

# **Argumentative Convergence as a Reconfigurator in the Trajectories of Risks**

**A Comparison of Low-Dose and CMR arguments  
in Controversies on Health and Environment**

**Francis Chateauraynaud  
GSPR – EHES**

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## ***Abstract***

Since the beginning of 1990s, public argumentations in biomedicine, toxicology and epidemiology have undergone a big change. In order to understand the argumentative features in which low doses on the one hand, and CMR on the other hand, are used by different actors, transforming their common space of reasoning, I suggest to proceed to a systematic comparison of a set of controversies : thus I will track the use of the two topics in issues like asbestos, radioactivity, GMOs, pesticides, air pollution, nanotechnologies, bisphenol-A and different other cases. The collected materials are rich enough to provide many configurations of actors and arguments. They help us to describe the transformations or trajectories over time of argumentative configurations, and to detect and formalize characteristics of different public controversies commonly defined as typical risk society issues. Key questions will be : can we observe an argumentative convergence, commonly produced through the precautionary principle, by which each new alert or controversy in the field of health and environment necessarily creates the same configuration of actors and arguments ? In what cases does the classical divide between political issues and medical or scientific issues still predominate ? Could the standardization of tools and categories help the actors to transform the balance of power or could it accelerate the grasp of a new form of biopower ?

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In 2009, on August 25, UFC-Que Choisir (leading french consumer association) publishes its proposals relating to indoor air pollution<sup>1</sup>. This contribution is produced in preparation for the future negotiations and discussions in the drafting process of the law "Grenelle II". The key arguments are based on studies showing that indoor air is 5 to 10 times more polluted than outdoor one, difference due to toxic emissions - volatile organic compounds (VOCs), fiber or metal - by decoration products (paint, varnish) and also by deodorants and cleaning products. In this intervention, the association uses a form of "argumentative convergence" linking the proven dangers of certain substances for human health to serious doubts created by other substances. According to Que Choisir, these doubts are due to "insufficient data" on VOCs which potentially cause "skin irritation and pulmonary system illnesses, nausea, headaches, but also cancers, impaired fertility and developmental disabilities"<sup>2</sup>. In addition, the representative of consumers do not forget to mention the "cocktail effect" of simultaneous exposure to multiple pollutants, whose health consequences are not yet well measured<sup>3</sup>. UFC-Que Choisir claims for the implementation of measures listed in the law Grenelle I published in August 2009. This Law provides the submission of all the construction products, including wall and floor coverings, to a labeling requirement, and prohibits products with substances classified as carcinogenic, mutagenic or toxic to reproduction – CMR from category 1 and 2. By the way, the NGO approves the recommendations of a report of the Parliamentary Office for Evaluation of scientific and technological Choices (OPECST) on the pollution of indoor air<sup>4</sup>, hoping a quick adaptation in the Law "Grenelle II".

In a book published in 1986, Sheila Jasanoff noticed that the main feature which clearly distinguishes modern risk management from past policy procedures is "the increased demand by private citizens for a role in public decision-making"<sup>5</sup>. She added that, "increasingly, citizens in the industrialized nations are reluctant to commit the resolution of such issues to the exclusive jurisdiction of experts and the state." Indeed, the making of critical expertise by associations was widespread in Europe since the last 20 years, even though this configuration needed a series of health crises for being taken in account by state agencies<sup>6</sup>. Different

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<sup>1</sup>Que Choisir, « Air intérieur. Un problème de santé publique », 25 août 2009.

<sup>2</sup> Many reports and books had produced such an argumentation in the past. See for instance, N. Ashford & C. Miller, Chemical Exposures. Low Levels and High Stakes, New York, Van Nostrand Reinhold, 1998. On the impaired fertility and developmental disabilities, see the report called Evaluating Chemical and Other Agent Exposures for Reproductive and Developmental Toxicity, Washington, The National Academies Press, 2001.

<sup>3</sup> In Europe, the question of "cocktail effect" is taken more and more seriously by experts and regulation agencies. In November 2009, the Swedish environment ministry warned that "chemicals are only being assessed for risk in isolation, rather than when combined with others". This warning was similar to that of Defra (the UK government department responsible for policy and regulations on the environment, food and rural affairs), made in response to a Danish report concerning chemicals in the home and their effect on children.

<sup>4</sup> OPECST, The risks and dangers posed to human health by commonly-used chemical substances: glycol ethers and indoor air pollutants. Evaluation of the competence of the public authorities and of the choices made, Report, 23 january 2008.

<sup>5</sup> S. Jasanoff, Risk Management and Political Culture, New York, Russell Sage Foundation, 1986, p. 55.

<sup>6</sup> F. Chateauraynaud and D. Torny, Mobilising around a risk : from alarm raisers to alarm carriers, 2005 (english version on line ; french version published in Cécile Lahellec (coord.), Risques et crises alimentaires, Paris, Tec & Doc, 2005.

processes of mobilization in health and environmental seem to confirm this key pattern for the relationships between scientific expertise and democracy : non-institutional actors are able to grasp with new standards on risk assessment and management and to put them in their public argumentative devices. But, in many situations we observe that citizens are less involved than stakeholders and that many spokesmen are not really emerging civil players. At any case, a group like UFC-Que Choisir has occupied the public arenas in France for a long time and is not what we call a emerging actor! Whatever the making of these spokesmen, a question must be asked : are the argumentative devices used by these groups performative enough to produce changes in the political and legal systems ? Who is in position to relaunch a critical work when public controversies or conflicts around health and environment are finished and when official agencies say that all is under control – pointing, for instance, the existence of REACH ? When we look to the different trajectories followed by many risk issues from the post-war period to nowadays, we observe that a lot of norms and regulating tools were early put in place but has failed to change situations on the ground – let us recall the case of mesotheliom caused by asbestos, causality recognized by different social security systems during the 1950s. The rise of issues like low doses and CMR during the past years, certainly gives an indication of an intense activity of regulation but we must have a watch on the critical arguments, the types of alarm and controversy engaged in and out the institutional field in charge of risk assessment<sup>7</sup>. This short paper suggests some research directions to explore these questions, by crossing two analytical techniques : a sociology of public argumentation and a series of corpus-based studies grounded in the collection of important textual databases.

The recent events concerning the indoor air issue put at question the processes by which actors, remote from institutional expertise, could grasp, or not, the problem of low doses and/or CMRs. After recalling the main patterns of an argumentative sociology when applied to a large range of risk issues followed in the long run, I propose to watch how topics like low doses and/or CMRs emerge in a dozen cases. The systematic analysis of a series of corpus allows both to construct a space of variation (by moving over time, by examining the argumentative devices of multiple authors-actors and by comparing different objects of risk) and to extract key moments of argumentation which involved low doses and the CMRs. By focusing on specific moments selected from the study of data, I will discuss some hypothesis concerning the shifts by which the standards used for assessing and managing risks are taken seriously by actors in order to produce collective mobilization and political deconfinement.

## **1. The Contribution of Argumentative Sociology to the Analysis of Risk**

Following actors and mapping social networks are very normal, quite undiscussed, methods in contemporary sociology, and seem to be sufficient to describe the rise and fall of public issues: acting, networking, bringing together human and non-human actors, topics and groups, devices and institutions ... but what about the birth and death of arguments? If many studies have focused on the rhetoric of science, STS and pragmatic sociology have much to gain from argumentation theories<sup>8</sup>. In what context does a new argument emerge – and, at the same

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<sup>7</sup> On the dialectic between regulation and critique in the “risk society” see B. Adam, U. Beck and J. Van Loon (eds), The Risk Society and Beyond New York, Sage, 2000.

<sup>8</sup> See W. Keith and W. Rehg, “Argumentation in Science: The Cross-Fertilization of Argumentation Theory and Science Studies”, in Handbook of Science and technology Studies, op. ct., p. 211-239.

time, at least one counter-argument? What kind of trajectory does it take, and through which modifications? What does it mean to resist to criticism? Are the arguments immanent of the actor networks or are they produced by the disputing process itself, with a contextual relevance, impossible to reproduce at a distance? How can an argument travel from small communities through different kinds of arenas and groups, winning in strength and in surface, and becoming, step by step, a watchword, a political tool, a rule of law or a common sense feature? To understand the turning moments in the trajectories of arguments, we need to engage, in our conceptual and analytical toolbox, a good theory of argumentation able to work as close as possible to the actors' practical and critical reasoning<sup>9</sup>.

Involving into an argumentative process presents a cost for actors : it implies to put at risk basic beliefs! A first reason for this is that protagonists must deal with other beliefs ; a second reason lays on the fact that elements drained by different arguments come into contradiction with the principles underlying beliefs and fundamental values<sup>10</sup>. This explains why, in many debates, accepting to enter into a genuine dialogic process quickly leads players to seek a compromise, if they are oriented towards consensus and cooperation - which generates multiple processes to close as soon as possible the discussion ( "we will not argue on this point", "it would lead us too far ") – or, in the case of a dissensus orientation, the figure that Lyotard describes as the concept of «differend », it leads to a defensive consolidation in order to reduce the views of others and to literally bomb his opponent's arguments so that he could not respond.

What kind of arguments do we find in the cases of public controversy around sanitary and environmental issues ? Three types of arguments predominate in controversies around risk: the argument to the consequences (appeal to consequences, also known as argumentum ad consequentiam in classical studies of rhetoric<sup>11</sup>) ; the argument by the precedent (referring to a previous event or case, for instance referring to asbestos for warning about nanoparticles) ; and the argument by comparison (especially when two sources of risk, two substances or two types of results are compared and contrasted<sup>12</sup>). Moreover, we can distinguish three levels to characterize the different sets of arguments and their critical points of articulation: values (or axiological level), knowledges and tools (epistemic level) and life worlds in which interact many entities (ontological level). The shape and scope of alerts and controversies dramatically change when players leave the only discussion on ways of knowing and begin to put in question activities or objects by examining their consequences on values and everyday life settings. This argumentative shift follows, in many cases, the entry of competing players away from the nuclei of scientific expertise and production of norms and standards, from large NGO activists to associations of local residents or users, from journalists to political

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<sup>9</sup> For a deeper development, see F. Chateauraynaud, « Public controversies and the Pragmatics of Protest. Toward a Ballistics of collective action », Culture Workshop, Harvard University, february 2009 (on ligne).

<sup>10</sup> See Peter Gärdenfors and David Makinson, « Revisions of knowledge systems using epistemic entrenchment », Proceedings of the 2nd Conference on Theoretical Aspects of Reasoning about Knowledge, 1988.

<sup>11</sup> D. Walton, Legal Argumentation and Evidence, Pennsylvania State University Press, 2002.

<sup>12</sup> M. Doury, « Evaluating Analogy: Toward a Descriptive Approach to Argumentative Norms », in Houtlosser P. & van Rees A. (eds), Considering Pragma-Dialectics. A Festschrift for Frans H. van Eemeren on the Occasion of his 60th birthday, Mahwah (NJ) London, Lawrence Erlbaum Associates, 2006, pp. 35-49.

spokesmen, etc.. The regime of controversy is transformed by entering in the logic of collective mobilization. But this version, grounded on a unidirectional logic must be completed by a dialectical view : many norms and standards, many expertises and regulative decisions are the result of early and huge mobilizations. Even if we lack space here to completely develop the socioargumentative point of view, the comparison of multiple cases followed over a long period may allow both to measure the degree of deconfinement of these issues and clearly identify the contexts of their public discussion<sup>13</sup>.

## 2. The forms of presence of low doses and CMR in the collection of corpus

In recent years, many corpus were built in order to examine the evolution of sets of players and arguments around health and environmental issues. A main research question was to understand how the major issues which saturate the contemporary public space (risk society, precautionary principle, security, science, expertise, governance or democracy) are concretely tested, and submitted to feed back effects by multiple critical processes through different social areas. The databases were not built from the problem of low doses or of CMR, thus they offer the opportunity to assess their significance in public controversy and collective mobilization.

Corpus		Dates	Nbtxt	Nbpages
Bisphenol A	Bisphenol (BPA)	28/04/2000 - 13/11/2009	401	731
JDLE	Journal of Environment (health thread)	11/10/2004 - 23/12/2009	2663	3313
Ethers de Glycol	Glycol ethers	04/10/1997 - 13/07/2006	269	505
Alertes varia	Varia alerts	21/06/2005 - 02/01/2010	399	774
Pesticides	Pesticides	23/11/1976 - 14/11/2009	7908	13236
Amiante	Asbestos	23/09/1971 - 14/12/2009	1104	6230
Benzène	Benzene	01/04/1974 - 08/01/2007	241	923
Nanomatériaux	Nanoparticles and health	21/12/2001 - 28/10/2009	354	3153
OGM	GMOs	09/07/1987 - 08/07/2009	10233	19930
Téléphonie	Mobile and Electromagnetic Fields	15/05/1989 – 14/12/2009	4421	10464
Nucléaire	Nuclear	06/08/1945 - 16/12/2009	3215	14285
Gaücho	Gaücho (bees and insecticides)	01/06/1991 - 22/02/2008	297	2466
charte environnement	Charter for the Environment	03/05/2001 – 28/02/2006	171	894
			31676	76904

Data Table 1 The collection of corpus focused on issues of risk

NB the series called “JDLE” and “Alertes varia” are generic threads, mixing many different issues like “waste”, “dioxin”, “green algae”, “carbon monoxide problems” etc - the main objective of this series is to follow daily the topics put on the public agenda; the corpus called "Charter for environment" contains polemics around the inscription of the Precautionary principle in French Constitution. All the series considered here are in french language – with an international extent through belgian, swiss or canadian texts.

<sup>13</sup> The theoretical backgrounds will be found in F. Chateauraynaud, *Argumenter dans un champ de forces. Essai de balistique sociologique (Argumentation in a field of forces. An Essay on sociological Ballistics)*, book to be published in 2010. The table of contents is available here :

[http://gspr.ehess.free.fr/documents/BALISTIQUE\\_4\\_PAGES.pdf](http://gspr.ehess.free.fr/documents/BALISTIQUE_4_PAGES.pdf)

This kind of collection is a first step in a long run cooperative process by which past series could be integrated while following the contemporary transformations of issues<sup>14</sup>. Maybe, the main methodological problem here is the different processes by which these databases have been collected during the last years. But precisely, because these volumes of texts were not specifically oriented to topics like “low doses” or “CMR”, they create an opportunity to test their modes of emergence.

### Low doses

Corpus	weight	Number txt	First date	Weight /100 pages	% txt
Bisphenol A	90	59	14/06/2001	4,79	14,7
Nucléaire	731	196	07/06/1957	4,03	6,07
Benzène	38	20	01/08/1994	4,02	8,29
Pesticides	315	202	15/06/1989	2,38	2,55
Téléphonie	248	205	15/04/1998	2,37	4,64
Alertes varia	31	19	31/01/2008	2,20	4,76
Amiante	142	69	05/04/1977	1,62	6,25
JDLE (santé)	35	30	21/10/2004	0,63	1,12
Gaücho	14	13	18/04/1998	0,56	4,30
charte environnement	4	2	13/03/2003	0,42	1,16
OGM	20	18	12/05/1999	0,01	0,17
Nanomatériaux	6	6	14/12/2004	0,03	1,7
Ethers de Glycol	2	2	09/12/2002	0,39	0,74
	1676	841			

Data Table 2 : Comparison of the position of Low doses in 13 different corpus

### CMR

Corpus	weight	Number txt	First date	Weight /100 pages	% txt
Bisphenol A	43	19	18/11/2008	5,88	4,74
JDLE (santé)	190	77	21/10/2004	5,73	2,89
Ethers de Glycol	27	13	19/04/2001	5,35	4,83
Alertes varia	23	11	30/05/2007	2,97	2,76
Pesticides	122	69	06/05/2000	0,92	0,87
Amiante	34	15	17/02/2001	0,55	1,36
Benzène	3	2	08/03/2000	0,33	0,83
Nanomatériaux	9	4	31/05/2006	0,29	1,13
OGM	18	8	27/03/2006	0,09	0,08
Téléphonie	7	5	18/03/2008	0,08	0,13
Nucléaire	7	4	01/04/1979	0,05	0,12
Gaücho	1	1	12/05/2007	0,04	0,34
charte environnement	0	0	-	0	0
	484	228			

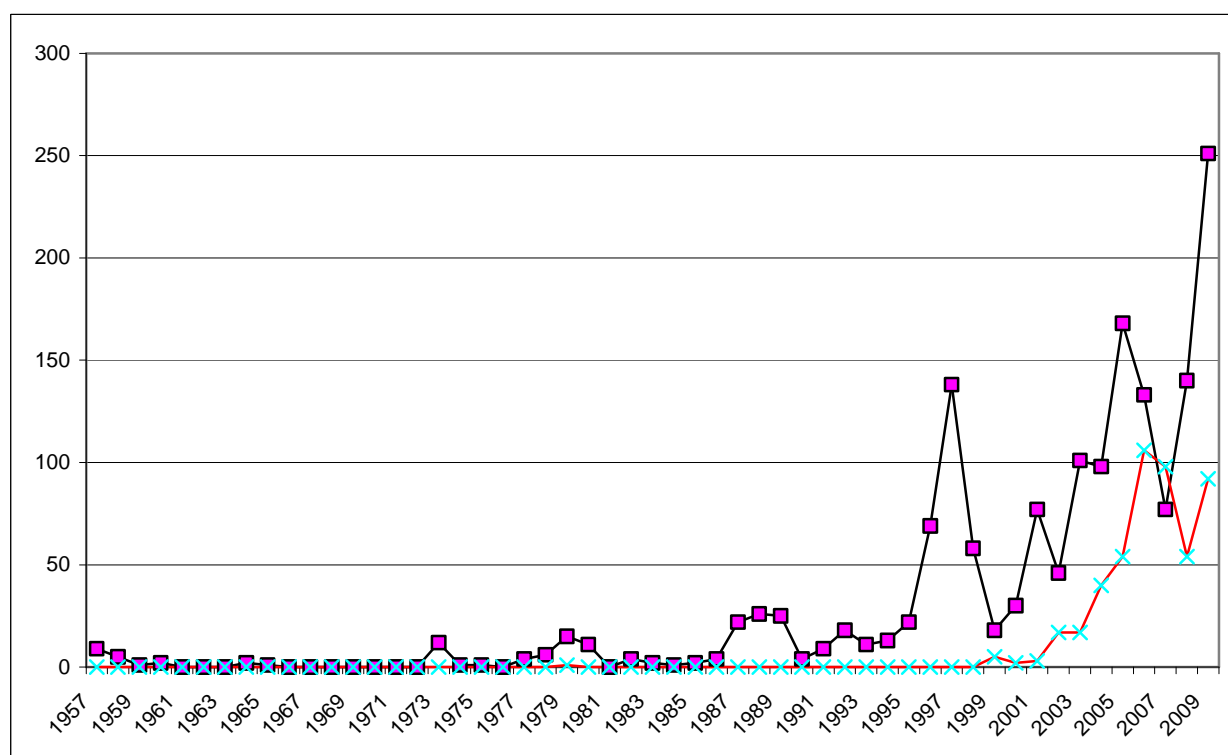
Data Table 3 : Comparison of the position of CMR in 13 different corpus

A few clues are mentioned in these two tables : a raw number of occurrences (or cumulative weight), the number of texts in which appears the topic, the date of the first quotation, and a frequency given by the ratio between weight and the size of each corpus – computed in number of pages or in number of texts.

<sup>14</sup> This methodological way is an alternative to the different « Issue Crawler projects » See N. Marres, “Tracing the trajectories of issues, and their democratic deficits, on the Web: The case of the Development Gateway and its doubles”, *Information Technology & People*, 2004, Vol. 17, 2, p. 124 -149.

Many informations can be derived from these tables – considered here as heuristic and comparative tools. First, depending the topic you choose, you do not get the same hierarchy of issues. But, surprisingly, one chemical reaches the top in the two rankings : Bisphenol A ! However, if you want to study the problem of low-dose you may open the files concerning controversies and mobilisations around Nuclear field or around Benzene fumes. If you prefer to focus on CMR, an electronic newspaper like Journal of Environment or an issue like Glycol Ether will be more relevant. On the other side, some issues seem to avoid low doses and CMR problems : for instance, GMOs which is more saturated by genetics and biotechnologies is clearly a bad choice – but an excellent counterpoint to build a contrastive reasoning ! Just notice that Pesticides are in a middle ranking in the two tables . But this position must be relativized : first, the volume of the database provides by itself many features related to our topics ; second, as we shall see below, pesticides are a relevant field in order to observe the coming rise of the argumentative conjunction between CMR and low doses questions.

Another key information concerning the date of first appearance of the themes in different folders. Low doses question appears very early in 1950s – 1957 in the nuclear textbase. For the CMR questions, very surprisingly, the first utterance is dated in 1979 in the nuclear corpus.



Graphic 1 Low Doses and CMR through time in the complete collection of corpus (the ordinate = number of relevant texts)

The two curves respectively describe the number of texts speaking of “Low doses” (black line, tracing a long history) and of “CMR” (red line, really taking off in 2000 (in our corpus)). On the low doses thread we observe different periods of emergence or rebound. Far for processing here by a complete analysis I can shortly give some landmarks : in 1950s many discussions were run in international institutions concerning the dangers of radiations, in

particular the famous ICPR<sup>15</sup> ; in 1970s we find the traces of alarms and controversies on asbestos but also the effect of a first importation in France of arguments putting forward low but constant exposure of population and environment around nuclear plants in the French environmentalist discourse<sup>16</sup> ; between 1986 and 1990 low doses come again with the multiple investigations and discussions about the sanitary consequences of Tchernobyl ; 1995-1997 is a period marked by the return of asbestos in French political field – in the regime of “scandal” – and by the controversy on the research held by Jean-François Viel around La Hague and showing a problematic peak of leukaemia on a population of childs<sup>17</sup>. With the new century, we note a more permanent presence of the question of low doses in public series, and in parallel the relative surge of CMRs. The fact that the two curves describe a clear growth in the last years is not sufficient to conclude to a convergence but the recent period seems to provide favorable conditions. Nevertheless, the true method to investigate this possibility is to turn to the texts themselves! If one asks Prospéro to extract, from the different series, all the texts which contain both CMR and low doses, it finds the following results – the 23 texts selected by the system are displayed in chronological order.

19/ 6/2000	Assemblée nationale	Groupe d'études santé-environnement : Téléphones portables, un danger pour la santé ?	Téléphonie
1/ 3/2003	Revue Experts	Produits toxiques et expertises	Pesticides
20/10/2003	Méar	6 – Les polluants de l'air intérieur de A à Z	Pesticides
19/12/2003	CPP@	Les perturbateurs endocriniens quels risques ?	Pesticides
2/ 3/2004	Vrousos	Priorités en radioprotection Propositions pour une meilleure protection des personnes contre les dangers des rayonnements ionisants.	Nucléaire
11/ 7/2004	PAN Belgique	Aperçu sur l'épidémiologie des pesticides	Pesticides
21/10/2004	JDLE	L'UE interdit des substances dans les cosmétiques	JDLE
1/ 1/2005	Devilleers et alii	Indicateurs pour évaluer les risques liés à l'utilisation des pesticides	Pesticides
26/ 1/2005	PNSE@	Bilan à 6 mois du Plan national santé environnement et perspectives 2005	Pesticides
15/ 3/2005	AFSSA-AFSSE	Question 2 Quels sont les points de la toxicité du fipronil à considérer au regard du risque pour l'homme ?	Pesticides
1/ 9/2005	Nouzille	CHAPITRE 5 Pesticides soupçons de contamination massive	Pesticides
26/10/2005	Sénat	Le drame de l'amiante en France comprendre, mieux réparer	Amiante
22/ 2/2006	Assemblée Nationale	Rapport fait au nom de la mission d'information sur les risques et les conséquences de l'exposition à l'amiante	Amiante
11/12/2007	JDLE	Une baisse de moitié de l'usage des pesticides est-elle possible ?	Pesticides
31/ 1/2008	Le Monde	La pollution de l'air intérieur, "enjeu sanitaire majeur" et négligé	Alertes Varia
12/11/2008	JDLE	Les doutes s'accumulent sur le retardateur de flamme déca-BDE	JDLE
16/ 2/2009	Lebioda	Fiche clinique électrohypersensibilité (EHS), par le Docteur Alexandre Rafalovitch	Téléphonie
2/ 3/2009	Réseau Environnement Santé	Le PNSE 2 un plan pour les années 2010 avec les idées des années 70. Pour un PNSE2 basé sur le principe de précaution	BPA
3/ 3/2009	Réseau Environnement Santé	Dans le cadre du lancement du Réseau Environnement Santé (RES)	BPA
2/ 4/2009	JDLE	Biberons au BPA le débat est relancé	BPA
3/ 7/2009	JDLE	Cancer et environnement l'Afsset prône un "changement de paradigme"	JDLE
30/7/2009	Réseau Environnement Santé	RISQUES LIES AU BISPHENOL A	BPA
2/11/2009	Réseau Environnement Santé	Plan Cancer - Un Plan qui a encore oublié l'environnement	BPA

Data table 4 : Texts bringing together low doses and CMR issues (date / author-actor / title / thread)

<sup>15</sup> S. Boudia, « Global Regulation : Controlling and Accepting Radioactivity Risks », *History and Technology*, vol. 23, n° 4 : 389-406 ; S. Boudia & N. Jas, « Risk and risk society in historical perspective », *History and Technology*, vol. 23, n° 4, 2007, 317-331.

<sup>16</sup> See for instance La Gueule ouverte, « Centrales nucléaires et environnement », avril 1973.

<sup>17</sup> D. Pobel & J.-F. Viel, “Case-control study of leukaemia among young people near La Hague nuclear reprocessing plant: the environmental hypothesis revisited”, *British Medical Journal*, No 7074 Volume 314.



It is needless to have heavy statistical expertise to see that three cases or sources are clearly relevant for investigating the process of argumentative convergence we try to track in this short contribution : Pesticides at the first rank (9/23), BPA (5/23) and Journal of Environment (JDLE : 3/23), covering nearly 75% of the selection we obtain! Even it is an effect of the building process of the different corpus, we must note that texts are more frequent from 2005 (16/23). By contrast we can put in evidence some “forerunners” like the “Groupe d’études santé-environnement “ from the national Assembly in 2000, Georges Méar, an early alarm carrier on indoor pollution<sup>18</sup>, and especially the Committee for Prevention and Precaution (CPP) in 2003. Obviously, if we look to the content of texts, we discover a very long history taken in account by the actors themselves.

Besides the nuclear already cited, the case of pesticides reveals a long-term process, widely documented and whose the major features characteristics are redeployed in the corpus<sup>19</sup>. Maybe a most interesting gate for us would be the endocrine disruptors. They were the focus of a report made by the French Committee for Prevention and Precaution in 2003. CPP grounded its statements on conclusions of the scientists who met in 1996 in an European workshop at Weybridge, linked to the European SCALE program (stressing the importance of the study of new-borns and children), and to the EDEN project (production of knowledge on combined effects and low dose exposure). CPP used also the work of EDTA (task force for testing and assessing endocrine disruptors)<sup>20</sup>. Let us a quote a large fragment from the CPP report rich enough to exemplify the argumentative convergence stimulated by the precautionary principle:

*“The CPP [...] asks for work to characterize the damages that endocrine disruptors are feared to cause. The nature and extent of those aspects related to reduced fertility must be estimated from a public health viewpoint and must include the aspects associated with overall birthrate, costs of fertility treatment, and psychological harm to the couples [...]. Other effects, such as those related to children's neurological development, sexual maturation, thyroid functions, and immune systems, must be characterized in the same spirit. The nature, extent, and permanence of the environmental impact must also be assessed in terms of its burden on ecosystems and its effect on various species and on biodiversity. [...] The CPP stresses that the absence of information about the extent of these phenomena is an obstacle to a decision in terms of the precautionary principle.”*

The endocrine disruptors issue seems to be an opportunity for pushing forward new approaches in the field of health and environment and to bring it closer the adjoining field of health and work. In this sense, the CPP recommends that screening of products and workplace surveillance be reinforced and specific risk-based environmental monitoring ("vigilance") be set up.

*“Workplace surveillance and health surveillance of workers must be strengthened, for both products used and effects suspected. Environmental monitoring must be organized to be able*

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<sup>18</sup> A. Bertrand, “La maison empoisonnée : aux origines d’une alerte aux formaldéhyde », in F. Chateauraynaud et alii, Pour un observatoire informatisé des alertes et des crises environnementales, research report, GSPR, 2003.

<sup>19</sup> N. Jas, “Public health and pesticide regulation in France before and after Silent spring”, History and technology, 2007, vol. 23, n° 4, p. 369-388.

<sup>20</sup> In the end of 1990s, an agreement was signed between the European Commission and US Environmental Protection Agency for sharing information about the development of protocols and the list of chemicals to be tested in priority. The topic of “endocrine disruptors” is very linked to this device of international cooperation.

*to identify and relate anomalies in environmental media and in animal populations. The CPP recommends that priority be accorded to research on combined exposure effects and on the populations of women and children. Continuation of the epidemiologic and toxicological research, including study of the dose-response relation and of the conditions for transposition of animal data to humans is obviously essential for operational knowledge of endocrine disruptors”<sup>21</sup>*

In table 4, we also notice that the key actor which handles the double question of CMR and low doses is a new NGO called Réseau Environnement Santé (Environment Health Network)<sup>22</sup>. This Association defends common values like the health of the living world (humans and its environment) and proposes solutions that take into account the health-environment interactions. The great project carried by Cicolella, involved in many public controversies, is to push institutions and experts systems to a paradigm shift by replacing classical causality (especially about cancers) by a systemic approach grasping all interacting elements that may affect health, and to provide scientific studies and epidemiological investigations in the long run. But, at the same time, this network aims to accompany individuals or legal representatives of sufferers of health damage associated with environmental degradation, and by this way, to reduce or eliminate the health impacts, including in the workplace, caused by environmental degradation and various forms of pollution. Sharing informations, produced by whistleblowers, by citizen groups, institutions or scientific communities, remains a central objective of this new public actor. In doing so, the convergence of different questions is a prior task to achieve. The main counter-argument used by the opponents is the propensity to amalgamate insoluble problems - as argue members of the Academy of Medicine, who describe themselves as huge enemies of this project of redefining the rules of method in health and environment issues<sup>23</sup>.

### **3. Invoking low doses and/or CMR in critical configurations**

The problem of low doses is a nagging question, rarely prominent but ubiquitous - at least if one takes an indicator like the ratio between the degree of presence in the series made with public media or political debates on the one side, and communications and publications in specialized arenas, on the other side. First built in the area of radiation protection, through a long history invoked in the previous point, low doses are regularly convened by multiple actors, and arise in long disputes in connexion to the notions of "acceptability" and "benefit-risk relationship". The trajectory of low doses over the long term, however, is marked by a progressive deconfinement and increased connectivity with many kinds of issues.

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<sup>21</sup> See Committee for Prevention and Precaution, Endocrine disruptors: what are their effects ?, Ministry of Ecology and Sustainable Development, March 2004.

<sup>22</sup> Founded by André Cicolella, a french toxicologist, this actor-network attempts to bring NGOs, health professionals, patients, scientists and citizens together and was launched under the aegis of the Alliance pour la Planète and the following NGOs: WWF France, Fondation Sciences Citoyennes, MDRGF, Fac Verte, Objectif Bio et Nord Ecologie Conseil.

<sup>23</sup> See the critique of the French Academy of Science arguments in the controversy on the possible cancer risks caused by ionizing radiation doses, by David J. Brenner and Rainer K. Sachs, "Estimating radiation-induced cancer risks at very low doses: rationale for using a linear no-threshold approach", Radiation and Environmental Biophysics, Volume 44, Number 4 / mars 2006, p. 253-256.

For a very long time, in multiple risk areas, low doses are involved in argumentative sequences concerning cases of illnesses unexplained by high exposures. What we see over time is a greater autonomy of low doses issue compared to high doses. This is due both to the generalization of categories and models for risk assessment and to the mode of existence of risk controversies which no longer depend on the occurrence of a major disaster (as for GMOs or nanotechnology that are opposed, under this dimension, to nuclear). In the following fragments of verbatim, which cannot be exhaustive, we see various critical figures, showing how the topic of " low doses" seems to lead per se to a critical argumentation – a critique at least based on the incompleteness of the studies and measures.

*“The "White Paper on asbestos" insists on the 20% of cases of mesothelioma where asbestos exposure has not been retrospectively found (but such retrospective surveys on subjects who died are necessarily very incomplete!) ; on the contrary, it does not mention the more and more numerous cases, occurring in individuals occupationally exposed to very low doses of asbestos (Ironers, machinists) or in individuals infected in the vicinity of asbestos factories or by domestic contact with workers in asbestos plants.”<sup>24</sup>*

In 1970 Jean Bignon, a french toxicologist was clearly on the side of anti-asbestos by warning government about the big dangers of long run exposure and of many hidden or forgotten flocking . But, during the 1980s, by his participation to the Permanent Committee on Asbestos (CPA), Bignon seemed to change his point of view by pointing other potential causes of cancer<sup>25</sup>. To show the transformation produced 30 years after, let us read some extracts in which National Assembly quotes the report produced by INSERM through a collective process of expertise in 1996.

*“The summary of the INSERM report "Health Effects of the main types of exposure to asbestos" is released at a press conference (July 2, 1996). The collective expertise extrapolates risk to low doses and confirms there is no threshold for risk. The estimated number of victims in France for 1996 was 1950 deaths (750 mesotheliomas and 1200 broncho-pulmonary)..”*  
*National Assembly, Report drawn up on behalf of the mission of information on the risks and consequences of exposure to asbestos / Date: 22/02/2006*

Here, the standard model of low-dose – using the linear model without threshold, wich was reinterpreted later as a typical application of the precautionary principle – is taken for granted. This form of reasoning will be used from the outset in the construction of nanoparticles as a major risk issue, and for which the precedent of asbestos is strongly requested<sup>26</sup>. With nanotechnology, metrology controversy already present in the nuclear and about

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<sup>24</sup> Due to the fact that my databases are in french, I give here an approximative translation.

<sup>25</sup> Refer to the inquiry run by the Commission d’information du Sénat, [Le drame de l'amiante en France : comprendre, mieux réparer, en tirer des leçons pour l'avenir](#), 20 octobre 2005.

<sup>26</sup> “In Study, Researchers Find Nanotubes May Pose Health Risks Similar to Asbestos”, [New York Times](#), May 21, 2008. Many researchers reported that injecting nanotubes into the abdomens of mice induced lesions similar to those that appear on the outer lining of the lungs after the inhalation of asbestos. See the Web Site of “Nature Nanotechnology”.

electromagnetic waves<sup>27</sup>, is a clear challenge for health and environment experts – a challenge even stronger than nanotechnologies are seriously criticized by citizen groups, especially in France.

*“Priority will also be looking for adverse events, focusing on toxicity studies of low dose on people with maximum vulnerability, particularly for workers in contact with nanomaterials that could have been exposed despite the safeguards, as a precaution, pregnant women should be excluded from these positions. In addition it will give priority to all measures necessary to protect workers in contact with nanomaterials, and containment areas of study and production of these nanomaterials. A tracking fetuses and newborns should be statutorily required in cases of risk of accidental or occupational exposure.”*

*Attac France / Date: 31/03/2009*

This argument concerning the specific vulnerability of persons is at the center of huge controversies. Indeed, another criticism is linked to the selection of employees, seen as a concrete application of techniques of biopower. A good example is provided by a critical comment of french government decrees, promulgated in 2001 and 2003, and called “CMR Act”. The decree n° 2001-97 (February 1st, 2001) establishes special rules for the prevention of risks linked to carcinogens, mutagens or toxic to reproduction (CMR Act) when using such products at the workplace. A number of suspect products in terms of their “CMR toxicity” are subject to other regulatory obligations, like the decree n° 2003-1254 on the Prevention of Chemical Risk. Their use should be discussed inside the different enterprises, knowing that the rankings of the toxicants will evolve with knowledge. We must recall here that CMR are strongly related to patterns of work organization and industrial relations, while Low Doses are more connected to epidemiology of general population – even their epistemic roots were linked to the making of workers’ protection.

Some actors rebelled against the specificity that France shares with Belgium leading occupational physicians to establish a form of profile of fitness for each employee. Indeed, this concept leads to a selection. The new decrees extend the logic developed by government in 1977 through a decree that set limits for exposure to asbestos at 2 fibres/cm<sup>3</sup> and asked physicians to certify that the worker do not present any medical contraindication to the inhalation of asbestos dust”! Since 1973 opponents, as Henri Pezerat, a french toxicologist, have established that such a standard was inadequate to protect employees against cancer, and in 2003 and 2004 a network of critical actors tried to contest the new decrees. They put at question the logic involved in this policy : “(after asbestos) will you attend the same carnage with glycol ethers, primarily concerned by the famous decree?” In fact, in the same period, the authorities still refused to ban in industries the ethers under investigation, known to be toxic, although they are still expanding the list of proscribed derivatives for consumption. It was already a common statement to say that these chemical molecules cause sexual dysfunction, infertility, cancer and severe fetal malformations. Patients and parents of malformed children were mobilized in the Association of Victims of glycol ethers (AVEG). They estimated that a million people were exposed to ethers in paints, varnishes, inks and cleaning products and the court of Evry opened a criminal investigation following a claim from a former IBM employee on disability.

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<sup>27</sup> As visible in table 2, for the thread concerning OEM, low-dose is an important topic. This is due to many comparative arguments between ionizing and non-ionizing rays under metrological aspects and to the main controversy on low exposure, the most frequent item here being “faibles niveaux d’exposition” (low levels of exposure). On these issues, see J. Debaz, « Breaking the Waves: Scientific Argumentation in French Electromagnetic Waves Controversies », Contribution of the Workshop Carcinogens, Mutagens, Reproductive Toxicants, March 2010.

*“Under the pretext of protecting employees against any CMR, these texts lead to promote a logic of selection to introduce into the world of work principles of individuation and discrimination by health, summarized Nicole Raynal, in charge of health at Mutuelles de France. And relieving employers of all preventive measures and collective security. In their "Call for moral and political authorities and occupational physicians," Philip Davezies and occupational physicians Christian Torres and Philip Dhuez, rebelled against "a misguided conception of the health system at work that leads to" find and remove the workers who would present an "extra risk"”*

In the nuclear field which, as noted above, was at the origin of the linear no-threshold model and thus provided an argumentative matrix for low doses issues, especially for the regulation of doses received by temporary workers in the nuclear<sup>28</sup>. In March 2004 the Committee Vrousos issued its report on Priorities in radiological proposals for better protection of individuals against the dangers of ionizing radiation :

*« It appears increasingly necessary for monitoring post-exposure, post-professional or detection and monitoring of occupational diseases, to dispose of a history of occupational exposures for which individual sheets are made of exposure to ionizing radiation, carcinogenic, mutagenic, toxic for reproduction and hazardous chemicals. »*

As we have seen above, BPA is a key issue to observe some argumentative convergences and the attempt aimed by different actors to shift into a new paradigm in health and environment. BPA has been used since the 1960s to make plastic bottles, cups for toddlers and the linings of food and beverage cans, including the cans used to hold infant formula and soda. Until recently, it was used in baby bottles, but major manufacturers have excluded this chemical after studies had shown that it can leach into food - a study of 2,000 people finding that more than 90 percent of them had BPA in their urine. Traces have also been found in breast milk, the blood of pregnant women and umbilical cord blood. Reports of potential health effects have made BPA notorious, especially among parents, and led to widespread ban of it in Canada, Chicago and Suffolk County (New York).

As part of its campaign to launch, the Environmental Health Network (RES) takes as focus target the Bisphenol A in plastic packaging for food and drink. In a lengthy statement explaining why we should ban BPA, the RES contests the position of the French Agency for Food Safety on the Bisphenol A in polycarbonate baby bottles. But the target is more political with a project of making a specific Grenelle on health and environment. The major resource, cognitive and political, is the precautionary principle:

*“The precautionary principle has become a constitutional principle in 2005. The Policies against cancer should therefore be based on this principle, which means it is not necessary to have an absolute proof in order to act. We must act from a network of facts, ie from experimental data without having the confirmed epidemiological evidence in humans [...] For this, we must have an overall view of the causes of cancer and break the discourse which tends to regard as "normal" that today cancer affects one in two men and one in three women.”<sup>29</sup>*

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<sup>28</sup> A. Thébaud-Mony, « Sous-traitance des risques, effacement des traces. Le cas des atteintes à la santé liées à la radioactivité dans l'industrie nucléaire », Mouvements, mai 2009.

<sup>29</sup> Réseau Environnement Santé, Texte de la conférence de Presse " Alerte sur le Bisphénol A dans les plastiques alimentaires ", 3 mars 2009.

On the question of risk assessment, RES considers that a systematic policy of substitution of chemicals classified in CMR and/or in endocrine disruptors is a priority for public health, going far beyond REACH. Note that this linguistic operator, “and/or”, is a good indicator for identifying convergent arguments<sup>30</sup>. The argumentative convergence is, in RES communication, a leitmotif :

*"We need a political of evaluation of emerging risk factors such as nanomaterials, electromagnetic fields and GMOs. The exposure limit values are based on outdated concepts and are not protective for worker health. For carcinogens, the VME correspond to risks in the range of 10<sup>-1</sup> to 10<sup>-2</sup>. They must be based on clear criteria for recognizing safety factors by committees with guarantees of independence on the basis of an ethics of expertise to establish by a High Authority. An acceptable risk for carcinogens and radiation impossible to substitute because naturally existing in the environment."*

A close examination of this fragment makes clear the connection of topics, which are ordinary treated by different networks of actors and institutions. The main spring of criticism is clearly the aim to rethink risk in health and environment as a whole and to end the fragmentation of an official assessment driven substance by substance.

#### **4. Brief reflections on the performativity of risk assessment in an era of radical criticism**

In mid-January 2010, the Food and Drug Administration of the United States, has surprised commentators by a shift position, expressing concerns about possible health risks from bisphenol-A (in plastic bottles and food packaging)<sup>31</sup>. This release is very surprising after FDA had declared BPA safe two years before! The US agency said that it had “some concern about the potential effects of BPA on the brain, behavior and prostate gland of fetuses and children,” and would join other federal health agencies in studying the chemical in both animals and humans. It confirms the propensity of the drug agency to become far more aggressive in taking serious looks at threats to public health ... under the Obama administration! In fact, US Government evaluations of BPA have had a contentious history. A draft report from FDA concluded to an absence of danger in 2008, but, a few months after, the National Toxicology Program, part of the National Institutes of Health, said BPA was cause for issues like “potential effects on the brain, behavior and prostate in fetuses, infants and children”. Then FDA asked an independent panel of scientific advisers to review its 2008 report and, as a result, the panel accused the F.D.A. of ignoring important evidence and giving consumers a “false sense of security about the chemical”. The main point for us here, is the visibility given, through this new rise of BPA in the public space, to the epistemic opposition between classical methods giving the priority to test animals with large doses and looking for tangibility of effects like illness, tumors or organ damage, and newer methods which study small doses to simulate human exposures and looking for more subtle effects (changes in behavior for instance). One major stake of these studies is to change the classification of the substance, and by this way its mode of regulation: shifting from a simple “food additive” to a “food contact substance”. Waiting this change, the debate on BPA is far from being closed. As an example, the American Chemical Council issued a statement saying BPA was safe,

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<sup>30</sup> F. H. Van Eemeren, P. Houtlosser and A. Francisca Snoeck Henkemans, *Argumentative Indicators in Discourse. A Pragma-Dialectical Study*, Springer, 2007.

<sup>31</sup> D. Grady, “F.D.A. Concerned About Substance in Food Packaging”, *New York Times*, January 15, 2010

praising the health agencies as confirming that there was no proof of harm to people by, saying that “some of the recommendations are likely to worry consumers and are not well founded.” On the opposite side, the National Research Center for Women and Families said that the FDA had not gone far enough : its recommendations put the responsibility on families and not on companies making products with BPA. In addition, this NGO observes that the focus on safety should not be limited to children, because studies have linked the chemicals to heart and liver disease and other problems in adults, warning that some legal actions could occur in the next future to change this situation.

The trajectory of this kind of public problem depends on the evolution of actors games in and around politics<sup>32</sup>. However, a political mobilization is never completely predictable in its temporality, its intensity and its scope, and if the standardization of arguments about toxic substances could prepare a deconfinement toward broader arenas, it does not produce a path dependency. In their paper called “Knowledge and political order in the European Environment Agency”, Claire Waterton and Brain Wynne have studied the kind of pressures bearing on the EEA to standardize and to achieve comparability in the field of chemical risk assessment<sup>33</sup>. They show how this agency has tried to provide an alternative policy by “acknowledging ignorance within scientific knowledge”. According to them, this strategy opens “a fundamental revision of policy responsibility between science, formal policy institutions and civil society”. Nevertheless; classical or alternative, a common policy needs a process of standardization. We can define the standards as collective tools which provide an objectivation of human agencies, and stabilize for a period the space of variation allowed by collective practices. To be socially organized a standard needs to bring together collections of data, tools and events. Furthermore, a collection could exist in two forms : in a “centre of computation” (like a laboratory, an institute or an non-profit organization) ; in a distributed network. By speaking of an alternative model of risk assessment, involving more heterogeneous actors, we generally imply the second acception : a distributed cognition in large networks of concerned protagonists.. Therefore, if standards are not grounded on vigilance and practice of variation, they put the collective devices at risk : overinterpretation of signs on one side versus lack of attention on the other side, the two attitudes will certainly lead to new catastrophes! If you say: “there is a standard, thus there is no problem!”, you are wrong. So, participating in the practice of a standard needs to develop a “perceptive work”<sup>34</sup>. According to William James, the “verifiability” is more significant than verification itself, because it points at potential or virtual verification<sup>35</sup>. The verifiability merges with a feeling of confidence: it enables us to test the agreement between ideas and reality, by an examination of the context which provides sufficient signs to cause our adhesion. Thus, the

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<sup>32</sup> Recently, in a discussion of de Vries’s strategy to redirect the attention of the STS community towards politics, B. Latour has tried to summarize some of the “successive meanings of political through which a given issue might pass”. According to Latour, One key topic here is the degree of political construction of an issue and the degree it contributes to redefine politics and policies. B. Latour, “Turning Around Politics: A Note on Gerard de Vries' Paper”, Social Studies of Science, 2007; 37; 811.

<sup>33</sup> C. Waterton and B. Wynne, “Knowledge and political order in the European Environment Agency”, in S. Janaoff (ed), States of Knowledge. The co-production of science and social order, New York, Routledge, 2004, p. 87-108.

<sup>34</sup> F. Chateauraynaud, « Vigilance and transformation. Corporal presence and responsibility in the operation of technological apparatus », Networks (Réseaux), 2007.

<sup>35</sup> W. James, The Meaning of Truth, Prometheus Books, 1997.

critical work produced by NGOs and civil society persons and groups in the field of risk assessment can be described as the public use of this verifiability principle.

The performativity of an argumentative convergence heavily depends on the solutions provided to overcome doubts and uncertainties. If this the problem is not adressed, the conflict of interpretations around the meaning and scope of the precautionary principle will bounce again. A good example is provided by uncertainties created around the substitute products not necessarily compatible with the computational space in which do operate multiple economic actors. At a second level, the convergence of causes related to low doses and/or CMR encounters the problems of hierarchization of risk issues. Any kind of argumentative convergence produces, as counter reaction, different operations of distinction, division or relativization. In some political contexts, it generates a denunciation against the “new power of environmentalists”. But, by contrast with three battlefields described in other studies - nuclear industry, GMOs and nanotechnologies -, critical actors who try to handle the tools and categories developed in risk assessment – metrologies, REACH classifications of CMR, low-dose modelling, endocrine disruptors – must empower a lot to be able to ground their criticism. Indeed, they must give some evidence to assess the negative consequences of the scientific or technological devices they contest. In order to achieve this critical task they show a clear preference for “consequentialism”, or “arguing by consequences”. Thus, they have not only to mobilize counter-experts, but to integrate institutional networks, in order to get the grasps without which counter-expertise is powerless. Their political work supposes such a cognitive work, in the aim to control scientific informations, that they run the risk to lack bridges with ordinary citizens. If the relationships between counter-experts and ordinary people is not reestablished through discussions and debates, the coproduction of norms and standards could serve a biopower project by transforming the open world as a giant laboratory for experts controversies. This is the reason why the so-called technical democracy cannot be an end by itself and must be constantly rebuilt.



## Annex 1

The requests passed in the search engine of Prospéro are never linked to a single keyword. One property of this device is to allow researcher to link themes and to bring together the whole spectrum of designations for the same topics. Below, the complete list used for tracking CMR and Low-Dose issues in the collection of corpus.

CMR@	489	FAIBLES-DOSES@	1621
CMR	313	faibles doses	997
cancérogènes,mutagènes et reprotoxiques	26	faible dose	219
cancérogènes,mutagènes ou toxiques	23	faibles niveaux d'exposition	179
cancérogènes,mutagènes et toxiques	18	doses faibles	49
cancérogènes,mutagènes et reprotoxiques	12	relation linéaire sans seuil	47
cancérogènes,mutagènes ou reprotoxiques	12	doses très faibles	45
substances cancérogènes,mutagènes et toxiques pour la reproduction	11	faibles expositions	36
substances cancérogènes,mutagènes et reprotoxiques	10	faibles débits de dose	12
substances cancérogènes,mutagènes et toxiques pour la reproduction	9	FAIBLES DOSES	8
cancérogènes,mutagènes et toxiques	7	dose faible	5
cancérogènes,mutagènes,toxiques pour la reproduction	7	Faibles doses	5
cancérogène,mutagène ou reprotoxique	6	faible débit de dose	5
CMR3	4	faibles irradiations	5
cancérogènes,mutagènes ou reprotoxiques	4	doses minimales	2
Cancérogènes,Mutagènes et Reprotoxiques	4	faibles niveaux de radiations	2
CMR2	3	doses sont trop minimales	1
CMR1	3	faibles débits de doses	1
Cmr	2	faibles valeurs de dose	1
cancérogène et mutagène	1	relations linéaires sans seuil	1
cancérogènes et mutagènes	1	expositions internes chroniques à faible niveau	1
cancérogènes et tératogènes	1		
cancérogènes,toxiques,mutagènes	1		
cancérogènes -mutagènes -toxiques	1		
cancérogènes,mutagènes et toxique	1		
Cancérogènes,Mutagènes et Toxiques	1		
cancérogènes mutagènes et toxiques	1		
cancérogène,mutagène et reprotoxique	1		
cancérogène,mutagène ou reprotoxique	1		
cancérogènes,mutagènes et tératogènes	1		
cancérogène,mutagène et reprotoxiques	1		
cancérogènes,mutagènes,et reprotoxiques	1		
cancérogènes,mutagènes et repro-toxiques	1		
cancérogènes et/ou mutagènes et/ou toxiques pour la reproduction	1		

Date Table 5 : deployment of two complex entities used for computer analysis

## Annex 2 :A short session with Marlowe on CMR and Low-Dose

Researcher: I need a comparison between the networks of CMR@ and of FAIBLES-DOSES@ ?

Marlowe : CMR@ a un poids de 489 , alors que FAIBLES-DOSES@ a un poids de 1621 .  
Ces deux éléments ne sont visiblement pas mis en rapport direct dans ce dossier. On continue sur cette piste ?

Researcher: yes

Marlowe : 14 éléments sont communs aux têtes de réseaux de CMR@ et de FAIBLES-DOSES@ , dans l'ordre : produits, risque@, LE-CANCER@, PESTICIDES@, effets, Santé, environnement, BISPENOL-A@, TRAVAILLEURS@, exposition, RADIOACTIVITE@, LA-FRANCE@, AMIANTE@, CHERCHEURS@

Au niveau des catégories influentes, les deux entités ont en commun d'être fortement marquées par : Logique sanitaire

Le réseau propre à CMR@ (comparé à celui de FAIBLES-DOSES@) est formé par :

substances, reproduction, EUROPE@, agents, substances chimiques, marché, catégorie, prévention, Décret, utilisation, interdiction, substitution, formaldéhyde, RISQUE-PROFESSIONNEL@, retrait, PBT, mesures, maladies mercure, phtalates, travail, ETAT-CENTRAL@, ENTREPRISES@, REACH@, perturbateurs endocriniens, cadmium, DEHP, l'homme, réduction, sécurité, santé au travail, substance

Le réseau propre à FAIBLES-DOSES@ (comparé à celui de CMR@) est quant à lui constitué par :

DOSE@, stations, étude@, POPULATION-GENERALE@, hypothèse, RIVERAINS@, relais, champs électromagnétiques, connaissances scientifiques, LA-PLANETE@, expositions, irradiation, LE-NUCLEAIRE-EN-GENERAL@, seuil, expertise, téléphonie mobile, EPIDEMIOLOGIE@, recherche, Risc-Rad, recherches, extrapolation, impact, experts scientifiques, projet, ENFANTS@, nombre

Researcher: what else ?

Marlowe : On a vu qu'il n'y avait pas de lien très tangible dans un même énoncé à examiner mais par contre CMR@ et FAIBLES-DOSES@ sont coprésents dans 23 textes. J'indiquerai particulièrement le texte de JDLE , daté du 11/12/2007 , dont le titre est " Une baisse de moitié de l'usage des pesticides est-elle possible ? "

Researcher: it's all ?

Marlowe : Une autre façon élémentaire de comparer les profils de CMR@ et FAIBLES-DOSES@ est de regarder les auteurs qui causent le plus de ces deux entités (on en comptabilise 45 ) :

JDLE, L'Humanité, AFP, Le Monde, Réseau Environnement Santé, La Croix, Environnement Magazine, Le Progrès, AFSSET@, Sénat, Libération, Viva, Les Echos, Novethic, Ouest-France, Beaugendre, AFSSA-AFSSE, Quotidien du Médecin, Revue Experts, Lebioda, Les Verts, Thébaud-Mony, Agence Europe, Le Figaro, Sud Ouest, L'Express, Ministère de la Santé, Ministère de l'Agriculture, MDRGF@, Le Télégramme de Brest, Assemblée Nationale, Nouzille, PNSE@, Le Parisien, Le Nouvel Observateur, PAN Belgique, Vrousos, CPP@, Méar, La Tribune, CRII-RAD, Groupe d'études santé-environnement de l'Assemblée nationale, Fagnani

Francis: anything else ?

Marlowe : On obtient 3 personnes communes aux réseaux de CMR@ et FAIBLES-DOSES@ : Belpomme, Raynal, Séralini

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