes' dialog box. The dialog box has a title bar 'GroupNotes' and a close button. Inside, it says 'Enter a comment or note for the selected articles:'. There are two input fields: 'Tag:' with the value 'chlorpyrifos' and 'Note:' with the value 'dose response / rat / brain'. Below these fields are three radio buttons labeled 'Yes', 'No', and 'Maybe', and an 'OK' button. The background of the dialog box is semi-transparent, showing the table and other interface elements.

	A	B	C	D	E	F	G	H	I	J	K	L
	Abstract Sifter	Query PubMed										
1												
2	v1.0	Your sifter terms and frequency counts										
3	PMID	mg/kg	rat	brain	Total	Pub						
4	16472531	12	22	2	36	2006 Effect of s						
5	10853531	11	9	3	23	2000 Lack of ca						
6	94259	11	10		21	1979 Efficiency						
7	28260687	10	7		17	2017 Temperat						
8	12521673	9	6		15	2003 Influence						
9	11829414	9			9	2001 Striatal dc						
10	3989223	9	1		10	1985 Toxicity of						
11	17454568	8	8		16	2007 Differenti						
12	12830919	8	5		13	2003 Rapid mul						
13	9588346	8	9		17	1998 Effects of						
14	2017753	8	1		9	1991 Promotio						
15	6201092	8			8	1984 Oral Intub						
16	28280510	7	3		10	2017 Determin						
17	28642910	7	7		14	2017 Decrease						
18	24809615	7	1		8	2014 Organoph						
19	22504667	7	5		12	2012 Cholinest						
20	16777161	7	5		13	2006 Effects of acute chlorpyrifos exposure on in vivo acetylcholine accumulation in rat striatum.						
21	10543028	7	6		13	1999 Changes in rat brain cholinesterase activity and muscarinic receptor density during and after repeated oral exposure to cl						
22	28373059	6	6		12	2017 Protective properties of 6-gingerol-rich fraction from Zingiber officinale (Ginger) on chlorpyrifos-induced oxidative dam						
23	25182558	6	10		16	2014 Effects of melatonin on changes in cognitive performances and brain malondialdehyde concentration induced by sub-chr						
24	24394474	6	7		13	2014 Taurine mitigates cognitive impairment induced by chronic co-exposure of male Wistar rats to chlorpyrifos and lead aceti						
25	24674379	6	3		9	2013 Oxidative damage induced by chlorpyrifos in the hepatic and renal tissue of Kunming mice and the antioxidant role of vit						

Figure 7. Taking group notes.

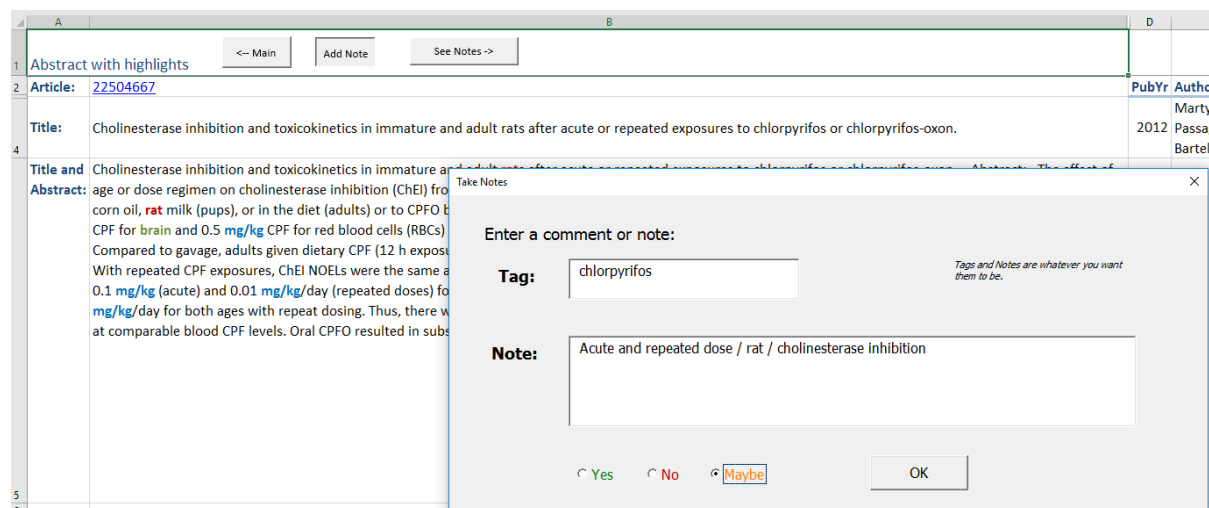


Figure 8. Taking group notes - another example.

My Notes										
	A	B	C	D	F	G	H	I	J	K
1	My Notes									
2	PMID		yes	no	Tag	Note	PubYr	Title	Authors	Journal
3	22504667	1	0	0	chlorpyrifos	Acute and repeated dose / rat	2012	Cholinesterase inhibition and toxicokinetics in immature and adult rats after acute or repeat	Marty, Andrus, Bell, Passage, Perala, Brzak,	Regulatory toxicol
4	2017753	1	0	0	chlorpyrifos	dose response / rat / brain	1991	Promotion of organophosphate-induced delayed polynuropathy by phenylmethanesulfonyl	Lotti, Caroli, Capodicasa, Moretto	Toxicology and appl
5	9588346	1	0	0	chlorpyrifos	dose response / rat / brain	1998	Effects of the pesticides carbofuran, chlorpyrifos, dimethoate, lindane, triallate, trifluralin, 2	Rawlings, Cook, Waldbillig	Journal of toxicolog
6	12830919	1	0	0	chlorpyrifos	dose response / rat / brain	2003	Rapid multi-residue method for the determination of azinphos methyl, bromopropylate, chl	Liapis, Aplada-Sarlis, Kyriakidis	Journal of chromat
7	17454568	1	0	0	chlorpyrifos	dose response / rat / brain	2007	Differential sensitivity to anticholinesterase insecticides in the juvenile rat: effects on thern	Mack, Gordon	Journal of toxicolog
8	3989223	1	0	0	chlorpyrifos	dose response / rat / brain	1985	Toxicity of organophosphorus esters to laying hens after oral and dermal administration.	Francis, Metcalf, Hansen	Journal of environm
9	26642910	1	0	0	chlorpyrifos	dose response / rat / brain	2017	Decreased anxiety in juvenile rats following exposure to low levels of chlorpyrifos during de	Carr, Armstrong, Buchanan, Eells, Mohamm	Neurotoxicology
10	16472551	1	0	0	chlorpyrifos	dose response / rat / brain	2006	Effect of chlorpyrifos-methyl on steroid and thyroid hormones in rat F0- and F1-generations.	Jeong, Kim, Kang, Ku, Cho	Toxicology
11										
12										
13										

Figure 9. The Notes page. Remember to save your workbook.

The note-taking process can be used to help keep track of which citations have been read and evaluated and which have not. By clicking on the *Highlight Noted* button on the Main page or on the Notes page, the color of each noted PubMed ID will be modified as shown in Figure 10.

The user is welcome to make changes on the Notes sheet and add or delete rows after Row 2.

	A	B	C	D	E	F	G	H	I
1	Abstract Sifter	Query PubMed				Query run: chlorpyrifos			Provided by the USEPA's National Center for Computational Toxicology
2	v1.0	Your sifter terms and frequency counts							
		mg/kg	rat	brain	Total	Pub		Take Group Notes	Highlight Noted
3	PMID				Yr	Title			Authors
4	16472551	12	22	2	36	2006 Effect of chlorpyrifos-methyl on steroid and thyroid hormones in rat F0- and F1-generations.			Jeong, Kim, Kang, Ku, Cho
5	3989223	9	1	0	10	1985 Toxicity of organophosphorus esters to laying hens after oral and dermal administration.			Francis, Metcalf, Hansen
6	17454568	8	8	0	16	2007 Differential sensitivity to anticholinesterase insecticides in the juvenile rat: effects on thermoregulation.			Trick, Gordon
7	12830919	8	5	0	13	2003 Rapid multi-residue method for the determination of azinphos methyl, bromopropylate, chlorpyrifos, dimethoate, parathion, and diazinon in various food samples.			Aplada-Sarlis, Kyriakidis, Cook, Waldbillig
8	9588346	8	9	0	17	1998 Effects of the pesticides carbofuran, chlorpyrifos, dimethoate, lindane, triallate, trifluralin, 2,4-D, and pentachlorophenol on the development of the rat.			Lotti, Maroldi, Capodicasa, Mc
9	2017753	8	1	0	9	1991 Promotion of organophosphate-induced delayed polyneuropathy by phenylmethanesulfonyl fluoride.			Carr, Armstrong, Buchanan, E
10	26642910	7	7	1	15	2017 Decreased anxiety in juvenile rats following exposure to low levels of chlorpyrifos during development.			Yano, Young, Mattsson
11	10653531	11	9	3	23	2000 Lack of carcinogenicity of chlorpyrifos insecticide in a high-dose, 2-year dietary toxicity study in Fischer 344 rats.			Hart, Cavey, Moore, Strong
12	94259	11	10	0	21	1979 Efficiency and safety of methidathion applied as a pour-on systemic insecticide for control of cattle lice.			Jegade, Owojori, Römcke
13	28260687	10	7	0	17	2017 Temperature influences the toxicity of deltamethrin, chlorpyrifos and dimethoate to the predatory mite Hypoaspis aculeator.			Gordon, Mack
14	12521673	9	6	0	15	2003 Influence of gender on thermoregulation and cholinesterase inhibition in the long-evans rat exposed to diazinon.			Karen, Li, Harp, Gillette, Blooi
15	11829414	9	0	0	9	2001 Striatal dopaminergic pathways as a target for the insecticides permethrin and chlorpyrifos.			Yeary
16	6201092	8	0	0	8	1984 Oral Intubation of dogs with combinations of fertilizer, herbicide, and insecticide chemicals commonly used on lawns.			Mahugija, Khamis, Lugwisha
17	28280510	7	3	0	10	2017 Determination of Levels of Organochlorine, Organophosphorus, and Pyrethroid Pesticide Residues in Vegetables from Markets and a Supermarket around Kwan Phayao Lake.			Sapbamrer, Hongsibsong
18	24609615	7	1	0	8	2014 Organophosphorus pesticide residues in vegetables from farms, markets, and a supermarket around Kwan Phayao Lake.			Marty, Andrus, Bell, Passage,
19	22504667	7	5	5	17	2012 Cholinesterase inhibition and toxicokinetics in immature and adult rats after acute or repeated exposures to chlorpyrifos.			Karanth, Liu, Mirajkar, Pope
20	16777161	7	5	1	13	2006 Effects of acute chlorpyrifos exposure on in vivo acetylcholine accumulation in rat striatum.			Tang, Carr, Chambers
21	10543028	7	6	7	20	1999 Changes in rat brain cholinesterase activity and muscarinic receptor density during and after repeated oral exposure to diazinon.			

Figure 10. After clicking on Highlight Notes and then sorting by color

The Log sheet

The Log sheet keeps track of the queries you have run. The Abstract Sifter routines insert a row into the sheet every time you complete a query. These queries can be viewed and rerun. To rerun a query, simply double-click on it. (Figure 11.) Delete rows after Row 2 if you want to clear old entries.

	A	B	C	D	E	F	G
1	Log of activity		<-- Main				
2	Date	Returned	Query Used (double-click on query to rerun)				
3	7/6/2017 16:46	80	(pfoa OR pfos) AND carolina				
4	7/6/2017 16:45	24	atrazine AND soybeans				
5	7/6/2017 16:45	231	oecd AND skin				
6	7/6/2017 16:25	4187	chlorpyrifos				
7							
8							
9							
10							

Figure 11. View of the Log sheet

The Landscape sheet

The Landscape sheet allows the user to get an overview of the literature for a set of entities like chemicals. Figure 12 shows an example of a Landscape sheet built by a researcher interested in the toxicity of a particular set of chemicals. Let's take a look at that first. Queries designed to find the chemicals of interest are entered into Column C and in this case, a short version of the chemical is in

Column B. The queries in Row 3 are typical ones used in searching for articles about different kinds of chemical toxicity. We will refer to these queries as subject matter queries.

The premise behind the design of the Landscape sheet is very simple: PubMed queries will be built by taking the values in Column C (in this example chemical names and corresponding CAS numbers) and appending this query text to the subject matter query text in Row 3 with an “ AND ” in between the two query parts.

	B	C	E	F	G	H	I	J	K
1	Landscape View	Feel free to delete columns after Column D and rows after Row 4.							
2		Update Article Counts	View / hide queries	Heat Map by column	Heat Map by row				
3						(dna/drug effects OR DNA Damage OR chromosome aberrations OR (reproduction AND (toxicity OR adverse effects)))	ment OR embryo OR morphogenesis OR congenital abnormal	* OR neurolog* OR behavior OR intelligence OR cognition OR brain	
4	Preferred Name	Chemical / entity query	Cancer	Chronic	Dermatitis	Genetox	Repro Tox	DevTox	Neuro Tox
5	Tetrahydrocurcumin	Tetrahydrocurcumin OR 36062-04-1	42	1	5	9	0	22	15
6	(6)-Gingerol	(6)-Gingerol OR 23513-14-6	116	1	13	110	3	52	31
7	Curcumin	Curcumin OR 458-37-7	4115	93	424	627	30	1738	1547
8	Doxorubicin	Doxorubicin OR 23214-92-8	51542	584	9368	16654	275	5890	4031
9	Hydroquinone	Hydroquinone OR 123-31-9	518	49	515	1808	22	449	291
10	Coumarin	Coumarin OR 91-64-5	1066	37	307	255	105	999	781
11	PFOA	Perfluorooctanoic acid OR PFOA OR 335-67-1	106	40	14	63	167	386	181

Figure 12. Example of Landscape sheet use

To illustrate, we will double-click on the cell highlighted in Figure 13. When we double-click on this cell this tells the Abstract Sifter to take the query text in Column C about Perfluorooctanoic Acid and append it to (chronic AND toxicity). Figure 14 shows the constructed query. We can then click on *Submit* and the query gets sent to PubMed and we can then see the results on the Main page. The number of articles retrieved from PubMed is 40. That count is placed in the corresponding Landscape cell that we just clicked on.

article counts are placed in the corresponding cells. To run the query and retrieve the results, just double-click on any of the article count cells.

Preferred Name	Chemical / entity query	Cancer	Chronic	Dermatitis	Genetox	Repro Tox	DevTox	Neuro Tox
Tetrahydrocurcumin	Tetrahydrocurcumin OR 36062-04-1	42	1	5	9	1	22	15
(6)-Gingerol	(6)-Gingerol OR 23513-14-6	116	1	13	110	3	52	31
Curcumin	Curcumin OR 458-37-7	4115	93	424	627	30	1738	1547
Doxorubicin	Doxorubicin OR 23214-92-8	51542	584	9368	16654	275	5890	4031
Hydroquinone	Hydroquinone OR 123-31-9	518	49	515	1808	22	449	291
Coumarin	Coumarin OR 91-64-5	1066	37	307	255	105	999	781
PFOA	Perfluorooctanoic acid OR PFOA OR 335-97-1	106	40	14	63	167	386	181
Atrazine								

Figure 15. Adding rows to the Landscape sheet

Atrazine		117	84	21	179	164	803	302
----------	--	-----	----	----	-----	-----	-----	-----

Figure 16. After clicking on Update Article Counts

New subject matter queries can be entered as well. The query part goes into Row 3 and a heading (your choosing) goes into Row 4. See the example below where the PubMed query part: skin OR dermatitis is entered with the heading skin. Next highlight the cells underneath and click on the *Update Article Counts* button. The counts of articles satisfying the queries are placed in the cells. What's happening behind the scenes? For each cell, a query is being built by the Abstract Sifter and sent to PubMed to retrieve a record count. That record count is then inserted into the corresponding cell. (Figure 17.)

Keep in mind that our examples revolve around chemicals, but that does not mean anyone is limited to chemicals. The entries in Column C and in Row 3 can be whatever you the end-user want them to be: genes, proteins, diseases, authors ...

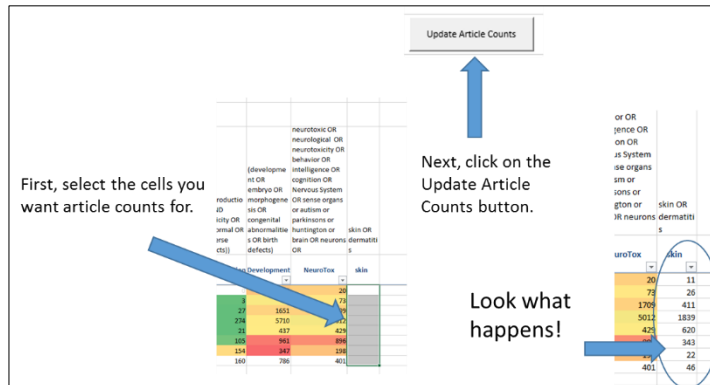


Figure 17. Steps for retrieving counts

Making things look good

The Landscape page has three buttons that make formatting easy (Figure 18). You can choose to hide the query row or show it. This button simply automates hiding and unhiding Row 3. The heat map buttons will quickly apply heat map coloring to the cells with article counts either by column or by row. Try them out!

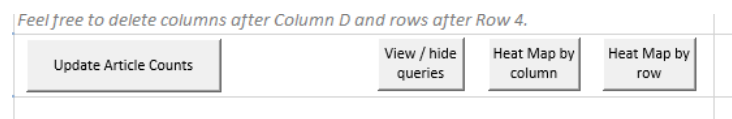


Figure 18. Buttons on the Landscape page include formatting actions

Using Sample Queries

The SampleQueries sheet contains a number of sample subject matter queries that the end user can use as a starting point for building a Landscape view of a set of entities. Let's see how. First, we will clean off the old subject matter queries by deleting columns E-J. Next, on the SampleQueries sheet we will

select rows with queries of interest then we click on the button *Send Queries to Landscape* (Figure 19). A form will ask for confirmation; to which we reply *OK*.

A B C		
1	Sample Queries	Note: these are starting points ... please expand and customize
2		
3	Category	Heading Query (double-click to see how the query looks to PubMed)
4	Ecological	HAB "harmful algal bloom" OR eutrophication OR (marine toxins AND algae)
5	Epidemiology	Epi epidemiology
6	Exposure	Dust exposure environmental exposure AND dust
7	Exposure	Food exposure environmental exposure AND food
8	Exposure	Water exposure Environmental Exposure AND (water OR groundwater OR drinking water)
9	Mechanism	Oxidative stress "oxidative stress" OR "free radicals" OR "reactive oxygen species" OR peroxides
10	Methods	Analytical chemistry "Chemistry Techniques, Analytical" OR analytical chemistry
11	Methods	Statistical Statistics as Topic[mh] OR statistics OR statistical
12	Methods	In vitro In Vitro Techniques[mh] OR cell culture OR "in vitro"
13	Mixtures	Mixtures (Drug synergism[mh] OR cocarcinogenesis OR pesticide synergists[mh] OR mixture[tiab] OR mixtures[tiab] OR
14	Pharmacology/medicine	Clinical trials ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trial[Publication Type])
15	Pharmacology/medicine	Clinical trials in children ((children OR child OR infants) AND human) AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical
16	Toxicity	Genetox (dna/drug effects OR DNA Damage OR chromosome aberrations OR genotoxicity OR micronucleus OR DNA Rep
17	Toxicity	Cancer neoplasms or cancer
18	Toxicity	Skin sensitization ("allergic" AND "contact" AND dermatitis) OR Dermatitis, Allergic Contact[mh]
19	Toxicity	ReproTox (reproduction AND (toxicity OR abnormal OR adverse effects))
20	Use	Pharmaceutical "therapeutic use" OR "therapeutic use"[subheading] OR pharmacologic actions[mh]
21	Use	Pesticide pesticide OR insecticide OR rodenticide OR fungicide
22	Use	Cosmetics cosmetics OR beauty
23	Use	Explosive Agents Explosive Agents OR explosive OR explosives
24	Use	Food food OR diet OR beverage OR nutrition
25	Use	Surface-acting Antifoaming OR Anti-foaming OR detergent OR detergents OR soap OR detergent
26	Use	Dye/coloring dye OR "coloring agent" OR pigment OR pigments
27	Use	Fertilizer fertilizer OR fertilize
28	Use	Solvents solvents OR solvent
29		

Figure 19. Selecting rows with queries of interest

Our Landscape sheet then looks like Figure 20.

B C		E	F	G
1	Landscape View	Feel free to delete columns after Column D and rows after Row 4.		
2		Update Article Counts	View / hide queries	Heat Map by column
3				
4	Preferred Name	Chemical / entity query	Algae	Dust exposure
5	Tetrahydrocurcumin	Tetrahydrocurcumin OR 36062-04-1		
6	(6)-Gingerol	(6)-Gingerol OR 23513-14-6		
7	Curcumin	Curcumin OR 458-37-7		
8	Doxorubicin	Doxorubicin OR 23214-92-8		
9	Hydroquinone	Hydroquinone OR 123-31-9		
10	Coumarin	Coumarin OR 91-64-5		
11	PFOA	Perfluorooctanoic acid OR PFOA OR 335-67-1		
12	Atrazine	Atrazine		

Figure 20. New queries on Landscape sheet

Next, we select the article count area and then click on *Update Article Counts*.

Figure 21. Selecting the cells for article counts

B		C			E	F	G
1	Landscape View	Feel free to delete columns after Column D and rows after Row 4.					
2		Update Article Counts	View / hide queries	Heat Map by column	Heat Map by row		
4	Preferred Name	Chemical / entity query			Algae	Dust exposure	Clinical trials
5	Tetrahydrocurcumin	Tetrahydrocurcumin OR 36062-04-1			0	0	3
6	(6)-Gingerol	(6)-Gingerol OR 23513-14-6			0	0	5
7	Curcumin	Curcumin OR 458-37-7			4	0	258
8	Doxorubicin	Doxorubicin OR 23214-92-8			6	1	9206
9	Hydroquinone	Hydroquinone OR 123-31-9			12	1	130
10	Coumarin	Coumarin OR 91-64-5			5	1	162
11	PFOA	Perfluorooctanoic acid OR PFOA OR 335-67-1			7	52	5
12		Atrazine			90	14	3

Exporting to other applications from the Notes sheet

The Abstract Sifter allows the user to export articles from the Notes sheet to outside applications. On the Notes sheet there are two buttons labeled *Get References* and *For HAWC*. By clicking on the *Get References* button, the form in Figure 23 appears. The box on the left contains the PMIDs for each of the rows in the Notes sheet. Clicking on Send to PubMed will send the PMIDs to PubMed for retrieval. In PubMed, the citation records will be displayed. At the top of the screen, the user can click on *Send to* (Figure 25). This starts a dialog leading the user through the steps of downloading the citations to a

reference management software. (Figure 26). The user can download all the PubMed IDs on the Notes page, or a selected set of rows through the All or Selected radio buttons shown in Figure 24.



Figure 23. Buttons on Notes sheet that allow export

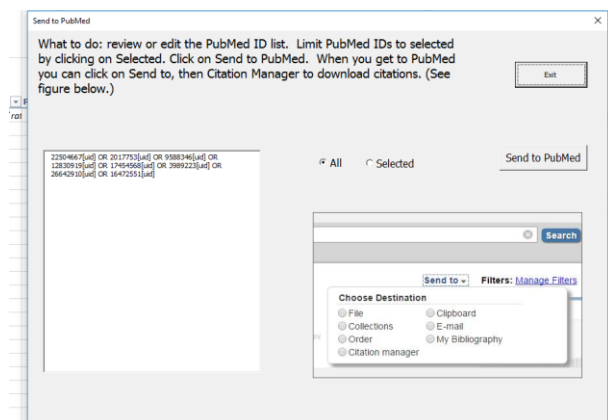


Figure 24. Form that appears after clicking on Get references button

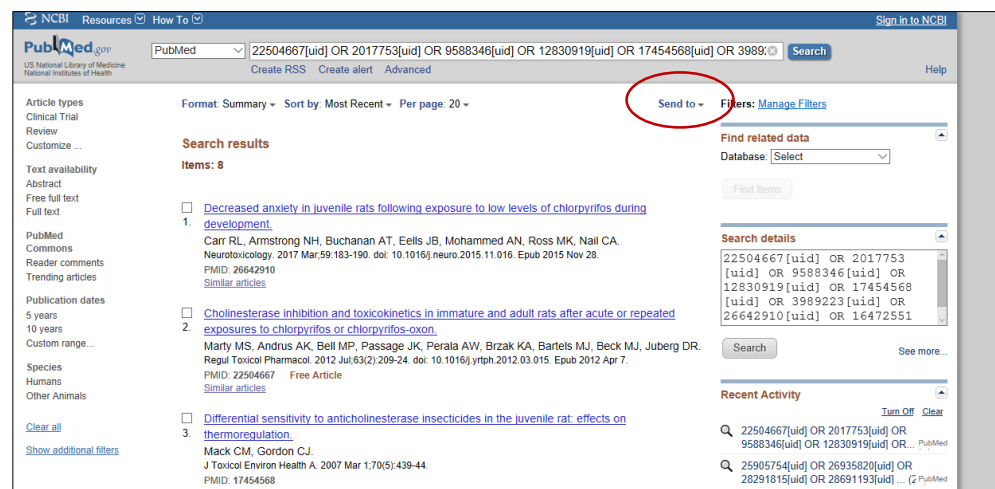


Figure 25. In PubMed, click on Send to

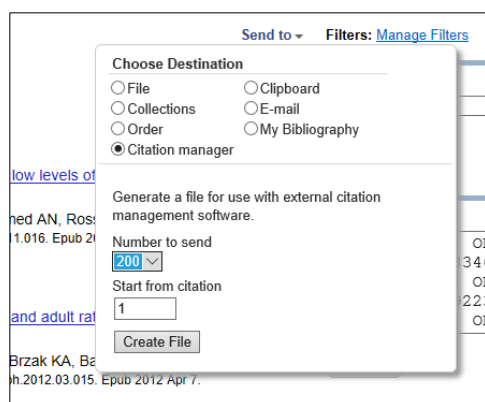


Figure 26. Dialog box for exporting to citation manager

When the user clicks on the Create File button, a file is created and downloaded in nbib format and can be imported into any reference manager software.

Similarly, the PMIDs can be formatted for input into Health Assessment Workspace Collaborative, also known as HAWC (Figure 27). HAWC tutorials are available to demonstrate the import process so it will not be covered here.

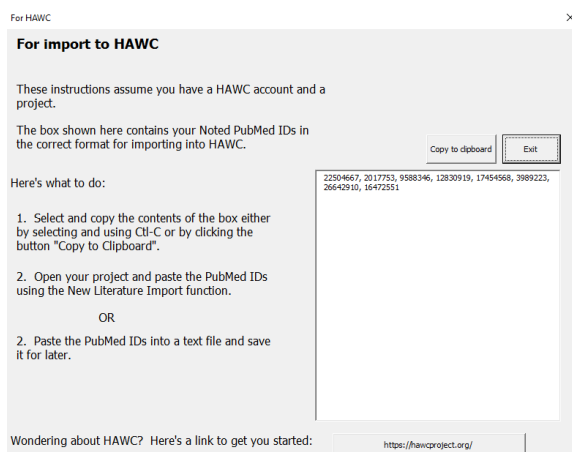
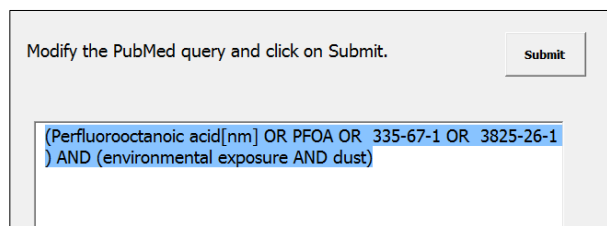


Figure 27. Form to send PMIDs to HAWC

Helpful Tips

Tip 1

The Landscape sheet is a great way to explore a set of chemicals but some chemical names are long, complex, and a challenge to PubMed. If you get unexpected results from a chemical query, it's a good idea to check it in PubMed. You can take any query generated by the Abstract Sifter and copy and paste it into PubMed using Ctl-C to copy and Ctl-V to paste. For example, the query in the box shown in Figure 28 is selected and copied (with Ctl-C). Then in PubMed the query is pasted into the query line at the top as shown in Figure 29. After we click on search we see that PubMed brings back 51 records. On the right side of the page is a box entitled *Search Details*. Click on the *See More ...* link to expand this box. (Figure 30) Figure 31 shows the information provided by PubMed about how it expands the query. If you need to learn more about PubMed queries, click on *Help* on the PubMed home page.



Modify the PubMed query and click on Submit.

(Perfluorooctanoic acid[nm] OR PFOA OR 335-67-1 OR 3825-26-1)
) AND (environmental exposure AND dust)

Figure 28. Select and Ctl-C to copy

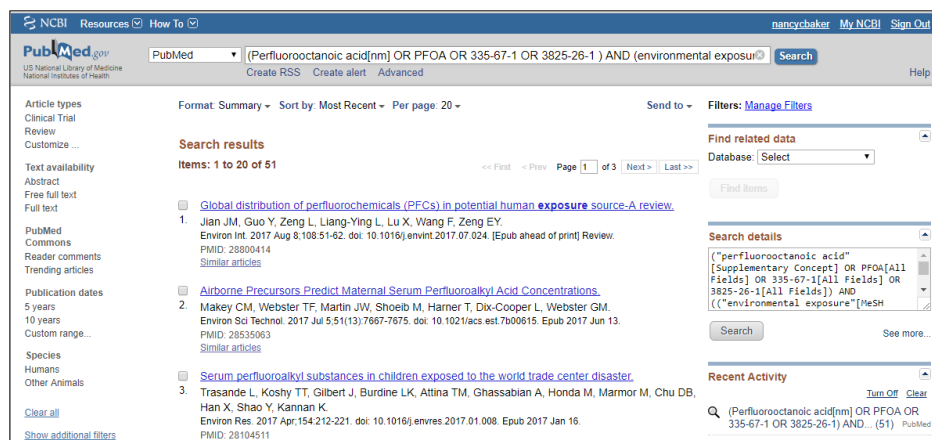


Figure 29. Ctl-V to paste in PubMed then search

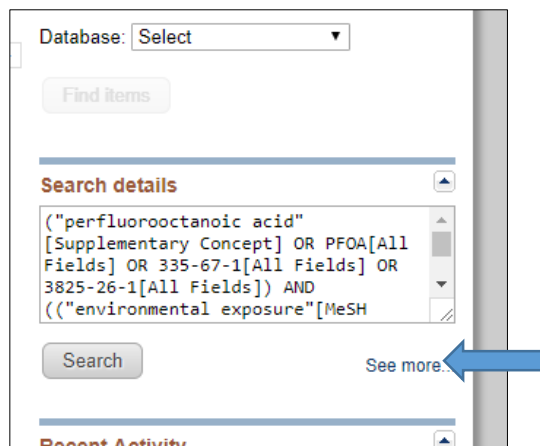


Figure 30. See what PubMed does to expand your search

NCBI Resources How To nancycbaker

PubMed.gov US National Library of Medicine National Institutes of Health

PubMed (Perfluorooctanoic acid[nm] OR PFOA OR 335-67-1 OR 3825-26-1) AND (environmental exposure AND dust) Search

Advanced

Search Details

Query Translation:

```
("perfluorooctanoic acid"[Supplementary Concept] OR PFOA[All Fields] OR 335-67-1[All Fields] OR 3825-26-1[All Fields]) AND ((("environmental exposure"[MeSH Terms] OR ("environmental"[All Fields] AND "exposure"[All Fields]) OR "environmental exposure"[All Fields]) AND ("dust"[MeSH Terms] OR "dust"[All Fields]))
```

Search URL

Result:

51

Translations:

Perfluorooctanoic acid[nm]	"perfluorooctanoic acid"[Supplementary Concept]
environmental exposure	"environmental exposure"[MeSH Terms] OR ("environmental"[All Fields] AND "exposure"[All Fields]) OR "environmental exposure"[All Fields]
dust	"dust"[MeSH Terms] OR "dust"[All Fields]

Database:

PubMed

User query:

(Perfluorooctanoic acid[nm] OR PFOA OR 335-67-1 OR 3825-26-1) AND (environmental exposure AND dust)

Figure 31. PubMed query breakdown and expansion

Tip 2

It can also be very helpful in chemical research to include the chemical name in the sifting process. This is because a chemical can be mentioned in an abstract even in cases where the article is not really about the chemical and will be retrieved in the PubMed query (depending on how the query is worded).

Counting the occurrences of the chemical name in the abstract through the sifting process can help the user discriminate between articles mentioning a chemical or those actually about a chemical.