

‘MEAT GIVES YOU CANCER’ The popularisation of scientific news with public health relevance¹

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Abstract – Early in October 2015, the International Agency on Cancer Research (IARC 2015a) evaluated the carcinogenicity of red and processed meat. On 24 October, the World Health Organization (WHO 2015a) issued a statement reporting the IARC press release on the subject. On 22 October, the *Daily Mail* (2015) anticipated these results, giving rise to the latest ‘meat-cancer scare’ on the international media. This case study analyses a small corpus of institutional documents and English-language press articles, collected in the eight days following the publication of the news. Based on a sociological model of public vs popular communication of science (Bucchi, Neresini 2008), integrated with methodological tools from critical discourse analysis (Fairclough 1995, 2003; Eisenhart, Johnstone 2008; Wodak 2013), argumentation theory (van Eemeren, Grootendorst 2004), and making reference to science popularisation studies (Calsamiglia 2003; Garzone 2006; Caliendo, Bongo 2014), the qualitative analysis shows how the pattern of diffusion of scientific news with public health relevance is changing. No longer following a top-down approach, power relations at work in this type of communication are changing, being increasingly affected by bottom-up interference and feedback, in a progressively more dialogic and negotiated scenario of communication.

Keywords: health discourse, institutional discourse, online media, discourse analysis, science popularisation

1. Introduction

This study looks at a recent episode in popularisation through the press, in which the results of a scientific investigation into the cancerogenicity of red and processed meat were sensationally reported for the general public. To start with, some background to the story will be provided, then the corpus and methods will be described. The linguistic analysis will subsequently focus firstly on the institutional documents issued on the scientific news and, secondly, on the coverage of the story provided by quality British and US online newspapers. Following a methodological framework for analysing popularising discourse (Garzone 2006), both the discursive aspects (such as citations, declarative verbs, sources, hedging and evaluation) and the terminological features will be examined. The ensuing results will finally be interpreted according to a novel model for interpretation of the dissemination of scientific knowledge, based on sociologists Bucchi and Neresini’s (2008) model for the public communication of science and technology (PCST), which takes account of recent changes in communication patterns, especially in the healthcare sector.

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2. Background

Early in October 2015, the WHO's International Agency on Cancer Research (IARC 2015a) evaluated the carcinogenicity of red and processed meat. On 24 October, the World Health Organization (WHO 2015a) issued a statement reporting the IARC press release on the subject. On 22 October, the *Daily Mail* (Macrae, Wright 2015) published these results in advance, giving rise to the latest 'meat-cancer scare' on the international media. To understand all the implications of this case of scientific news communication with public health relevance, it is worth detailing the chronology of the facts, which add information and perspectives on the incident that can definitely prove "relevant to its content and progression" (Fowler 1991: 153 ff.). This will also be functional to analysing the multi-faceted nature of science dissemination, which can be retrieved from the sequence of the communicative events (Table 1).

Date	Who	What
6-13 Oct. 2015	International Agency on Cancer Research (IARC)	Meet in Lyon, France, to evaluate the carcinogenic risks to humans.
9 Oct. 2015	IARC	Announces the forthcoming results of their study in its web news section.
22 Oct. 2015	<i>Daily Mail</i>	Reveals the results of the study in advance, using what they call "a well-placed source" (Macrae, Wright 2015)
22-25 Oct. 2015	British press and media	Pick up the news and a 'red and processed meat alert' begins, initially mostly confined to the UK
23 Oct. 2015	IARC	Publishes a piece of news commenting on the "random reports [...] in the British press", stating that "no breach of embargo" took place (IARC 2015b).
24 Oct. 2015	WHO	Announces the upcoming IARC results, labelling red meat as "probably carcinogenic to humans" and processed meat as "carcinogenic" (WHO 2015a).
26 Oct. 2015	IARC	Issues official press release no. 240 (IARC 2015c), also containing two Q&A file and a link to the updated list of substances considered to be carcinogenic. On the same day, the results of IARC evaluation are published in <i>The Lancet Oncology</i> (Bouvard <i>et al.</i> 2015).
From 26 Oct. 2015	International media	Pick up the news and amplify the debate on the issue.
29 Oct. 2015	WHO	Issues a press release with clarifications on the meat-cancer link (WHO 2015b), following the onset of the raging media debate.
By early Nov. 2015	International media	Stop dealing with the news and the ensuing debate. Some editorials on the coverage of the story appear.

Table 1
Chronology of the facts.

This study investigates how health organisations, the media and the public act, react and interact when faced with scientific news that may have significant public health relevance. Specifically, it looks at the research questions: how is the debate around these issues structured? How is this kind of news popularised through and by the media? What is the role of the public in this type of context? How do organisations behave?

3. Corpus and method

This case study analyses a small corpus composed of:

1. institutional documents:
 - a. the IARC's web news announcing the results of their study on the meat-cancer link on 9 October 2015;
 - b. the IARC's Note to the Media of 23 October 2015, commenting on the *Daily Mail's* article;
 - c. the WHO's piece of news of 24 October 2015 announcing the publication of the IARC's report;
 - d. the IARC's press release no. 240 of 26 October 2015, announcing the results of the study, to be published in the IARC Monograph Vol. 114;
 - e. the IARC report's Q&A file of 26 October 2015, hyperlinked to press release no. 240;
 - f. the WHO's press release of 29 October 2015, further clarifying the issue;
2. the *Daily Mail's* article of 22 October 2015 publishing the conclusions of the IARC's report in advance;
3. British and US quality online newspaper articles covering the meat-cancer link story in the eight days (26 October 2015–3 November 2015) following the official publication of the news (see paragraph 6, Primary sources, for a complete listing of the texts in the meat-cancer link corpus):
 - a. *The Guardian* (TG): 14 articles;
 - b. *The New York Times* (NYT): 8 articles;
 - c. *The Times* (TT): 7 articles;
 - d. *The Washington Post* (WP): 11 articles;
 - e. *USA Today* (USAT): 3 articles.

Given the multi-layered dimension of the debate aroused from this incident, which includes communicative, social and domain-specific (i.e. healthcare/medical) perspectives, our research was conducted integrating multiple applied linguistics and communication approaches.

The dissemination of science and technology through the media is a particularly prominent issue today. Because of the rapid scientific and technological evolution, a permanent and continuous process of information and updating of the public at large is needed. In this respect, “there have been growing sensitivity to and awareness of topics where misunderstanding or lack of proper communication between experts and non-experts can lead to failures in the activity being undertaken” (Calsamiglia 2003, p. 140). A number of studies were published on the role of science and scientists in the dissemination process of research findings to the layman, both in popular science journals, textbooks, communicative events, and in the general press (Gregory, Miller 1998; Henriksen, Frøyland 2000; Allan 2002; Brownell *et al.* 2013; Gotti 2014). The main assumption behind these is that popularisation discourse is always subject to the conventions and constraints of the media and communicative events that generated it. What researchers into the news discourse of science call into question is, in particular, how to bring the working style of the scientists closer to that of those in other trades and professions (e.g. journalists) (Peters 2012). They have been increasingly focussing on the changing role of the mediator (the media), highlighting that the

transmission of concepts via the news media is based on multiple, unstable notions, involved in a dynamic process of communication (Moirand 2003). It is thus especially interesting to delve into the strategies employed by journalists to manage scientific knowledge, to see what is presupposed, reminded, actualised and/or newly constructed (Calsamiglia, van Dijk 2004).

The methodological toolbox relied on was essentially based on critical discourse analysis (Fairclough 1995, 2003; Eisenhart, Johnstone 2008; Wodak 2013) for its focus on the relationship between language, social context and its actors, and its view to disclosing ideological implications behind texts. Particular reference was made to the critical analysis of news discourse (Cotter 2010; Catenaccio *et al.* 2011).

Following studies on ESP (medical discourse in particular) (Sarangi, Roberts 1999; Gotti 2005; Salager-Meyer 1994, 2006) and science popularisation (in addition to the above cited Calsamiglia 2003; Moirand 2003; Calsamiglia, van Dijk 2004, see also Garzone 2006; Caliendo, Bongo 2014), a number of key features were selected for the analysis of the corpus – including citations, declarative verbs, sources, hedging, evaluation and specialised terminology (see paragraph 4.3).

Argumentation theory studies (van Eemeren, Grootendorst 2004) were also taken into account to describe the various discussion stages enacted in the public debate.

Finally, the results were discussed and interpreted in the light of the literature on science communication models (Bucchi 1998; Sturgis, Allum 2004; Bucchi, Neresini 2008; Trench 2008; Metcalfe 2014).

4. Analysis

4.1. Institutional documents

Institutional document 1d (IARC, 26 Oct.) explains the degree of carcinogenicity of meat, divided into:

Red meat

...the IARC Monographs Programme classified the consumption of red meat as **probably** carcinogenic to humans (Group 2A), based on **limited evidence** that the consumption of red meat causes cancer in humans and **strong mechanistic evidence** supporting a carcinogenic effect. (Emphasis added)

and

Processed meat

Processed meat was classified as carcinogenic to humans (Group 1), based on **sufficient evidence** in humans that the consumption of processed meat **causes** colorectal cancer. (Emphasis added)

The document specifies in detail both the quantitative and qualitative aspects of the findings, differentiating between the two types of meat. For red meat, there is only the ‘probability’ of cancerogenicity, since the evidence supporting it is defined as *limited* and based on *mechanistic* (and not qualitative) proof. For processed meat, the evidence is called *sufficient*, which again expresses a quantitative datum, and the relationship between it and cancer is expressed as factual, using a simple present as usual in stating universal truths (*causes*). Attention is drawn to the careful choice of quantitative and qualitative expressions, as they will be differently reported in the press articles analysed later.

Text 1d also clearly specifies that the risk of developing cancer remains small, but that it increases with the amount of meat consumed, again being very clear about the relevance of

quantity in the cause-effect relation:

Meat consumption and its effects

“For an individual, the risk of developing colorectal cancer because of their consumption of processed meat **remains small**, but this risk **increases** with the **amount** of meat consumed,” says Dr Kurt Straif, Head of the IARC Monographs Programme. “In view of the large number of people who consume processed meat, the global impact on cancer incidence is of public health importance.” (Emphasis added)

Not only, institutional document 1e (IARC, 26 Oct.) further clarifies the difference between ‘hazard’ and ‘risk’ and its relevance to the announced meat-cancer link.

Q&A

IARC classifies carcinogens in five categories ranging from carcinogenic to humans (Group 1) to probably not carcinogenic to humans (Group 4). The classification indicates the weight of the evidence as to whether an agent is capable of causing cancer (technically called “hazard”), but it does not measure the likelihood that cancer will occur (technically called “risk”) as a result of exposure to the agent. [...] The distinction between *hazard* and *risk* is important. An agent is considered a cancer *hazard* if it is capable of causing cancer under some circumstances. Risk measures the probability that cancer will occur, taking into account the level of exposure to the agent. (Emphasis in the original)

Institutional document 1f (WHO, 29 Oct.) reassures the public, reaffirms the source’s authoritativeness and confirms the news:

WHO has received a number of queries, expressions of concern and requests for clarification following the publication of a report from the International Agency for Research on Cancer (IARC) relating to processed meat and colorectal cancer.

IARC was established 50 years ago through a resolution of the World Health Assembly as a functionally independent cancer agency under the auspices of WHO. Its programme of work is approved and financed by its participating states.

IARC’s review confirms the recommendation in WHO’s 2002 “Diet, nutrition and the prevention of chronic diseases” report, which advised people to moderate consumption of preserved meat to reduce the risk of cancer. The latest IARC review does not ask people to stop eating processed meats but indicates that reducing consumption of these products can reduce the risk of colorectal cancer. [...]

4.2. The Daily Mail’s article of 22 October 2015

Text 2 is the *Daily Mail*’s article that, on 22 October 2015, published the results of the IARC evaluation in advance. The headline and the bulleted list in the lead well summarise its content:

Bacon, burgers and sausages are a cancer risk, say world health chiefs: Processed meats added to list of substances most likely to cause disease alongside cigarettes and asbestos

- Fresh red meat is also due to join WHO ‘encyclopaedia of carcinogens’
- Rulings will send shock waves through farming and fast food industries
- Could lead to new dietary guidelines and warning labels on bacon packs
- Mounting concern that meat fuels disease that kills 150,000 a year in UK

Unsurprisingly, the text employs tabloid strategies to emphasize certain aspects of the story over others, such as the use of evaluation (“shock waves”, “mounting concerns” or the

slightly disparaging label “world health chiefs”). The usual register shifts are particularly frequent, for example in the alternation of specialised and non specialised terminology: “bacon, burgers and sausages” vs “red and processed meats”, or “encyclopaedia of carcinogens” vs “list of substances considered to be carcinogenic”, “warning labels” vs “dietary guidelines”. However, hedging is also used, since the information revealed was unconfirmed at the time: “most likely”, “could lead to”, “fresh red meat is also due to [...] and is likely to be ranked”, “the WHO is expected to go further”, etc.

4.3. UK and US quality online newspaper articles

A linguistic analysis following the discourse analytical method in Garzone (2006) was carried out on the texts in group 3, considering the lexical and discursive levels, to look at the linguistic strategies employed to popularise the news. The following aspects emerged as the most relevant for our aims.

4.3.1. Terminology

In specialised domains, lexicon has historically been “the linguistic element in which each LSP differs most evidently from ordinary language” (Garzone 2006, p. 13). While research has long turned its attention also on syntactic, textual and discursive aspects of specialised texts, terminology remains a key feature definitely worth at least a few considerations.

Looking at the presence of specialized vs non-specialized terms, two different trends emerge. Firstly, most articles across newspapers employ a very small number of specialized terms (e.g. ‘carcinogen’, ‘carcinogenic’), without decoding them for the public, taking it for granted that they are clearly understood. Secondly, the *Times* is the only newspaper that consistently features definitions [2 *A compound called haem, part of haemoglobin*], popular synonyms [3 *bariatric (weight loss)*; 4 *macronutrients – fats, carbs and proteins*], or popular terms rather than specialized ones [1 *the weedkiller ingredient glyphosate*].

[1] in the same category as the **weedkiller** ingredient **glyphosate** (TT, 3c5, 27 Oct.)

[2] **A compound called haem, part of haemoglobin** (the red pigment in the blood), is what gives red meat its colour (TT, 3c5, 27 Oct.)

[3] **bariatric (weight loss)** surgeon (TT, 3c7, 31 Oct.)

[4] **macronutrients - fats, carbs and proteins** (TT, 3c7, 31 Oct.)

In addition to the above trends in the usage of specialised terminology, one article in *The Guardian* represents a different editorial choice, that of simply literally reporting the institutional source as is, i.e. with the exact intraspecialistic terms used by the specialists: “The 116 things that can give you cancer – the full list” (G, 3a14, 28 Oct). This list of carcinogens, in spite of the colloquial subheadline [5 *rocked, terribly bad*]

[5] **Rocked** by the news that processed meat could be **terribly bad** for you? Well, chimney sweeping, salted fish and fracking also appear on the list compiled by the International Agency for Research on Cancer (G, 3a14, 28 Oct.)

is entirely copied and pasted from the IARC’s own Group 1 list of carcinogens. Only the first 39 substances are illustrated, while the rest are merely quoted, without any commentaries, in a list that begins with “Acetaldehyde, 4-Aminobiphenyl and Aristolochic acids and plants containing them” and ends with “Vinyl chloride, Ultraviolet radiation, X-radiation and gamma radiation”. As such, the reader is fed highly specialised terminology, which is never defined or explicated. In providing readers with such a list, totally unexplained and

uncommented on, the news writer makes him/herself conspicuous for his/her absence rather than for his/her presence, which is at least questionable when dealing with public health scares that call for responsible mass communication.

4.3.2. Citations and declarative verbs

Citations and the use of related declarative verbs to quote sources are common in the press, where “the use of quotations, or – better – the use of different linguistic devices that ‘attribute’ statements to researchers, scholars, scientists, engineers, experts, etc.” (Garzone 2006, p. 98; see also Calsamiglia, López Ferrero 2003) is in fact a typical feature of popularising discourse.

All the citations in the 43 texts were isolated and analysed. Particularly significant are those reporting the news in each newspaper for the first time, as listed below.

[6] Two rashers of bacon a day increase the risk of bowel cancer by 18 per cent, the World Health Organisation has warned. Ham, sausages and other processed meats can definitely cause cancer and red meat “probably” does, the WHO’s expert advisory agency **ruled**. (TT, 3c3, 26 Oct.)

[7] Bacon, ham and sausages rank alongside cigarettes as a major cause of cancer, the World Health Organisation **has said**, placing cured and processed meats in the same category as asbestos, alcohol, arsenic and tobacco. (G, 3a2, 26 Oct.)

[8] An international panel of experts convened by the World Health Organization **concluded** Monday that eating processed meat like hot dogs, ham and bacon raises the risk of colon cancer and that consuming other red meats “probably” raises the risk as well. (NYT, 3b1, 26 Oct.)

[9] A research division of the World Health Organization **announced** Monday that bacon, sausage and other processed meats cause cancer and that red meat probably does, too. (WP: 26 Oct.)

[10] Eating hot dogs, ham and other processed meat can cause colorectal cancer, and eating red meat “probably” can cause cancer, the World Health Organization's cancer agency **reported** Monday. (USAT, 3e1, 26 Oct.)

The first noticeable choice is that none of the newspapers explicitly mentioned the IARC, which was instead either not referred to at all [7] *has said*, or described in general terms [6] *ruled*, [8] *concluded*, [9] *announced* and [10] *reported*. This of course is due to the IARC’s not being as publicly well-known an organisation as the WHO, which, on the contrary, features in all the citations.

Since “the quoting verb, because of its purported neutrality, with very few exceptions is ‘said’ [...] [while] any other verbs like ‘claimed,’ ‘insisted,’ ‘opined,’ ‘refuted,’ ‘declared,’ ‘stated,’ etc. are disfavored and suggest a deviation from the norm” (Cotter 2010: 149), all the declarative verbs introducing the citations in group 3 have been divided into two categories: neutral (e.g. [7] *has said*, [9] *announced*, [10] *reported*) and deviant (from the norm), e.g. [6] *ruled*, [8] *concluded*).

Other interesting examples of deviant declaratives from other passages are:

[11] the International Agency for Research on Cancer **ruled** (TT, 3c4, 27 Oct.)

[12] The IARC's report, published in Lancet Oncology, **notes** that (WP, 3d1, 26 Oct.)

[13] A report this week by the World Health Organization's International Agency for Research on Cancer **suggested** that (NYT, 3b6, 29 Oct.)

Example [11] *ruled* shows the power attributed to the IARC in the article, making it seem almost like a legal authority, close to a court. Examples [12] *notes* and [13] *suggested* pursuing the different scope of reducing the load of the news.

Concerning the content of the citations, examples [6] to [10] alone show how, expectedly, a number of other popularising strategies were employed. Exemplification, selecting culture-bound foods (bacon first in the UK newspapers, hot-dogs in the US newspapers):

each 50-gram portion of processed meat eaten daily (WHO, 1c, 24 Oct.) →
 Two rashers of **bacon** a day (TT, 3c3, 26 Oct.)
Bacon, ham and **sausages** (G, 3a2, 26 Oct.)
hot dogs, ham and **bacon** (NYT, 3b1, 26 Oct.)
bacon, sausage and other processed meats (WP, 3d3, 26 Oct.)
hot dogs, ham and other processed meat (USAT, 3e1, 26 Oct.)

Generalisation, from a specialised term to a non-specialised, more generic term:

colorectal cancer (WHO, 1c, 24 Oct.) →
bowel cancer (TT, 3c4, 27 Oct.)

Explication, adding extra information that was not present in the original news for didactic purposes, so that “the reader is offered information which enriches his/her knowledge of the subject matter treated, thus increasing artificially the degree of shared knowledge between expert-journalist and layman-reader” (Garzone 2006, p. 97):

Other carcinogenic substances in the same groups as red and processed meat (not mentioned in the IARC report, but only as examples in the Q&A) →
 alongside tobacco and asbestos (TT, 3c3, 26 Oct.)
 alongside cigarettes [...] in the same category as asbestos, alcohol, arsenic and tobacco (G, 3a2, 26 Oct.)
 cigarettes are similarly labelled (USAT, 3e1, 26 Oct.).

4.3.3.Sources

Not only the analysis of how sources are quoted, as indicated in the previous paragraph, is interesting, but also the quality of the sources themselves (Peters 2012).

In the considered corpora, different sources are quoted, starting with but not limited to the original, official, specialised IARC press release no. 240 of 26 October 2015 (1d) [14]. The news appears to be reported in the corpus using the same words as in the press release and, generally speaking, not altering the original meaning [18, 19]. Occasionally, extra connotations are added by means of words such as “definitely” in [15] and “major” in [16], or information is omitted, for example in not distinguishing between hazard and risk, as in [17].

[14] IARC: “the IARC Monographs Programme classified the consumption of red meat as probably carcinogenic to humans Processed meat was classified as carcinogenic to humans” (IARC, 1d, 26 Oct., emphasis in the original)

[15] Ham, sausages and other processed meats can **definitely** cause cancer and red meat “probably” does, the WHO’s expert advisory agency ruled (TT, 3c3, 26 Oct.)

[16] Bacon, ham and sausages rank alongside cigarettes as a **major** cause of cancer [...]. It places red meat in group 2A, as “probably carcinogenic to humans” (G, 3a2, 26 Oct.)

[17] eating processed meat like hot dogs, ham and bacon raises the **risk** of colon cancer and that

consuming other red meats “probably” raises the **risk** as well (NYT, 3b1, 26 Oct.)

[18] A research division of the World Health Organization announced Monday that bacon, sausage and other processed meats cause cancer and that red meat probably does, too (WP, 3d3, 26 Oct.)

[19] Eating hot dogs, ham and other processed meat can cause colorectal cancer, and eating red meat “probably” can cause cancer (USAT, 3e1, 26 Oct.)

After the initial report from the institutional source (IARC), a heated debate ensued in the media worldwide. The various newspapers quoted different opinions by experts in various fields and belonging to universities [21] *Sir David Spiegelhalter, of the University of Cambridge*, research centres and associations [20 *Casey Dunlop of Cancer Research UK*; 22 *Susan Gapstur, the vice president of epidemiology for the American Cancer Society*], corporations [24 *CEO of BaconFreak.com Rocco Loosbrock*], business associations [23 *Dr Jill Jenkins, a GP and member of the Meat Advisory Panel, an industry sponsored body*; 25 *The North American Meat Institute*]:

[20] Casey Dunlop of Cancer Research UK (TT, 3c2, 24 Oct.)

[21] Sir David Spiegelhalter, of the University of Cambridge (TT, 3c3, 26 Oct.; 3c4, 27 Oct.)

[22] Susan Gapstur, the vice president of epidemiology for the American Cancer Society (NYT, 3b1, 26 Oct.)

[23] Dr Jill Jenkins, a GP and member of the Meat Advisory Panel, an industry sponsored body (G, 3a1, 26 Oct.)

[24] CEO of BaconFreak.com Rocco Loosbrock (WP, 3d2, 27 Oct.)

[25] The North American Meat Institute (USAT, 3e1, 26 Oct.).

Interestingly, other frequently quoted sources are Dr Kurt Straif, head of the IARC monographs programme, and Dr Christopher Wild, Director of IARC. These, however, are not primary sources [26], interviewed directly by the newspapers, as it may appear in the various articles [27-33], but they are secondary sources, which were originally quoted in the IARC press release itself:

[26] “For an individual, the risk of developing colorectal cancer because of their consumption of processed meat remains small, but this risk increases with the amount of meat consumed,” says **Dr Kurt Straif, Head of the IARC Monographs Programme**. “In view of the large number of people who consume processed meat, the global impact on cancer incidence is of public health importance.” [...] “These findings further support current public health recommendations to limit intake of meat,” says **Dr Christopher Wild, Director of IARC**. “At the same time, red meat has nutritional value. Therefore, these results are important in enabling governments and international regulatory agencies to conduct risk assessments, in order to balance the risks and benefits of eating red meat and processed meat and to provide the best possible dietary recommendations.” (IARC, 1d, 26 Oct.)

[27] **Kurt Straif, who heads the agency’s classification programme**, said: “For an individual, the risk of developing colorectal cancer because of their consumption of processed meat remains small, but this risk increases with the amount of meat consumed” (TT, 3c4, 27 Oct.)

[28] **Dr Kurt Straif, head of the IARC monographs programme** (G, 3a2, 26 Oct.)

[29] **Kurt Straif of the International Agency for Cancer Research** said the risk of developing colorectal cancer from eating processed meat remains small but rises with the amount consumed. (USAT, 3e1, 26 Oct.)

[30] **Kurt Straif, an official with the World Health Organization's International Agency for Research on Cancer** (WP, 3d3, 26 Oct.)

[31] **Dr Christopher Wild, the director of IARC** (G, 3a6, 26 Oct.)

[32] **The IARC's director, Christopher Wild** (WP, 3d1, 26 Oct.)

[33] **IARC director Christopher Wild** said the findings support current public health recommendations to limit intake of meat but stressed that red meat has nutritional value. (USAT, 3e1, 26 Oct.).

By re-quoting the IARC press release, making it look like a primary source, newspapers exploit a 'free' extra source to add to the debate, and also appear to be in direct contact with experts in the specialised field, which in turn increases their authoritativeness with the public, who can now relate to a specific person (Dr Straif / Dr Wild).

Although it is well known that press releases are traditionally issued to be retold, often without any significant reformulation or even *verbatim* (Bell 1991, p. 58 ff.), and that those coming from 'solid' institutions such as the WHO/IARC tend to be treated in this way even more, what is argued here is that this paradigm has been challenged by the recent developments in the fruition of information as news and news as information by the public. The accessibility of data and sources, even on specialised issues, provided by current technologies has definitely raised the general layperson's expertise (Grundmann 2017; Nichols 2017; Wynn 2017) and, in general terms, the stakes in public debates conducted on the web. The critical stance on the reception of news often advocated in not-so-distant a past, for example by Fowler (1991, p. 234) calling for public discourse to be "actively critical rather than meekly receptive", has in the present time gone past all hopes and expectations, and often assumed the extreme form of conspirationism and total distrust in institutions and the media (Vicentini 2016; Vicentini, Grego 2016). This new scenario in turn calls for a more critical and responsible attitude on the part of the media as mediators between experts and laypeople, considering that "no objectivity is possible in the news and that, instead, press releases propose 'objectively-voiced', yet 'unavoidably non-objective' text" (Jacobs 1999, p. 306), and that "journalists do not simply swallow what sources have to tell them" (Jacobs 1999, p. 309) – and never have. The journalist's choice of reporting a source (in this case, a press release) *verbatim* may thus be a mere legacy of traditional news production (Bell 1991, p. 41's "cut and paste jobs from [...] sources"), but it is argued that this cannot be justified in these times and where news with public health relevance is concerned, and the news writer has a clear responsibility in his/her way of communicating (about) it. Therefore, non-reformulation too, just like its opposite, should be seen as an ideological choice, precisely because we live in a 'copy and paste' society ('cutting' still presupposes some sort of editorial process to reassemble cut information) made possible and amplified by the Internet.

4.3.4. Hedging and evaluation

Hedging and evaluation are features of domain-specific discourse that are more common at the specialised level but are also increasingly applied at the popular level. Hedging, in particular, "has been extended to embrace in general all the linguistic features and strategies aimed at modulating or reducing the speaker's or writer's commitment to the truth or the illocutionary force of an utterance" (Garzone 2006, p. 73; see also Salager-Meyer 1994;

Crompton 1997; Markkanen, Shröder 1997; Horn 2001; Fraser 2010).

Apart from the hedging present in the citations reporting the news for the first time ([6] to [10]), possibly due to the impact of the information, and also following the commotion caused by the initial *Daily Mail*'s article, hedging strategies are common throughout the texts in group 3 but only when reporting the scientific aspects of the news. This can be due to the media imitating features of specialised communication. Other examples of hedging are represented by cautious evaluations on part of the newspapers. For instance, *The Guardian* writes:

[34] Vegetarians are **probably** breathing a sigh of relief today (G, 3a3, 26 Oct.)

[35] One impact of the IARC report **maybe** to increase the pressure to drop the recommended upper limit still further (G, 3e4, 26 Oct.)

[36] History **suggests** food shoppers only change eating habits in short-term (G, 3a9, 26 Oct.).

Examples [34] to [36], differently realised at the lexico-syntactic level, report the newspaper's own view on the debate. While [34] *probably* only modulates an ironic opening of a sentence, [35] *maybe* addresses the government itself and its possible changes in health policies. Example [36] *suggests*, finally, expresses *The Guardian*'s opinion on the socio-economic impact of the news, imitating the depersonalisation strategies typical of scientific-academic discourse, in this case the 'plural subject + declarative present simple verb' structure, where the subject is grammatically personal but lexically impersonal (e.g. 'studies show', 'results indicate').

On the other hand, when opinions are given not by the newspapers themselves but by institutional or professional experts interviewed or quoted by the media, hedging is less common, whereas evaluative language tends to abound. While this is understandable, because experts are consulted specifically for their contribution to the debate, the trend is possibly inflated by the sensationalism often sought after by the media. Evaluation is a feature of popularisation discourse and is recurrent in media communication (Bednarek 2016). It is the broad cover term for the "expression of the writer's or speaker's opinion [and/or emotional attitude]" (Hunston, Thompson 2003, p. 2), which emerges through connoted language (Besnier 1993, Halliday 1994). A selection of the numerous examples is as follows.

[37] It's a **scary** message, made **worse** by the WHO's **candid** admissions about the things its experts don't know. Why should processed meat cause cancer? **Frankly**, the scientists cannot tell us. (G, 3a9, 26 Oct.)

[38] The first wave of reporting [...] was **predictably** simplistic and alarmist. (NYT, 3b4, 28 Oct.)

[39] You will take processed meat **from my cold, dead hands**. (WP, 3d8, 27 Oct.)

Example [39] *from my cold, dead hands*, in particular, reproduces a popular slogan associated with US organisations defending the right to keep and bear firearms, "I'll give you my gun when you take it from my cold dead hands", creating a possible connection between gun owners and meat consumers.

5. Discussion

5.1. Argumentation pattern

The analysis of selected linguistic indicators of popularisation (terminology, citations and declarative verbs, sources, hedging and evaluation, Garzone 2006) was, however, not limited to describing only how the news was popularised, but it was also aimed at considering the entire ensuing debate, looking at the actors involved (Fairclough 2003) and the discussion stages followed (van Eemeren, Grootendorst 2004).

Five lead actors emerged as conducting the debate:

1. the health research institutions producing the scientific news (HRI);
2. the scientific community: research centres, cancer research organisations, specialised journals, etc. (SC);
3. the media (M);
4. third parties with economic stakes in the matter (E);
5. the public (P).

Interestingly, in our corpus, political institutions did not emerge as an actor in the debate. Supporting actors, on the other hand, were the individual experts that were consulted by the media asking for their opinion. It is worth highlighting how each of these actors used the specific genres of how they communicate, i.e. the health research institutions used press releases, Q&A and web news; the scientific community used press releases and journal news; the media used news articles and editorials; the public had at their disposal the comments to the news articles and editorials, as well as all the social media genres: posts, comments, memes, etc. The nature and purposes of all these genres determine their linguistic features, frequency and visibility. However, linguistic strategies were employed by actors in very hybrid ways, i.e. employing those typical of popular genres in specialised genres and vice versa. For instance, the statement released by the WHO following “a number of queries, expressions of concern and requests for clarification” (Text f), contains explication (what the IARC is and why it is reliable) and reformulation with an explanation of the main concept at stake (what the review does not do and what it does do). Although this kind of statement is usually aimed at the press to diffuse to the public, this text, which is significantly termed a ‘statement’ and not a ‘press release’, could also be seen from its language to bypass the mediation of the press and to be directed straight at the public, who in turn demanded clarifications in ways unmediated, made possible by current communication technology. Thus, the linguistic indicators analysed and their distribution within the various “discussion stages” (van Eemeren, Grootendorst 2004) taken by the actors involved, contribute to identifying and interpreting the argumentation pattern into which the debate seems to have developed (Vicentini, Grego 2016) over the period considered (see Background). Each discussion stage within the debate presses it forward and at the same time prompts the replies of the various actors. The emerging argumentation pattern of the debate is articulated into the following discussion stages, which can be seen to correspond at least in part to van Eemeren and Grootendorst (2004, p. 68)’s discussion stages in their pragma-dialectic model, only applied to a critical discussion that is not limited to a “speech event” but that embraces the entire debate, with the scientists and the media as the actors and the non-specialised reading public as the audience. It is noticeable how the speed at which information can spread and the possibility to interact provided by online technology can sometimes cause current public debates to change the chronological order of a classic critical discussion.

Dates	Debate step	Discussion stage	Actors enacting the stage	Genres employed
22 October 2015	News leaked	Confrontation – Expressing a standpoint	M	Tabloid news article
24 October 2015	News announced	Confrontation – Expressing a standpoint	HRI	Web news
22-25 October 2015	News leak debated in the UK	Confrontation - Acceptance or non-acceptance of a standpoint, upholding non-acceptance of a standpoint	M / P	News articles, comments to news articles, social media genres (posts, comments, memes, etc.)
26 October 2015	News officially published	Confrontation – Expressing a standpoint	HRI / SC	Press release, journal news
26 October 2015	News reported internationally	Confrontation – Expressing a standpoint	M	News articles
26-29 October 2015	Immediate irrational reactions	Confrontation - Acceptance or non-acceptance of a standpoint, upholding non-acceptance of a standpoint	M / E / P	News articles, press releases, comments to news articles, social media genres (posts, comments, memes, etc.)
26-29 October 2015	Fear and warnings in specific sectors: healthcare, meat and food industries, etc.	Argumentation- Advancing argumentation / Acceptance or non-acceptance of argumentation	M / E / P	News articles, press releases, comments to news articles, social media genres (posts, comments, memes, etc.)
29 October 2015	News confirmed and explained	Opening - Decision to start a discussion	HRI	Statement
29 October 2015 – Beginning of November 2015	Differing professional and institutional opinions	Argumentation- Advancing argumentation	M / SC / E	News articles, press releases
29 October 2015 – Beginning of November 2015	Internal reactions: country's own (food) culture and economy	Argumentation- Advancing argumentation	M / SC / E	News articles, press releases
29 October 2015 – Beginning of November 2015	External reactions: abroad and in countries with commercial and cultural links	Argumentation- Advancing argumentation	M / SC / E	News articles, press releases
29 October 2015 – Beginning of November 2015	Focus returns to health: dissemination articles, healthy lifestyle files, etc.	Concluding Acceptance or non-acceptance of a standpoint	M	News articles
29 October 2015 – Beginning of November 2015	Debate put into perspective: editorials on the media coverage of the story	Concluding - Requesting a usage declarative	M	Editorials

Table 2
Argumentation pattern in the meat-cancer debate.

5.2. *Communication pattern*

The argumentation pattern identified, together with the actors involved and the genres employed, reflects a changing way of communicating scientific news with public health relevance. Existing communication models (Trench 2008; Metcalfe 2014) focus on the public as the parameter according to which communication is defined, i.e. deficit, dialogue and participation models. Such a classification, however, could be better integrated by also looking at the changing degree of participation of the scientific community, from whom scientific news stems. In the meat-cancer link case, for instance, the reactions by the public at the news published were so many and so strong that the health research institutions that released it in the first place were compelled to reply and thus enter into a dialogue with the public by issuing a statement, only three days later, to reassure them, reaffirm their credibility and confirm the news. This happened regardless of the ‘quality’ of the public (“ignorant” or “engaged” or “critical” as in Trench 2008) but, on the contrary, under quantitative pressure only: “WHO has received a number of queries, expressions of concern and requests for clarification” (WHO, 1f, 29 Oct.) – where “a number” sounds like an understatement. It is the involvement of public health, which affects people across social indicators like income, education and political views, which shifts the focus on the quantity of the immediate public reaction. Only at a later stage, when the debate starts to consider different views and calls on experts from various fields to provide their opinion, does the quality of the public start to make a difference, and so does the influence of social indicators such as income, education and politics on their lifestyles, eating habits and health issues.

Of course, this bottom-up action was made possible, in such a short time, thanks to both the power of the Internet channel, enabling public participation, and the mediating work of the media, between the public service purpose they have and the economic interests they necessarily pursue. However, this case shows how the media’s role is also changing. They no longer just mediate between specialists and non-specialists, since these can now communicate directly through the Internet. The media now find themselves also playing a new amplifying part, whenever they feed the debate two-directionally, i.e. not only spreading scientific news top-down from specialists to the public, but also inviting and publishing comments, letters to editors and reactions of both the public and lobby-like third parties with economic interests in the case.

A graphic representation summing up these considerations could start from Bucchi and Neresini (2008)’s model for public communication of science and technology (PCST), integrated with Neresini (2015), and build upon it. The traditional bottom-down flow of scientific information used to be from specialists to non-specialists with the media in charge of popularising it to the public (straight left-to-right arrows connecting the levels of consolidated scientific knowledge, and straight left-to-right arrows connecting HRI, the media and the public on top). With the changing role of the media and the empowerment of the public through their access to the Internet technology, participation has increased and can now become a quantitative pressure factor affecting the masses, particularly when public health (fear factor) is involved: mass communication becomes bidirectional, top-down but also bottom-up. Under the quantitative pressure of mass participation, HRI (specialists) can find themselves compelled to communicate directly with the public, which they can now do also using the Internet, and skipping the passage through the media that usually occurs in situations not involving the fear factor (curved left-to-right and right-to left arrows connecting the HRI and the public directly).

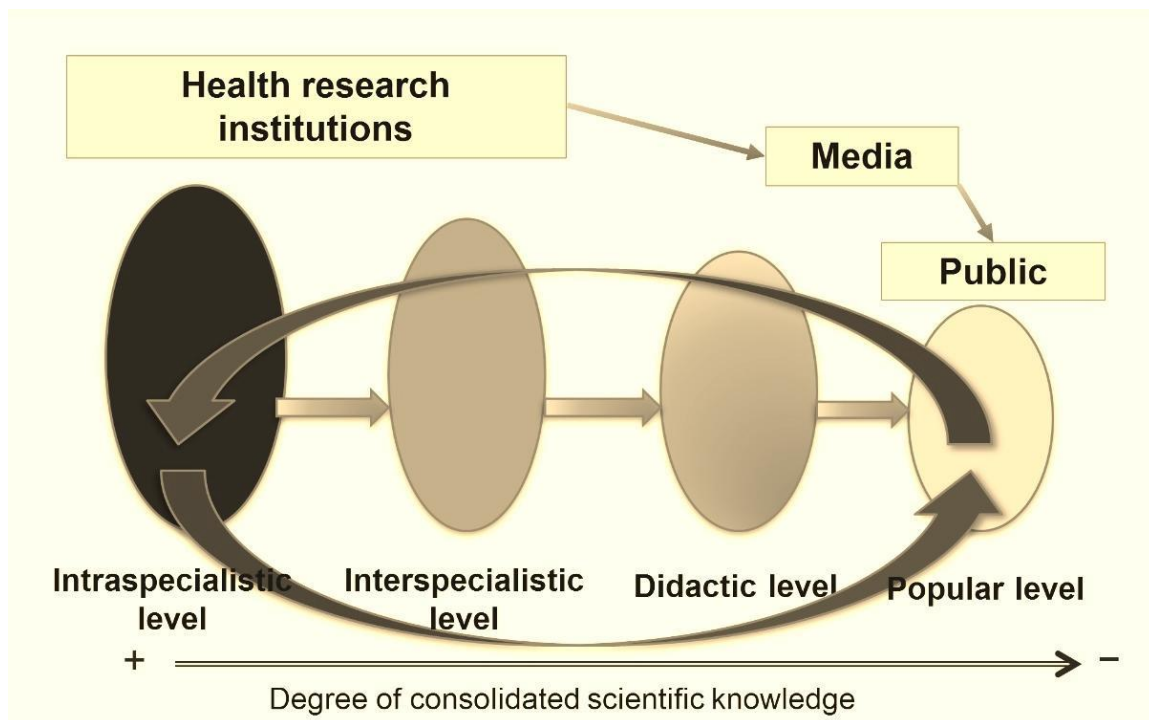


Figure 1
Communication pattern in the meat-cancer debate.

6. Conclusions

This case study has analysed a corpus of institutional and media texts related to the meat-cancer link emerged in science in 2015, to identify how scientific news with public health relevance popularised through/by the media. It has identified and analysed a number of linguistic indicators specific to each of the texts that make up the corpus and represent the various discussion stages enacted by the actors in this public debate. What emerged is that linguistic strategies were employed by actors in very hybrid ways, i.e. employing those typical of popular genres in specialised genres and vice versa, that point to specific discussion stages enacted by the actors in the debate. A possible argumentation pattern has been proposed to describe the development of the discussion, from the diffusion of the news by health research institutions, to its popularisation by the media, to the reactions of the public and third parties with economic interests. In turn, this argumentation pattern reflects a change in the communication of scientific news with public health relevance, exemplified in Fig. 1. A possible future development of this study could be the analysis of the public's reaction to the news in the form of comments to news articles, social media posts, etc.

Attention is drawn to the nature of this type of scientific information having an impact on public health: the fear factor it involves triggers a shift in power relations (Fairclough 1995, 2003; Wodak 2013). The public, empowered by their access to the Internet, can now use it to demand explanations, extra information and, ultimately, reassurance. Health research institutions are then called upon to contribute to re-establishing public order by clarifying the information, reaffirming their scientific authoritativeness and reassuring the people. They do so using the genres typical of their communication, i.e. statements and press releases. These would typically be directed at the media but, by publishing them online, they can in fact reach the public directly. Science is thus perceived by the public as debatable and negotiable, influenced by society, evolving in open confrontation with the public, who assumes a

controlling function, in a more dialogic scenario. Ethical and deontological issues arise as to: a) the sensitivity of communicating scientific news when this affects public health (specialists' and media responsibility), and b) the risks involved in the public's functioning as a social controller of science when they necessarily are a composite whole of individuals with different demographics and levels of scientific knowledge. The ethical concern they raise makes it relevant to continue researching this type of media cases and to do so from multidisciplinary perspectives.

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Appendix

The meat-cancer link corpus

1. Institutional documents

- 1a. IARC (2015a) Volume 114: Red Meat and Processed Meat, IARC Monographs News, 9 October 2015, <http://monographs.iarc.fr/ENG/News/index.php>.
- 1b. IARC (2015b) Volume 114: Red Meat and Processed Meat, IARC Monographs News, 23 October 2015, <http://monographs.iarc.fr/ENG/News/index.php>.
- 1c. WHO (2015a) Monographs evaluate red and processed meats, WHO news, 24 October 2015.
- 1d. IARC (2015c) IARC Monographs evaluate consumption of red meat and processed meat, Press release no. 240, 26 October 2015, https://www.iarc.fr/en/media-centre/pr/2015/pdfs/pr240_E.pdf.
- 1e. IARC (2015d) IARC Monographs Questions and Answers, 26 October 2015, <http://www.iarc.fr/en/media-centre/iarcnews/pdf/Monographs-Q&A.pdf>.
- 1f. WHO (2015b) Links between processed meat and colorectal cancer, Media centre, 29 October 2015, <http://www.who.int/mediacentre/news/statements/2015/processed-meat-cancer/en/>.

2. The Daily Mail leak

- Macrae F. and Wright S. 2015, Bacon, burgers and sausages are a cancer risk, say world health chiefs: Processed meats added to list of substances most likely to cause disease alongside cigarettes and asbestos, in "The Daily Mail Online", 22 October 2015, <http://www.dailymail.co.uk/news/article-3285490/Bacon-burgers-sausages-cancer-risk-say-world-health-chiefs-Processed-meats-added-list-substances-likely-cause-disease-alongside-cigarettes-asbestos.html>.

3. The UK-US newspapers corpus

3a. The Guardian (TG):

- 3a1. Gayle D. 2015, Processed meats pose same cancer risk as smoking and asbestos, reports say, in "The Guardian", 26 October 2015, 09:44.
- 3a2. Boseley S. 2015a, Processed meats rank alongside smoking as cancer causes – WHO, in "The Guardian", 26 October 2015, 12:30.
- 3a3. Gage S. 2015, Meat and tobacco: the difference between risk and strength of evidence, in "The Guardian", 26 October 2015, 13:18.
- 3a4. Boseley S. 2015b, How bad is meat for me? Frankly, the experts don't know, , in "The Guardian", October 2015, 15:35.
- 3a5. The Guardian 2015a, Processed and red meat: what are the cancer risks?, , in "The Guardian", 26 October 2015, 15:53.
- 3a6. Robinson A. 2015, I'm not giving up my ham and mustard sandwich, in "The Guardian", 26 October 2015, 15:59.
- 3a7. Gani A., Nicholson B. and Gajanan M. 2015. 'It's scaremongering': the world's meatiest places react to WHO report, in "The Guardian", 26 October 2015, 16:14.
- 3a8. Quinn B. and Nardelli A. 2015, Italy's Parma ham connoisseurs defend prosciutto amid processed meat scare, in "The Guardian", 26 October 2015, 19:03.
- 3a9. Ruddick G. 2015. Food industry greets cancer links with a shrug – it's been here before, in "The Guardian", 26 October 2015, 19:37.
- 3a10. The Guardian 2015b, The Guardian view on meat and cancer: a little of what you fancy will do you no harm, in "The Guardian", 26 October 2015, 19:37.
- 3a11. Watts J. 2015, Argentinians react to report linking meat to cancer: 'I'd rather die than give it up', in "The Guardian", 26 October 2015, 21:15.
- 3a12. The Guardian 2015c, Australians should limit but not stop eating red meat, say experts, in "The Guardian", 26 October 2015, 00:27.
- 3a13. Agence France-Presse in Berlin 2015, Wurst case scenario: Germany and Austria defend their sausages, in "The Guardian", 26 October 2015, 18:15.
- 3a14. Gani A. and Nicholson B. 2015, The 116 things that can give you cancer – the full list, in "The Guardian", 28 October 2015, 07:00.

3b. The New York Times (NYT):

- 3b1. O'Connor A. 2015a. Meat Is Linked to Higher Cancer Risk, W.H.O. Report Finds, in "The New York Times", 26 October 2015.
- 3b2. The New York Times 2015a, Meat as a Cause of Cancer, in "The New York Times", 28 October 2015.
- 3b3. Tatlow D.K. 2015, Some Chinese Take Aim at Meat Industry After W.H.O. Report on Cancer Risks, in

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- 3b5. The New York Times 2015b, Meat as a Cause of Cancer, in “The New York Times”, 28 October 2015.
- 3b6. Cowell A. 2015, A Most British Response to the W.H.O. Study on Processed Meats, in “The New York Times”, 29 October 2015.
- 3b7. O’Connor A. 2015b, So Will Processed Meat Give You Cancer?, in “The New York Times”, 31 October 2015.
- 3b8. The New York Times 2015c, A Possible Link Between Meat and Cancer, The Opinion Pages, in “The New York Times”, 2 November 2015.

3c. The Times (TT):

- 3c1. Humphries W. 2015, Sausages ‘are MAJOR cancer risk’, in “The Times”, 23 October 2015.
- 3c2. Smyth C. 2015a, Meat trade challenges cancer claim, in “The Times”, 24 October 2015.
- 3c3. Smyth C. 2015b, Bacon, ham and sausages cause cancer, says WHO, in “The Times”, 26 October 2015.
- 3c4. Smyth C. 2015c, Processed meats blamed for thousands of cancer deaths a year; Sausages and bacon raise risk of cancer, in “The Times”, 27 October 2015.
- 3c5. Naish J. 2015, The new rules for eating meat, in “The Times”, 27 October 2015.
- 3c6. Kington T. 2015, Cancer scare makes Italians lose taste for ham and salami, in “The Times”, 29 October 2015.
- 3c7. MacMahon B. 2015, What eating too much meat is really doing to your health, in “The Times”, 31 October 2015.

3d. The Washington Post (WP):

- 3d1. Cha A. E. 2015a, WHO says hot dogs, bacon cause cancer. Does this mean we should all become vegetarians?, in “Washington Post”, 26 October 2015.
- 3d2. Judkis M. 2015, It may cause cancer, but these bacon-lovers refuse to be cured, in “Washington Post”, 26 October 2015.
- 3d3. Whoriskey P. 2015, Hot dogs, bacon and other processed meats cause cancer, World Health Organization declares, in “Washington Post”, 26 October 2015.
- 3d4. Cha A.E. 2015b, Hot dogs are now considered carcinogens. There are roughly 480 other things the WHO says might cause cancer, in “Washington Post”, 26 October 2015.
- 3d5. Cha A.E. 2015c, The science against meat: A look at 5 key studies about cancer risk, in “Washington Post”, 27 October 2015.
- 3d6. Noack R. 2015, CHART: The WHO warns that processed meat causes cancer. These countries should be worried most, in “Washington Post”, 27 October 2015.
- 3d7. Basulto D. 2015, Bacon innovation is down, but certainly not out, in “Washington Post”, 27 October 2015.
- 3d8. Petr A. 2015, You will take processed meat from my cold, dead hands, in “Washington Post”, 27 October 2015.
- 3d9. Cha, A.E. 2015d, #freebacon: Meat lovers unite to defend beloved foods as #smugvegetarians get behind WHO cancer warning, in “Washington Post”, 28 October 2015.
- 3d10. Whoriskey P. 2015, Is bacon actually bad for you? It may depend on your DNA, in “Washington Post”, 2 November 2015.
- 3d11. Ferdman R.A. 2015, The crazy thing that happens when you tell Americans their food causes cancer, in “Washington Post”, 3 November 2015.

3e. USA Today (USAT):

- 3e1. Bacon J. 2015, Hot dogs, bacon, processed meats linked to cancer, in “USA Today”, 26 October 2015.
- 3e2. Krantz M. 2015, Meat stocks don’t fall on WHO report in “USA Today”, 26 October 2015.
- 3e3. USA Today 2015, Perhaps vegetarians are onto something: Your Say in “USA Today”, 26 October 2015.