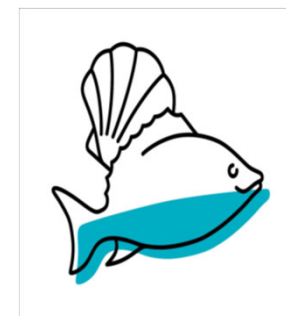


# **Ciguatera - outbreaks in Germany due to imported fish 2012 - 2018**



10/11 June 2024

Symposium on Aquatic Toxins Berlin

**Miriam Friedemann**

**National Poisoning Register**

**German Federal Institute for Risk Assessment**

# Epid. investigation of the ciguatera – outbreak in Germany 2012

## Case reports:

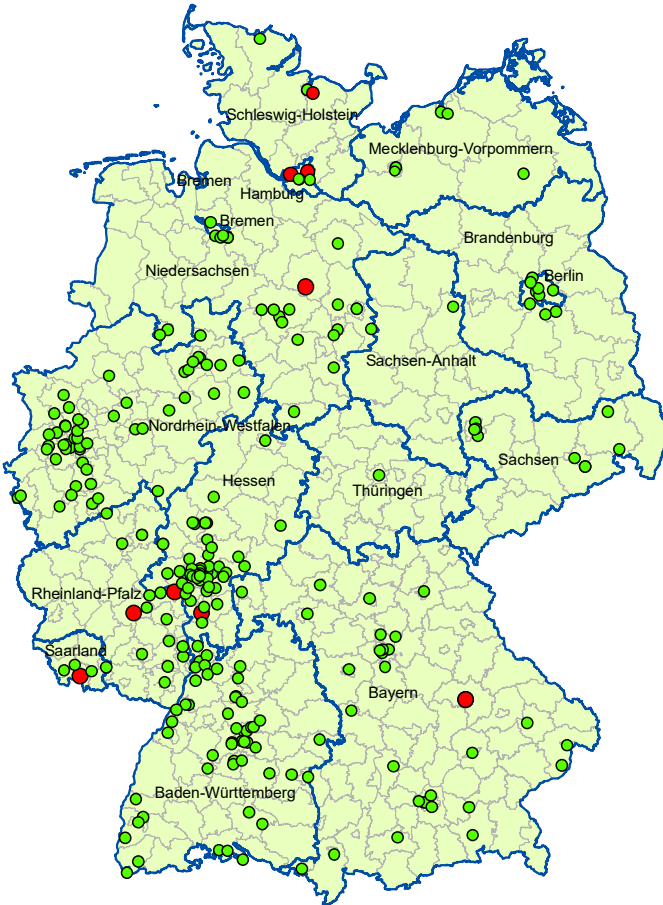
- German Poisoning Centres
- Local Public Health → BVL
- BfR

## Product information / RASFF:

- > 1800 kg fresh fish filets
- > 250 points of sale
- > 200 cities (green dots)

## Outbreak investigation / BfR:

- 23 cases
- 7 cities (red dots)



Graphic: Annett Martin

EUROPEAN COMMISSION  
HEALTH & CONSUMERS DIRECTORATE-GENERAL  
Directorate G – Veterinary and International affairs  
G4 – Food, Alert system and training

RASFF  
Rapid Alert System for Food and Feed

Brussels, 16 November, 2012

**RASFF  
ALERT**

**FOOD**  
VERY URGENT - TRÈS URGENT  
**ALERT NOTIFICATION: 2012.1602**  
**ORIGINAL NOTIFICATION**

SUBJECT: SUSPICION OF CIQUATERA POISONING CAUSED BY FRESH RED SNAPPER FILLETS (LUTJANUS SPP.) FROM INDIA

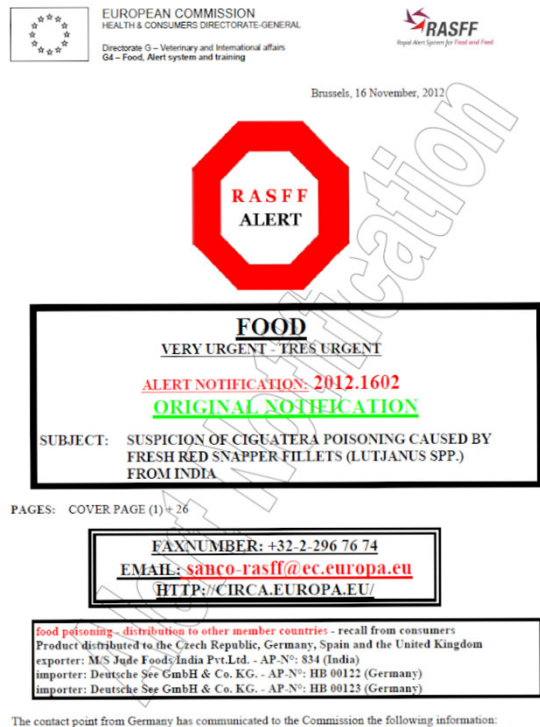
PAGES: COVER PAGE (1) + 26

FAXNUMBER: +32-2-296 76 74  
EMAIL: [sanco-rasff@ec.europa.eu](mailto:sanco-rasff@ec.europa.eu)  
HTTP: [CIRCA.EUROPA.EU/](http://circa.europa.eu/)

Food poisoning - distribution to other member countries - recall from consumers  
Product distributed to the Czech Republic, Germany, Spain and the United Kingdom  
exporter: M/S Jude Foods India Pvt.Ltd. - AP-N°: 834 (India)  
importer: Deutsche See GmbH & Co. KG. - AP-N°: HB 00122 (Germany)  
importer: Deutsche See GmbH & Co. KG. - AP-N°: HB 00123 (Germany)

The contact point from Germany has communicated to the Commission the following information:

# RASFF notification on ciguatera caused by „Red Snapper“ from India



- Reporting country: Germany
- Kind of hazard: Biotoxins
- Reporting date: 14. November 2012
- Reported risk: Typical symptoms in 6 individuals
- Produkt: Red Snapper, fresh filets, vacuum packed
- Importer: Deutsche See GmbH
- Imported to: Germany, Czech Republic
- Voluntarily measures: Lokal press, TV, radiocommunication, information of costumers, call back of fish batch
- Official measures: Public warning (internet)



# Epidemiological investigation of the first ciguatera outbreak in Germany 2012

**Tab. 3** Chronologische Details der Ausbruchcluster 2012

Cluster Nr.	Lieferung an den Einzelhandel			Ciguatera-Indexfall				Ciguatoxin-Analytik	
	Kreis/Bezirk	Datum	Menge (kg)	Kauf	Verzehr	Symptome	Meldung	Nachweis	Probenart
1	Hamburg-Wandsbek	05.11.	3,28	06.11.	06.11.	06.11.	07.11.	15.01.2013 (+)	Verdachtsprobe, Gegenprobe
2	Hamburg-Altona	05./07.11.	3,08/1,80	?	07.11.	07.11.	09.11.	n. d. <sup>b</sup>	n. d.
3	Plön	05.11.	2,64	06.11.	07.11.	07.11.	13.11.	15.01.2013 (-)	Beschwerdeprobe
4	Celle	05.11.	6,12	05.11.	05.11.	05.11.	12.11.	n. d.	n. d.
5	Mainz	07./09.11.	3,0/12,0	09.11.	09.11.	09.11.	09.11.	n. d.	n. d.
6	Bad-Kreuznach	05./07.11.	3,84/3,10	07.11.	07.11.	07.11.	15.11.	28.06.2013 (+)	Rückläufer-, Beschwerdeprobe
7	Darmstadt	05.11.	3,00	05.11.	11.11.	12.11.	13.11.	n. d.	n. d.
8	Regensburg	05.11.	2,80	06.11.	07.11.	07.11.	13.11.	15.01.2013 (+)	Beschwerdeprobe
9 <sup>a</sup>	Saarpfalz	07.11.	3,00	?	Kein	Entfällt	Entfällt	15.01.2013 (+)	Rückläuferprobe

Bundesgesundheitsbl 2016 · 59:1556–1565 DOI 10.1007/s00103-016-2456-y  
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M. Friedemann

## Erster Ciguatera-Ausbruch in Deutschland 2012

### Zusammenfassung

Im November 2012 traten in Deutschland nach dem Verzehr von importiertem Tropenfisch (*Lutjanus* spp.) 23 Vergiftungen mit der für Ciguatera typischen Kombination gastro-intestinaler und neurologischer Symptome auf. Anhand eines Fragebogens wurden der Krankheitsverlauf und Informationen zum Fischverzehr erfasst. Alle Patienten litten an der pathognomonischen Kaltallodynie. Zwei Patienten hatten schwere Symptome, die anderen Fälle verliefen mittelschwer. Im Rahmen des 3-Jahres-Follow-up berichteten sieben Patienten von länger als ein Jahr anhaltenden Parästhesien. Bei zwei Patienten konnten fast drei Jahre anhaltende Neuropathien detailliert dokumentiert werden. Die

objektiviert. Eine Hochrechnung auf der Basis Ciguatoxin-haltiger Proben ergab etwa 20 verhinderte Erkrankungsfälle. Im Rahmen der Ausbruchsauflösung wurden irrtümlich widersprüchliche Kennzeichnungen auf den Lieferpapieren hinsichtlich der an den Einzelhandel gelieferten Fischart sowie deren Fanggebiet bekannt. Durch die uneinheitliche Vorgehensweise bei den Meldungen an Giftinformationszentren, Veterinär- und Gesundheitsämter erwiesen sich die Erfassung der Fälle und die Aufklärung des Ciguatera-Ausbruchs als schwierig. Vielen Ärzten in Deutschland ist das durch Tropenfisch verursachte Krankheitsbild bislang unzureichend bekannt. Das Auftreten

## Detailed cluster information

- Definition:
- Details on the affected retail markets/stores:
- Information on the index case of each cluster:
- CTX-analytics in each cluster:

## Affected retail stores

- Delivery date and amount of fish, call back
- Acquisition, consumption, onset of symptoms, report
- Kind of sample, date of analytics, results

## Duration of ciguatera symptoms in the German outbreak in 2012, results of the 3-years-follow-up

<b>1 month</b>	<b>23 patients (100 %)</b>
<b>3 months</b>	<b>10 patients (53 %)</b>
<b>&gt; 1 year</b>	<b>7 patients (37 %)</b>
<b>&gt; 2.5 years</b>	<b>2 patients (11 %)</b>

## Severe course of ciguatera in the German outbreak 2012 (woman, 64 y)

- Paraesthesia / burning (oral mucosa) 0.5 h after the fish meal
- Myalgia (legs) 1 h
- Diarrhoea, vomiting, abdominal pain, fatigue 2.5 h
- **Bradycardia  $32 \text{ min}^{-1}$  and syncope** (1 week) 4 h → **hospitalisation** (3 days)
- Hypotension, dizziness, pruritus (extr.), diarrhoea, lower abdominal pain, disorders of sleep, speech, memory, concentration (1 week after hospitalisation)
- Cold allodynia (palms), myalgia (legs), paresthesia (extremities), hypothermia, shivering, fatigue, lack of appetite (6 weeks)

## Longlasting chronic course of ciguatera in the German outbreak 2012 (woman, 27 y)

- Paraesthesia / burning (oral mucosa) 1 h after a very small fish portion
- Nausea, diarrhoea, vomit, abdominal pain 2.5 h → hospitalisation (1 day)
- Cold allodynia of palms, numbness, tingling, abdominal disorders (3 weeks)
- Cold allodynia in her face (3 months)
- Hypothermia, shivering, sweating, fatigue, lack of appetite (2,5 years)



## Ciguatera cases and outbreaks in Germany 2012 - 2018 caused by imported snapper (Lutjanidae)

	2012	2013	2014	2015	2016	2017	2018
Cases	23	1	6	16	4	16	3
Cluster	8	1	1	7	1	7	2
Cities	7	1	1	6	1	8	2
Bundesländer	6	1	1	6	1	8	2
Restaurants	0	1	0	1	0	5	2
Households	15	0	4	6	2	1	0
Other	0	0	0	0	0	(1)	0
		Workplace canteen			Additional 6 cases in France caused by same batch of fish	Laboratory self-experiment	



Journal of Consumer Protection and Food Safety  
March 2019, Volume 14, Issue 1, pp 71–80 | Cite as

## Ciguatera fish poisoning outbreaks from 2012 to 2017 in Germany caused by snappers from India, Indonesia, and Vietnam

Authors Authors and affiliations

Miriam Friedemann

Research Article  
First Online: 31 October 2018

148  
Downloads

### Abstract

Ciguatera fish poisoning (CFP) is the most common fish intoxication worldwide. It is caused by ciguatoxins produced by tropical, benthic and epiphytic microalgae in the genera *Gambierdiscus* and *Fukuyoa*. These potent neurotoxins accumulate in the food chain reaching their highest concentration in tropical fish and invertebrates. In addition to gastrointestinal symptoms, cold allodynia and other neurologic signs are characteristic of ciguatera. In continental Europe, most cases were linked to vacation trips to tropical areas. The first outbreak in Germany was documented in 2012. The objective of this study is to document ciguatera outbreaks in Germany associated with imported tropical fish. Reports by physicians and the German Public Health Service to the German Federal Institute for Risk Assessment (BfR) were collated and evaluated for symptoms consistent with CFP. Data of molecular identification of the fish, as well as toxicity data from meal and batch remnants, were provided where possible to substantiate ciguatoxins as the causative agent. A series of six outbreaks were registered in Germany between 2012 and 2017. Fourteen of the 65 patients were hospitalised. All German outbreaks were caused by snappers (Lutjanidae) imported from India, Indonesia and Vietnam. Though ciguatera remains a rare disease in Germany, physicians should be aware of it, and appropriate preventive strategies should be established. Reporting of CFP in fish importing countries may contribute to improve regional public health strategies in the affected fish exporting countries and reduce chances of exporting ciguatoxic fish. This article proves that fish from the Indian Ocean can cause ciguatera, which has been poorly documented previously.

### Keywords

Ciguatera Ciguatoxin Food related outbreak Red snapper *Lutjanus bohar*

**65 CFP cases (46 % female, median age 57 y)**

**All cases caused by imported snapper (Lutjanidae)**

**First symptoms 0.5 – 8 h (median 4 h)**

**14 hospitalisations (22 %) with a mean stay of 3 d**

**3 severe CFP cases (7 %)**

	m49 y	m60 y	f64 y
<b>bradycardia &lt; 40 min<sup>-1</sup></b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>multiple syncope</b>	<b>x</b>		<b>x</b>
<b>severe abdominal pain</b>		<b>x</b>	
<b>respiratory distress</b>		<b>x</b>	

# Imported fish causing ciguatera outbreaks in Germany

## Friedemann (2018)

	2012	2013	2014	2015	2016	2017
<b>Manufacture</b>						
Date	October 2012	October 2013	November 2014	October 2015	November 2015	December 2016
Country	India	India	Indonesia	India	India	Vietnam
Ocean	Indian Ocean, eastern			Indian Ocean, western		Pacific, western central
FAO-zone	57	57	57	51	51	71
Processing	Fresh	Frozen, raw	Frozen, raw	Fresh	Frozen, raw	Frozen, raw
<b>Fish</b>						
Import	<i>Lutjanus</i> spp.	<i>Lutjanus</i> spp.	<i>Lutjanus</i> spp.	<i>L. bohar</i>	<i>Lutjanus</i> spp.	<i>L. malabaricus</i>
Retail	<i>L. malabaricus</i>	<i>L. malabaricus</i>	<i>Lutjanus</i> spp.	<i>L. bohar</i>	<i>Lutjanus</i> spp.	<i>L. malabaricus</i>
DNA-barcoding	<i>L. bohar</i> , <i>L. argentimaculatus</i> <sup>a</sup>	<i>L. bohar</i> <sup>b</sup>	<i>L. bohar</i> , <i>L. argentimaculatus</i> , <i>L. erythropterus</i> , <i>P. pinjalo</i> <sup>c</sup>	<i>L. bohar</i> <sup>c</sup>	n.d.	<i>L. bohar</i> <sup>c</sup>
<b>CTXs</b>						
Method	LC-MS/MS <sup>d</sup>	n.d. <sup>f</sup>	Cell-assay, LC-MS/MS <sup>d</sup>	Cell-assay, LC-MS/MS <sup>d</sup>	Mouse-assay <sup>e</sup>	Cell-assay, LC-MS/MS <sup>g</sup>
Results	CTX1B; 2,3-dihydroxy CTX3C	n.d. <sup>f</sup>	Positive	51-hydroxy CTX3C	Positive	Positive
<b>DNA:</b>						
	G. Näumann (IHU Hamburg)	T. Gerhardt (LLBB Berlin)	I. Huber (LGL Bayern)	I. Huber (LGL Bayern)		I. Huber (LGL Bayern)
<b>CTX:</b>						
	A. Gago Martinez (Spain)		A. Gago Martinez (Spain)	A. Gago Martinez (Spain)	M. Nicolas (France)	A. Abraham <sup>+</sup> (USA) C. Loeffler (BfR Berlin)



# Food Safety Risk in Germany From Mislabeled Imported Fish: Ciguatera Outbreak Trace-Back, Toxin Elucidation, and Public Health Implications

Christopher R. Loeffler<sup>1,2\*</sup>, Astrid Spielmeier<sup>1</sup>, Miriam Friedemann<sup>3</sup>, Katrin Kapp<sup>1</sup>, Ulrich Schwank<sup>4</sup>, Oliver Kappenstein<sup>1</sup> and Dorina Bodi<sup>1</sup>

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Ciguatera poisoning (CP) is a prevalent food related health risk, caused by the consumption of seafood contaminated with ciguatoxins (CTXs). Seafood is the most traded food commodity worldwide, and since 2012, imported snapper fish (Lutjanidae)

# Cluster of the ciguatera outbreak in Germany, 2017

## Loeffler et al. (2022)

**TABLE 1** | Ciguatera poisoning outbreak clusters that occurred in Germany in 2017 from imported fish labeled as "Red Snapper".

Postal code	City, Federal region	Delivery date in 2017	Number of cases	Sample type/analysis	Lot VN/385/III/#	Home (H) or Restaurant (R)	Onset of symptoms in 2017
82275	*Emmering, BY	February (10 kg)	8	S/ DNA CTX	124	R/H	Early March
82216	Maisach, BY	February (10 kg)	0	S/ DNA CTX	124	(R)	–
87466	Oy-Mittelberg, BY	–	2	M/ DNA CTX	122	H	20th March
82467	Garmisch, BY	2nd March (15 kg)	1 <sup>&amp;</sup>	–	124	R	3rd March
63739	Aschaffenburg, BY	7th March (5 kg)	1	–	124	R	10th March
87435	Kempten, BY	–	0	P/ DNA	122	WS	–
50670	Cologne, NW	–	2	–	UNK	H	25th March
18609	Binz, MW	3rd March (5 kg)	1 <sup>&amp;</sup>	–	124	R	4th March
70734	Fellbach, BW	–	1	–	UNK	R	March

\*Cases were reported from the common location of Fürstenfeldbruck, the product was purchased at a restaurant but consumed at home.

<sup>&</sup>Other cases reported colloquially. Postal code, city, and federal region provide locational details for each cluster. Delivery date and amount (in kilograms with glazing/gross weight) of product delivered were provided by the wholesaler according to postal codes. Sample type references the material collected, meal (M) are leftovers or meal remnants from CP patients and suspected (S) are related products collected from the same point of sale where a CP case acquired the product, (P) is a parallel sample, (DNA) means molecular species confirmation, (CTX) refers to ciguatoxin analysis by N2a-assay and liquid chromatography with tandem mass spectrometry (LC-MS/MS). Home (H) or restaurant (R) is the location of consumption; (WS, wholesale. BW, Baden-Württemberg; BY, Bayern; NW, North Rhine-Westphalia; and MW, Mecklenburg-Western Pomeranian. Lot # was VN/385/III/124 or VN/385/III/122, only the final number is indicated in the table for simplicity. The date of onset of symptoms are the same as the date of consumption and are based on the most complete information available, the dates and information listed are as they were reported. UNK, unknown.



# Product information on the fish involved in the ciguatera outbreak 2017

Loeffler et al. (2022)

RASFF 2017-0345

## LOT VN/385/III/124

### Vietnam export to Hamburg, Germany

(Cleared- September 2016)

Product label: Red Snapper fillet - Portion

Cartons: 1,200

Total gross weight: 6,000 kg

Production date: Unknown

Frozen on: Unknown

best-before-date: 16<sup>th</sup> July 2018

Catch region: FAO 71

## LOT VN/385/III/122

### Vietnam export to Hamburg, Germany

(Cleared- September 2016)

Product label: Red Snapper fillet - Portion

Cartons: 250

Total gross weight: 2,500 kg

Production date: 11<sup>th</sup> July 2016

Frozen on: 11<sup>th</sup> July 2016

best-before-date: 31<sup>st</sup> December 2018

Catch region: FAO 71

### Distribution in Europe

Austria: 220 kg (November 2016 to March 2017)

Czech Republic: 35 kg (December 2016 to February 2017)

Netherlands: 380 kg (November 2016 to February 2017)

Poland: 70 kg (November 2016 to March 2017)

### Distribution in Germany

9<sup>th</sup> November 2016 to 13<sup>th</sup> March 2017

4,260 kg to 191 postal codes

among 144 municipalities or cities

from 15 (of 16) Federal States

### Distribution in Europe

1,000 kg – Schladming, Austria (September 2016)

150 kg – Liezen, Austria (January 2017)

### Distribution in Germany

unknown



Contact e-mail [rita.banduraki@bvl.bund.de](mailto:rita.banduraki@bvl.bund.de)

food - alert notification - food poisoning - TK-Red Snapper Filet - Germany - suspicion of ciguatera poisoning

Notification Link [https://webgate.ec.europa.eu/sanco\\_rasff/notification/view/326536](https://webgate.ec.europa.eu/sanco_rasff/notification/view/326536)

### General Information

Notification number:	326536 - 328547
Reference:	2017.0345
Notification type:	food
Notification basis:	food poisoning
Notification classification:	alert notification
Product name:	TK-Red Snapper Filet
Product category:	fish and products thereof
Notifying country:	Germany
Notifying Country region:	Schleswig-Holstein
CP Reference:	2_131_170317_1_SH
Date of notification:	16/03/2017
Infosan Informed:	Yes
Reason Infosan:	
Notification status:	EC VALIDATED 17/03/2017 14:54:18
Follow-up status:	328547 EC VALIDATED 26/04/2017 17:17:39 DE
Number of follow-ups:	18

## **What we have learned ...**

- 1. Each single case caused by imported fish refers to the existence of an outbreak and should be reported.**
- 2. The first appearing ciguatera case should be designated as the index-case of an outbreak.**
- 3. An outbreak-specific cluster-definition (e.g. by postal codes of retail stores, restaurants, etc.) is necessary.**
- 4. Other cases should be searched actively by different strategies, e.g. requests on cases at**
  1. Poisoning Centres
  2. Public Health Services
  3. Food Safety Administrations
  4. Tropical Medicine Facilities
- 5. Cases of one and the same outbreak might occur in various cities, counties, countries and continents.**
- 6. The interval between the appearance of ciguatera-cases of an outbreak caused by frozen imported fish might be large.**
- 7. Strategies for the investigation of outbreaks have to be specified if the causative fish was imported (fresh or frozen).**
- 8. The species of the fish should be analysed genetically (DNA-barcoding) to exclude false-labelling.**

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