

Development of a Food Database of
potential carcinogens:
A tool for epidemiological studies

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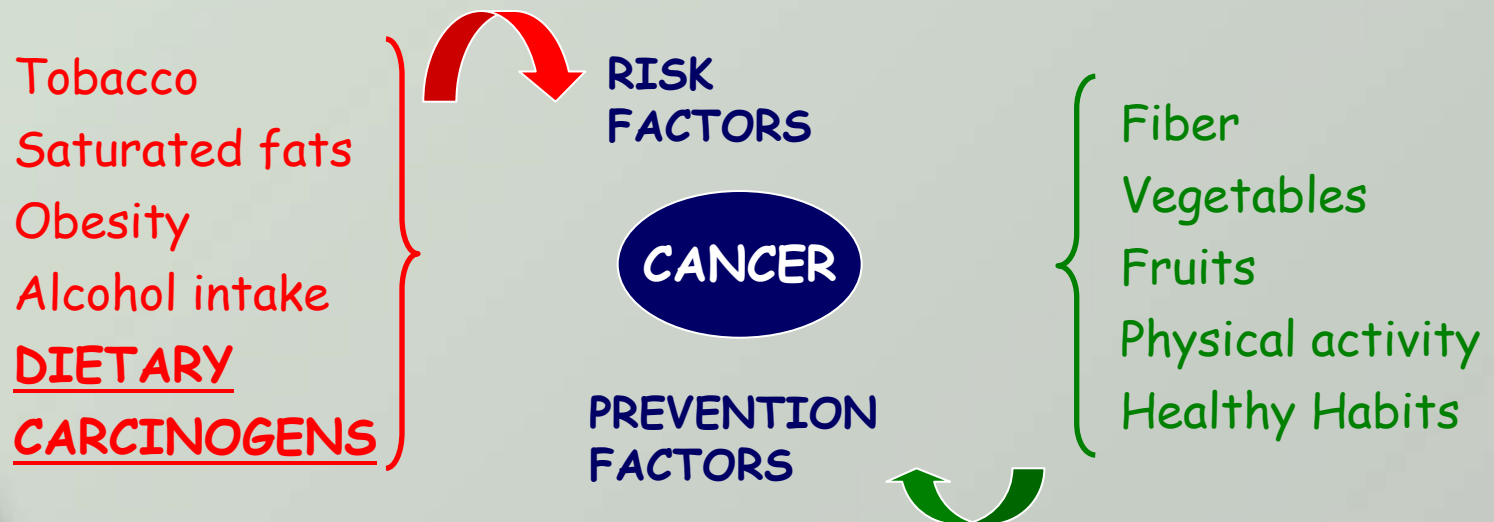
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BACKGROUND

Through diets, humans are exposed to complex mixtures of substances that play important roles in causing, modulating and preventing many types of cancer.



Dietary carcinogens

- ✦ Relationship with preservation process (Nitrosamines)
- ✦ Relationship with cooking process (HA and PAH)
- ✦ Bacterial contamination (aflatoxin B1)
 - Health problem in tropical countries
- ✦ Chemical Contamination (PCBs, POPs)
 - The data are relevant at local level

Nitrosamines

- ✦ They are formed during the preservation process
- ✦ Nitrates and Nitrites are precursors of endogenous nitrosamines
- ✦ Often found in salted, pickled and fermented foods
- ✦ Food that have high content may be associated with colorectal, gastric and esophageal cancers

Heterocyclic amines (HA)



- ✦ They are formed when creatinine, creatine, sugars and aminoacids (meat and fish) react at high cooking temperatures
- ✦ Food content have direct relationship with temperature, time and degree of doneness
- ✦ There is evidence that high intake may increase the risk of colorectal, gastric and bladder cancers.

Polycyclic aromatic hydrocarbons (PAH)

- ✦ They are formed by cooking foods at high temperatures
- ✦ The most important PAH are benzo(a) pirenene and Dibenzo(a) anthracene
- ✦ They are mainly present in cereals, meat and oils

JUSTIFICATION

- ✓ There are evidence that these compounds are carcinogens in experimental conditions and animal models, but their effects in humans have not be clearly established
- ✓ Not present naturally in foods but may be developed during preservation or cooking process
- ✓ Present in tobacco smoke and environment, but the main source of exposure is diet

JUSTIFICATION

✓ Problems with the dietary assessment of potential carcinogens:



Lack of information about levels of these compounds, mainly because they are not included in Food Composition Databases

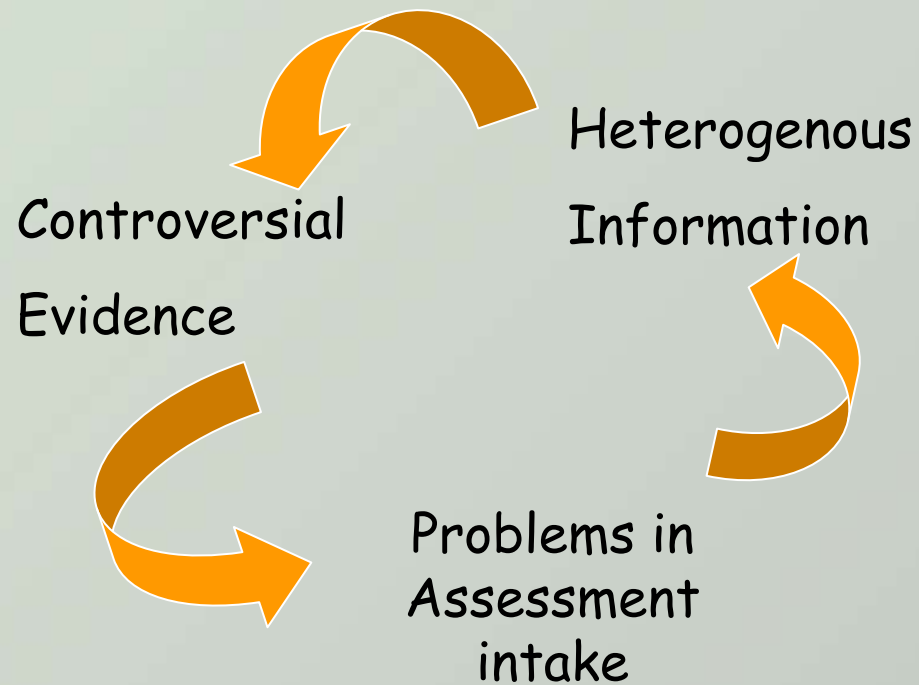


Heterogenous disperse information



Their concentration depends on the cooking or preservation method, information is frequently not included in FFQ (Food Frequency Questionnaire)

JUSTIFICATION



OBJECTIVE

Development of a database of food content on potential carcinogens:

- ✦ NITROSAMINES AND PRECURSORS (Nitrates and Nitrites)
- ✦ HETEROCYCLIC AMINES (HA)
- ✦ POLYCYCLIC AROMATIC HYDROCARBONS (PAH)

METHODS

Objective



1. Bibliographical search
2. Database structure
3. Variables
4. Review Process

Food Database

METHODS

Objective



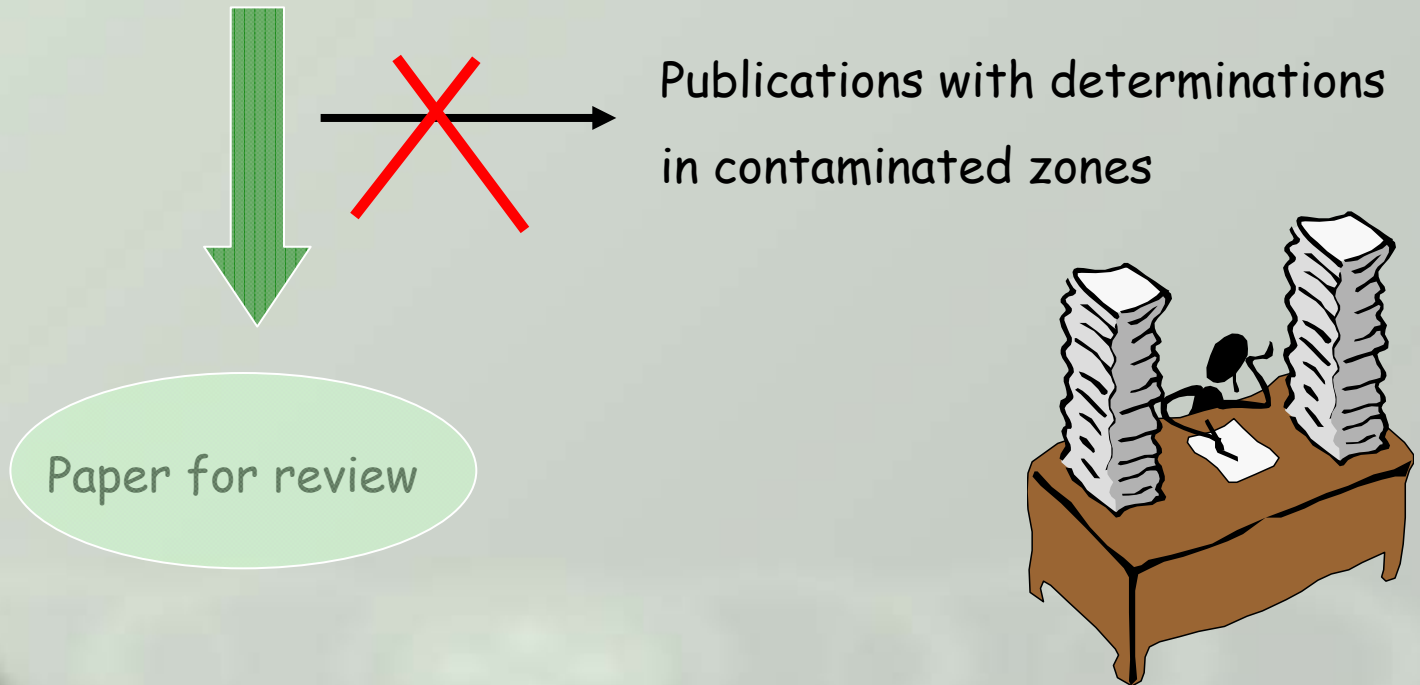
1. Bibliographical search
2. Database structure
3. Variables
4. Review Process

Food Database

Bibliographical search

Identify papers with information of food content dating back 1980

(MEDLINE AND EMBASE DATABASE)



Paper for review

Publications with determinations
in contaminated zones

METHODS

Objective



1. Bibliographical search
2. Database structure
3. Variables to extract
4. Review Process

Food Database

Database structure

Which are the relevant variables ?

What kind of information will be useful to do a food matching in a specific country?

- ✦ General variables (according to the food databases normative)
- ✦ Specific variables (cooking methods, T°, etc)
- ✦ Information about publication

METHODS

Database structure

Heterocyclic amines

FOOD	ALIMENTO	COOKING METHOD Método de Cocción	DEGREE OF DONENESS Grado de Cocción	TEMP Temp	TIME tiempo	Phip	Meiqx	Dimeiqx	Meiq

VALUE	ANALYTICAL METHOD Método Analítico	SAMPLE METHOD Método de Muestreo	YEAR Año	AUTHOR Autor	COUNTRY País	SOURCE Fuente	REF Ref



METHODS

Objective



1. Bibliographic searching
2. Database structure
3. Variables
4. Review Process

Food Database

Variables

FOOD CHARACTERISTICS

- ✦ NAME: English/ Spanish
- ✦ COOKING METHOD: fried, boiled, microwaved, baked, raw, cooked, etc.
- ✦ DEGREE OF DONENESS : rare, medium, well done, extra well- done
- ✦ PRESERVATION METHOD: canned, cured, dried, fresh, frozen.....
- ✦ TEMPERATURE: (°C)
- ✦ TIME: minutes



Variables

MEASUREMENT INFORMATION

- ✦ AMOUNT: mg/100g; μ /100g; ng/g; μ /kg
- ✦ VALUE TYPE: median, mean, range, weighted
- ✦ ANALYTICAL METHOD: HPLC, GC, MS, not available.
- ✦ SAMPLING METHOD: according to the number and origin of the collected samples: **complete, incompletely, not specified, not available**

Variables

PUBLICATION INFORMATION

- ★ AUTHOR: name
- ★ YEAR: year of publication
- ★ COUNTRY: country where the determinations have been done
- ★ TYPE OF PUBLICATION: original and review

METHODS

Objective



1. Bibliographic searching
2. Database structure
3. Variables
4. Review Process

Food Database

Review Process



External reviewers

R. Shina - National Cancer Institute - **USA**

E. Riboli - IARC- **FRANCE**

A. Farran - Cesnid. Barcelona- **SPAIN**

L. Puignou - Dep. Analytic Chemistry. UB- Barcelona- **SPAIN**

G. Keating /M. Knize- Lawrence Livermore National Laboratory- **USA**

K. Skog - Lund UNiversity- **SWEEDEN**

S. Rohrman - Division Clinical Epidemiology. Heidelberg- **GERMANY**

M. S. García Falcón, A. Lage Yusty - Sgo. Compostela- **SPAIN**

RESULTS

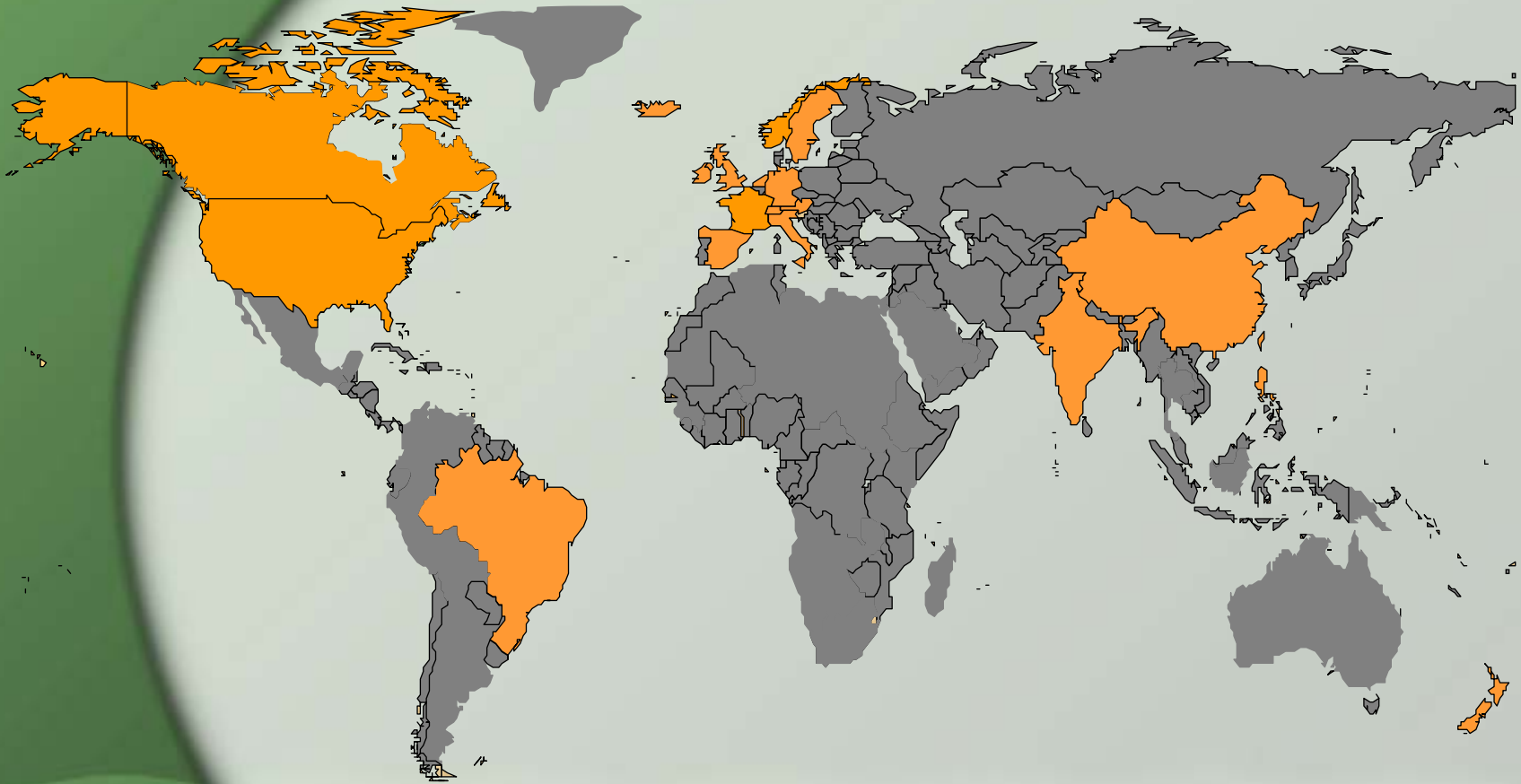
The complete database:

- ✦ Is divided into nitrosamines, heterocyclic amines and polycyclic aromatic hydrocarbons sectors.
- ✦ Was gathered from a total of 139 publication from 23 different countries
- ✦ The food items are grouped according to the standard classification
- ✦ The amount of each compounds is expressed in the units usually reported in the literature

Summary of available information

Groups of compounds	Compounds	Publications	Country of Publication	Food groups included	Food Items	Information extracted
Nitrates, Nitrites, Nitrosamines	Nitrates, Nitrites, NDMA, NPIP, NPYR, NPRO, and combinations	n 54	CA, CN, DE, FR, GR, HK, IN, IS, JP, NL, SC, UK, US	Potatoes, Vegetables, Fruits, Dairy products, Cereals, Meat, Fish, Eggs, Fats, Alcoholic beverages, Non-alcoholic beverages	n 207	Name, cooking method, preservation method, value, type of value, analytic method, sampling method, year of publication, author, country, source (review or original data)
Heterocyclic Amines (HA)	PhIP, MeIQx, DiMeIQx, AC, IQ, MeIQ	59	AT, CA, CH, CN, ES, FI, DE, JP, NO, NZ, SE, UK, US	Meat (fresh, preserved meat, meat products) and Fish (fresh, seafood, canned fish)	297	Name, degree of doneness, cooking method, temperature, cooking time, preservation method, value, type of value, analytic method, sampling method, year of publication, author, country, source (review or original data)
Polycyclic Aromatic Hydrocarbons (PAH)	B(a)P, DiB(a)A, PAH total	26	AT, BR, CA, CN, DE, ES, FI, IS, IT, KW, NL, UK, US	Potatoes, Vegetables, Fruits, Dairy products, Cereals, Meat, Fish, Fats, Sweets and desserts, Alcoholic beverages, Non-alcoholic beverages	313	Name, cooking method, preservation method, value, type of value, analytic method, sampling method, year of publication, author, country, source (review or original data)

Distribution of publications



Countries where the data were gathered

LIMITATIONS

⇒ Quality

We did not perform any directly measure of the compounds, but papers that were published in peer review journal gave some reassurance about their quality

⇒ Completeness

Not all information is available (access, language, etc.)

PRACTICAL APPLICATIONS

- ✓ Assessment of intake in epidemiological or nutritional studies
- ✓ Relationships with dietary biomarkers (DNA adducts)
- ✓ This will provide basis for investigating potential relationships between such compounds and the risk of cancer (particularly in the digestive tract)

ACKNOWLEDGEMENTS

EXTERNAL REVIEWERS

- R. Shina, E. Riboli, A. Farran, L. Puignou, G Keating, M. Knize, K. Skog, S. Rohrman, M. S. García Falcón, and A. Lage Yusty

INTERNAL REVIEWERS:

- R. Ibáñez, A. Agudo, R. García-Closas, P. Amiano, G. Pera and C. A. González

FOOD CONTENT OF POTENTIAL CARCINOGENS

Nitrates, nitrites, nitrosamines, heterocyclic amines and polycyclic aromatic hydrocarbons



CONTENIDO DE SUSTANCIAS POTENCIALMENTE CANCERÍGENAS EN ALIMENTOS

Nitratos, nitritos, nitrosaminas, aminas heterocíclicas e hidrocarburos aromáticos policíclicos



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ELECTRONIC version : <http://www.epic-spain.com>

Thanks!!



Sagrada Familia (Gaudí)- BARCELONA