



Chemical Food Poisoning

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Food Poisoning

Acute illness with gastrointestinal or neurological manifestations affecting two or more persons who have shared a meal during previous 72 hours





Food Borne Illness

- ★ Hepatitis A
- ★ Mad cow disease
- ★ DEHP related liver cancer?





Etiology of food poisoning

★ Infective

★ Chemical (food borne toxin)

- Simple chemical
- Biotoxin





Food borne toxins

★ Acute toxic effects

Food poisoning

Mainly on G.I.T , neurological system

★ Chronic toxic effects

Long term /cumulative effects

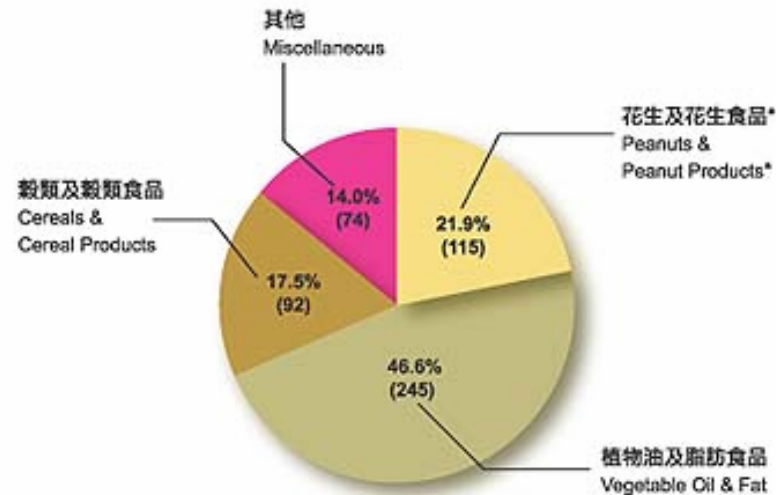
Blood, kidney, nerve, skeletal system

Carcinogenicity/teratogenicity

Dioxins, Aflatoxin, Mercury



香港的黃曲霉毒素監察結果 (1998 - 2000) Surveillance Results - Aflatoxin (1998 - 2000)



樣本總數 Total number of samples 526

*包括花生油 Including Peanut Oil





Food borne toxins

- 1) Natural occurring
 - ★ Ciguatoxin
 - ★ Amatoxin
- 2) Natural contamination
 - ★ Mercury
 - ★ Dioxin in seafood
- 3) Artificially added
 - ★ Clenbuterol (pork)
 - ★ Tetramine
 - ★ Melamine





Man-make chemical food poisoning

★ Criminal poisoning

- Rat poison : tetramine

★ Adulteration

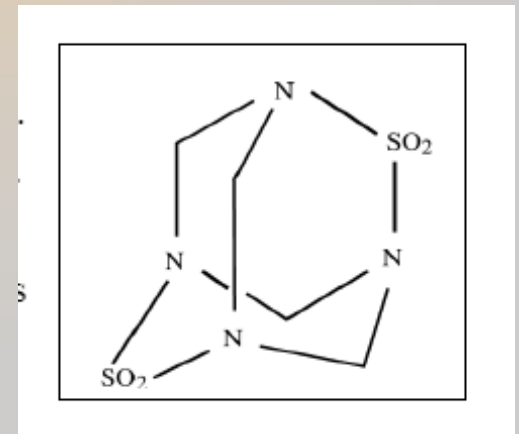
- Melamine milk product poisoning





Tetramine Rodenticide Poisoning

- ★ Tetramine (Tetramethylene disulfotetramine)
- ★ Known as 毒鼠强, 四二四, 三步倒, 聞到死
- ★ Extremely toxic rodenticide
- ★ Cause non-stop convulsion





Tetramine Rodenticide Poisoning

- ★ >>100 deaths in hundreds of poisoning outbreaks
- ★ Banned in China since 1990s
- ★ Popular : potent and cheap
- ★ >3 cases in HK



Melamine Milk Product Poisoning

- ★ Largest food poisoning outbreak
- ★ In China >47,000 hospitalised
- ★ >4 death as at Oct 2008
- ★ High melamine content renal stone
- ★ Sanlu Milk Product





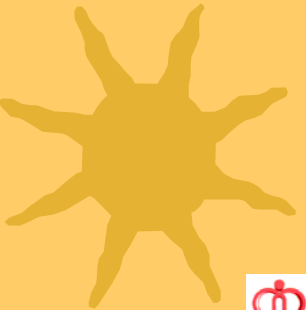
Melamine milk product poisoning

- ★ Hong Kong: Mass panic in parents
- ★ Need to set up screening clinic & Special assessment centre
- ★ >50,000 screened
- ★ 15 stones detected





Causative Agents of food poisoning Hong Kong (1)



| Causative Agent | % among all food poisoning outbreaks notified to DH* | | |
|--------------------------------|---|-------------------------|--------------------------|
| | 2004 (n=821) | 2005 (n=972) | 2006 (n=1095) |
| <i>Vibrio parahaemolyticus</i> | 45.9% | 40.8% | 39.5% |
| <i>Staphylococcus aureus</i> | 17.2% | 13.2% | 16.3% |
| <i>Salmonella spp.</i> | 11.1% | 13.5% | 11.4% |
| Norovirus | 7.8% | 10.5% | 16.7% |
| Ciguatoxin | 7.8% | 4.2% | 2.5% |

*Source : Department of Health





Causative Agents of food poisoning Hong Kong (2)

Less common but important causes :

| Causative Agents | No. of notifications* | | |
|-------------------------|------------------------------|-------------|-------------|
| | 2004 | 2005 | 2006 |
| Paralytic shellfish | 2 | 42 | 3 |
| Mushroom | 22 | 9 | 11 |
| Tetrodotoxin | 0 | 3 | 2 |
| Pesticide | 0 | 2 | 0 |
| Clenbuterol | 0 | 0 | 0 |

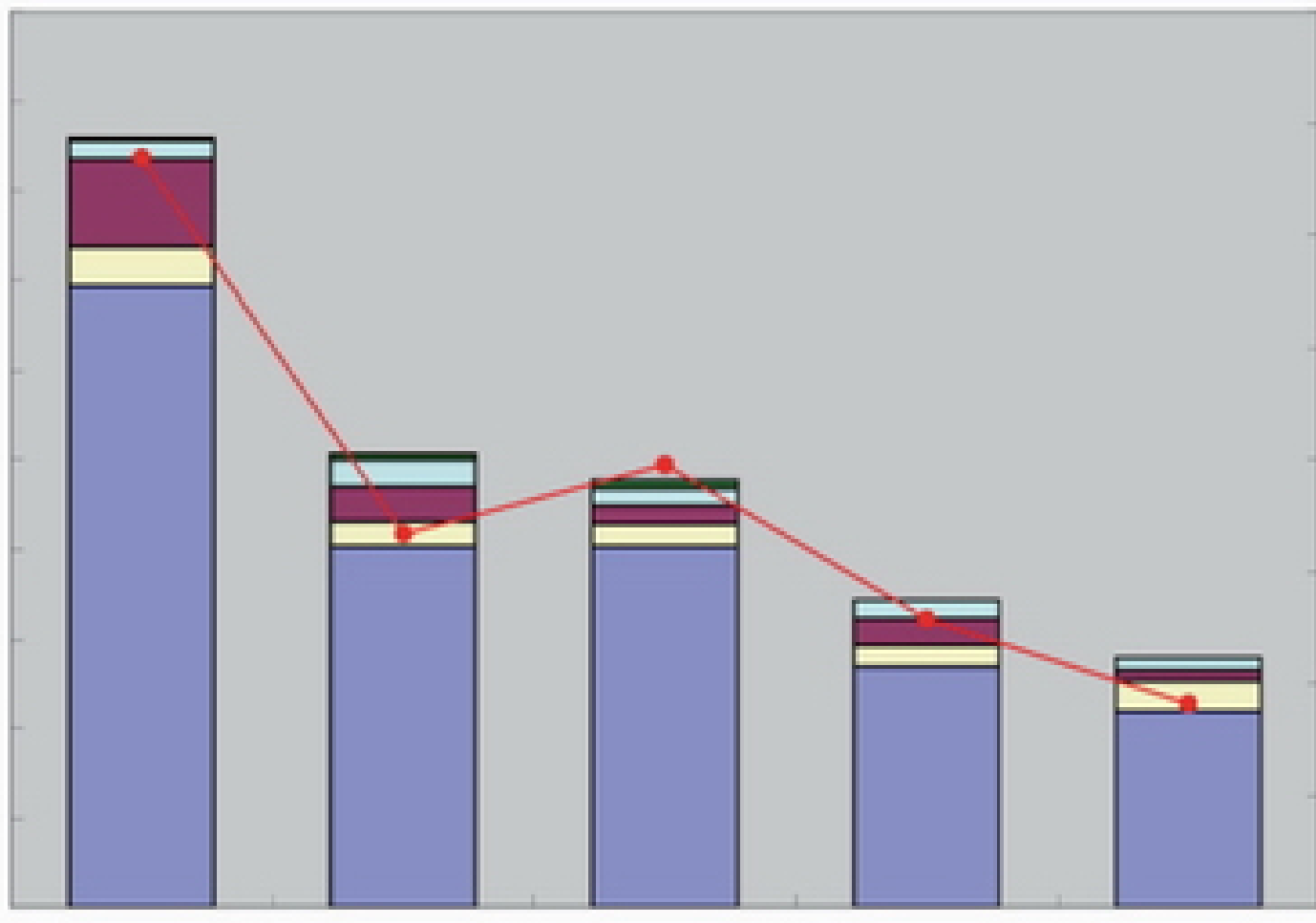
*Source : Department of Health
+ confirmed cases only



事件數目 (按病原體劃分)

Number of outbreaks by class of causative agents

1000
900
800
700
600
500
400
300
200
100
0



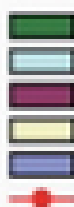
2006

2007

2008

2009

2010



其他 Others

化學物 Chemicals

病毒 Virus

生物毒素 Biotoxin

細菌 Bacteria

有關食肆及食物業的食物中毒事件受影響人數

Number of persons affected in food poisoning related to food premises and food business

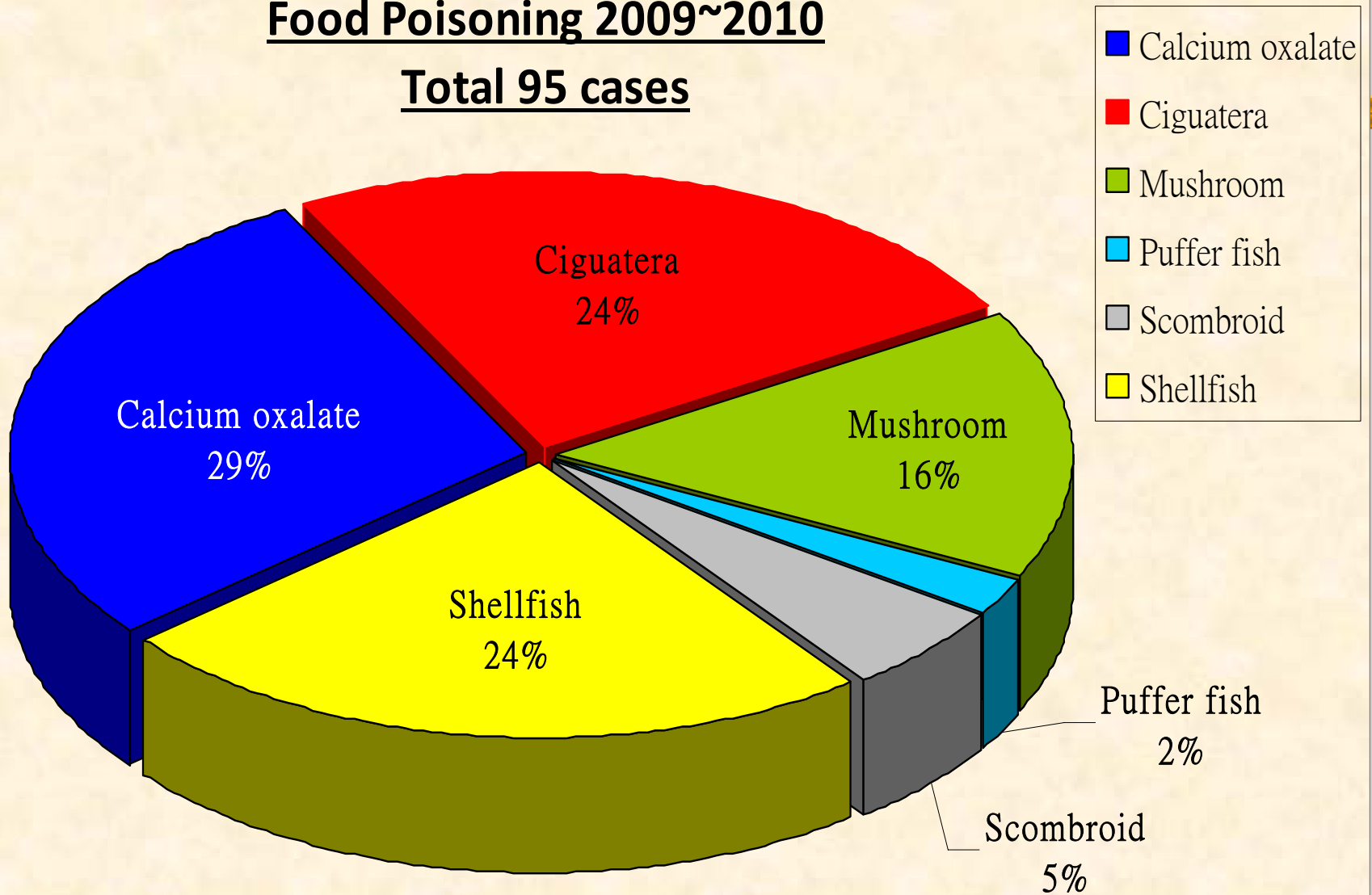
受影響人數

Number of persons affected

4000
3500
3000
2500
2000
1500
1000
500
0

Food Poisoning 2009~2010

Total 95 cases





Case 1

- ★ 7 workers
- ★ 8 hrs after sharing a meal
- ★ Severe G.E. requiring admission
- ★ Notice Jaundice on D3
- ★ SGOT & bilirubin raised

What can cause such poisoning?





Clues to causative agents

★ Symptoms

- G.I. Only
- also neurological
 - Neuropathic
 - Paralytic

★ Incubation period

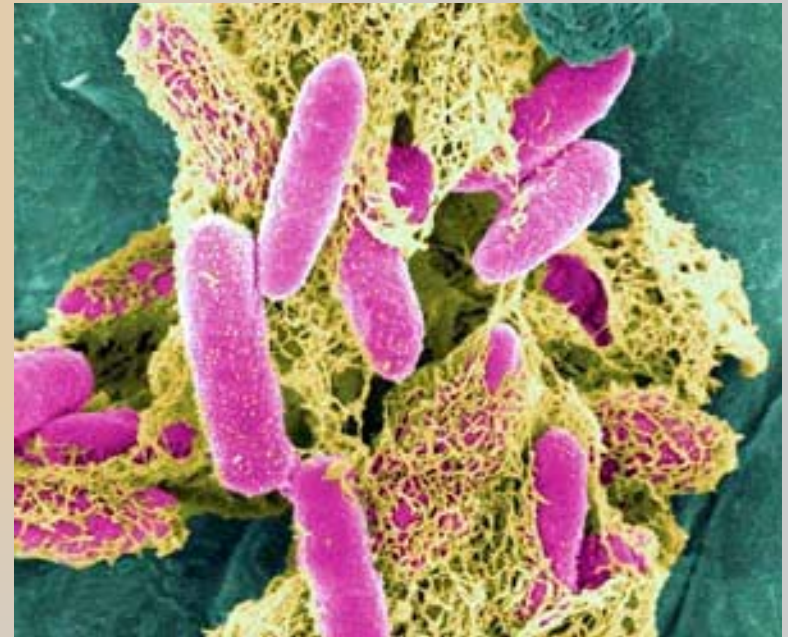
- Short – preformed biotoxin/chemical
- Long - infection





Infective food poisoning

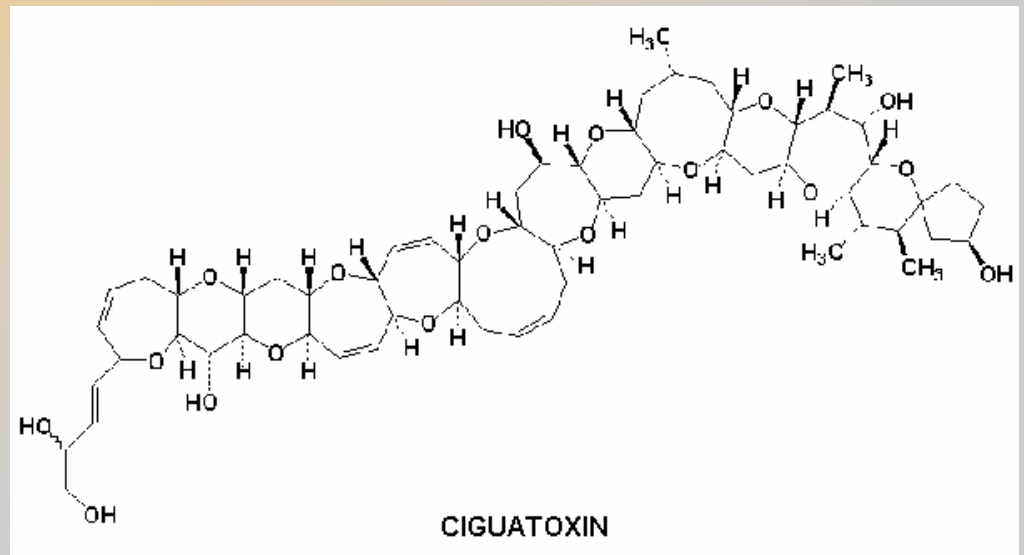
- ★ Longer incubation period
- ★ Killed by adequate cooking





Chemical (Biotoxin)

- ★ Short/No incubation period
- ★ Mostly heat resistant





Clues to causative agents (continue)

★ Type of food

- Undercooked seafood (*Vibrio parahaemolyticus*)
- Pig lung (Clenbuterol)
- Vegetable (Pesticide)
- Coral fish (Ciguatoxin)
- Canned food (Botulism)





GI symptoms beyond 6 hours

- ★ Mostly gut infection
- ★ Amatoxin mushroom poisoning





Diagnosis : Amanita verna poisoning

★ 23/3/05 廣州

七人食用於華南植物園內採摘的“白毒傘”，三人病情嚴重須換血





GI symptoms beyond 6 hours

Mushrooms poisoning





Delay G.E. & Hepatotoxic mushroom

Amanita Phalloides

鵝膏菌

又名毒蘑菇、绿帽菌、毒伞

- 記載香港曾有此菌生長，但至今未發現





Hepatotoxic mushrooms



白毒鵝膏菌
Amanita
verna





Amatoxins poisoning

- ★ Severe GE 6-24 hrs, remission of symptom
- ★ Fulminant liver & renal damage 2-3days
- ★ Vigorous fluid replacement
- ★ Activated charcoal
- ★ High dose Pen G or silibinin
- ★ May need liver transplant
- ★ 10-50 % mortality





Toxic mushroom Syndromes



Protoplasmic toxins

- ★ Delayed G.E. & liver failure
- ★ Delayed G.E. & CNS impairment
- ★ Delayed G.E. & renal failure



Neurotoxins

- ★ Cholinergic
- ★ Hallucination
- ★ GABAnergic effects



Others

- ★ Disulfiram–like reaction
- ★ **G.I. Irritants**





Irritant Mushrooms poisoning



- ★ 14 patients in 4 years
- ★ All G.I. Symptoms
- ★ In half to 5 hours
- ★ +/- numbness, sweating, weakness
- ★ Mushrooms picked in park
- ★ Some brought from market





Mushrooms poisoning

- ★ Mushrooms picked in park
- ★ *Macrolepiota neomastoidea* & *Lepiota cristata*



「冠狀環柄菇」
(*Lepiota cristata*)



「大環柄菇」
(*Macrolepiota neomastoidea*)





綠褶菌

Chlorophyllum molybdites

Fairy ring





Mushrooms poisoning

- ★ Some brought from market
- ★ Inedible *Clitocybe* sp. (漏斗菇)
confused with edible (豬肚菇)





Case II

- ★ 20/6/96
- ★ 18 firemen had oral numbness and rasping, burning sensation in throat
- ★ **Immediately** after taking some vegetables for lunch in **canteen**



What is the causative agent?





G.I. Symptoms within 6 hours

Biotoxin/chemical

- ★ Plant irritant
- ★ Bacterial preformed toxin
- ★ Undercooked green bean
- ★ Green potato
- ★ Irritant mushroom





Diagnosis

Oxalate crystal in Alacasia plant

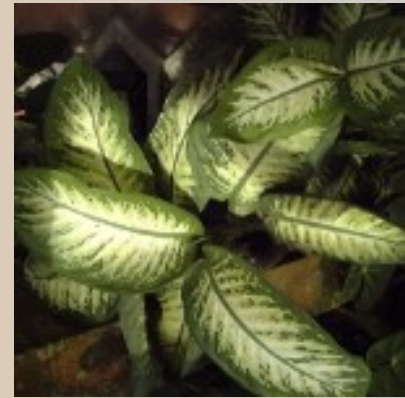




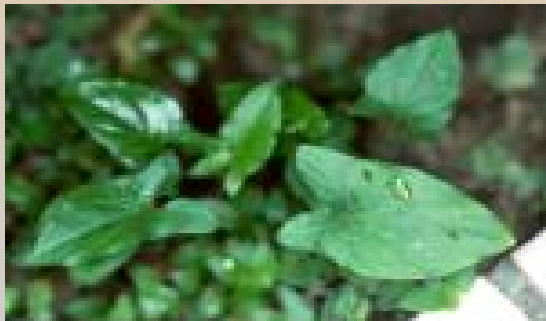
Irritant Plant : *Araceae* 天南星科



海芋 *Alocasia macrorrhiza*



萬年青 *Dieffenbachia* spp



半夏 *Pinellia* spp



芋頭 *Colocasta esculenta* (L.) Schott

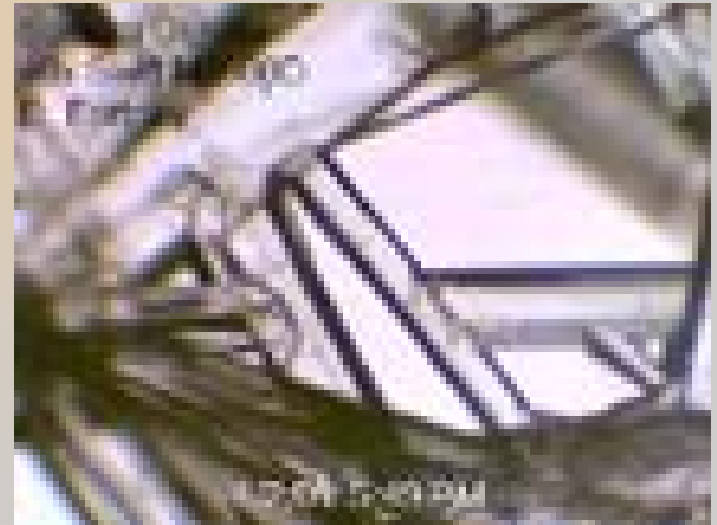




Irritant Plant



- ★ Contain insoluble Calcium Oxalate Crystal
- ★ Ingestion: irritate oral mucosa , burning pain +/- swelling
- ★ Contact:
skin rash & itchiness





Irritant Plant

- ★ Occur in canteen & restaurant during typhoon seasons
- ★ Contamination with Chinese Water Spinach (通菜)





Bacterial Preformed Toxin

- ★ Cooked food contaminated with organisms
- ★ Produce heat resistant toxin
- ★ Early abdominal pain, vomiting & diarrhoea within 6 hrs
- ★ *Bacillus cereus*: fried rice





Green Beans 四季豆

- ★ Under-cooked beans cause many outbreaks in China
- ★ Haemagglutinin destroyed by soaking & cooking
- ★ Onset 1-3 hours
- ★ Nausea, vomiting & diarrhoea

Green Bean





Spouting/green Potatoes

- ★ Contain glycoalkaloid
– solanine (龍葵碱)
- ★ Usually low level
& non-toxic
- ★ Green, sprouting, ↑↑ toxin





Spouting/green Potatoes



- ★ Bitter taste
- ★ Not destroyed by cooking
- ★ Oral burning sensation
Severe abdominal pain, vomiting
- ★ +/-Respiratory depression
cerebral edema & haemolysis





Case III

- ★ 7 friends share some food in dinner
- ★ 2 hours later 1 die
- ★ 1 developed ventilatory failure requiring intubation
- ★ 5 had weakness

Diagnosis?





Food poisoning with neurological symptoms



1) Puffer fish

2) Ciguatoxin



3) Vegetable-borne pesticide

4) Shellfishes

5) Clenbuterol



6) Scombroid





Diagnosis



Puffer fish poisoning





Puffer Fish Poisoning

- ★ Poisoning common in Japan (fugu)
- ★ Tetrodotoxin in puffer fish
- ★ Heat stable potent neurotoxin blocking Na Channel





Puffer Fish Poisoning

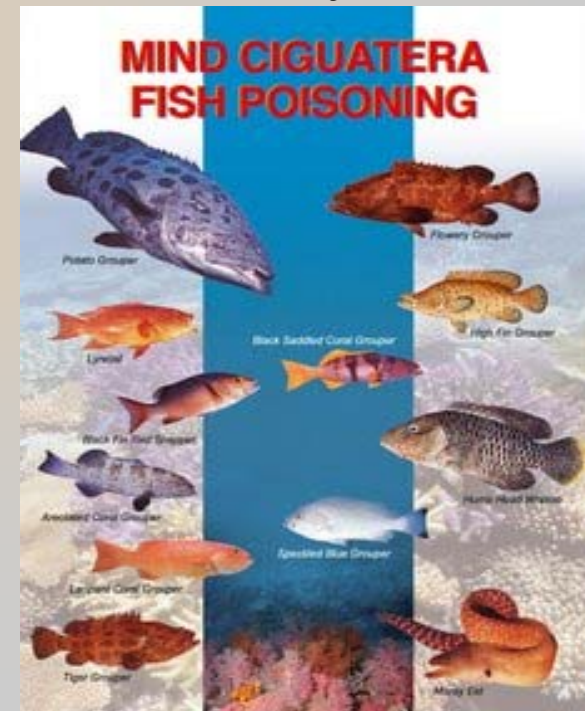
- ★ G.I. symptom +/- hypotension ,arrhythmia,
- ★ Numbness, incoordination
- ★ Dysphagia, paralysis, resp. failure
- ★ Onset 10 min. to 4 hrs.





Ciguatera Poisoning

- ★ Heat stable ciguatoxin from Dinoflagellate
- ★ Big coral fish (snapper, grouper)
- ★ Increase sodium channel permeability
- ★ Last for days to months
- ★ G.I. Symptoms 1-6 hrs
- ★ Numbness of mouth





Ciguatera Poisoning



- ★ Pruritis, muscle and joint pain
- ★ Characteristic shooting pains in legs & teeth
- ★ dysesthesia (burning pain to cold)
- ★ Severe cases:
 - Cranial nerve palsy
 - Respiratory & cardiovascular failure





Vegetable-borne Pesticide



★ Methamidophos (organophosphate) in flowering vegetable (choi sum)



★ G.I. symptoms

★ Lacrimation/small pupil/ sweating

★ weakness

★ Dose small, none develop paralysis

★ Incubation half to 4 hrs.





Paralytic Shellfish Poisoning

- ★ Heat stable Saxitoxin in dinoflagellates
- ★ Common in red tide season
- ★ Sodium channel blocker in nerve & muscle
- ★ Numbness \pm G.I. Symptoms
- ★ Dyspnoea/dysphagia/resp failure
- ★ Incubation 5 min. to 4 hrs.
- ★ Duration hours to days

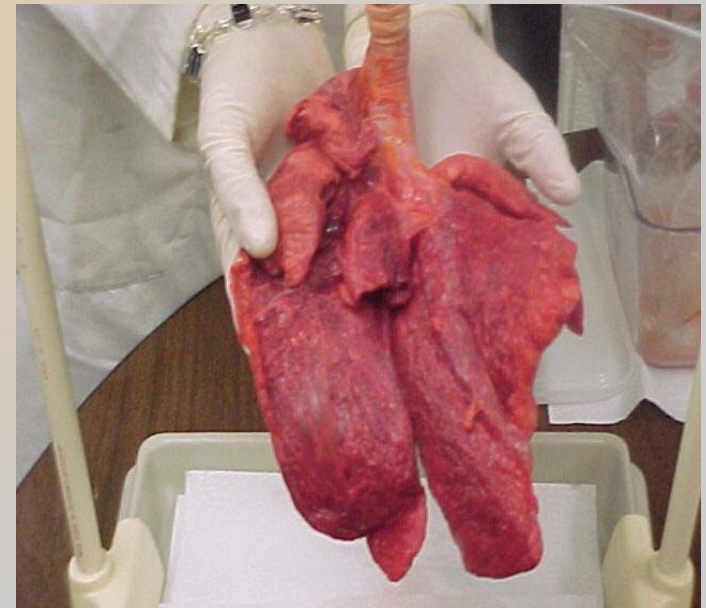




Clenbuterol



- ★ Long acting beta-agonist (half life ~ 30 hours)
- ★ Induce muscle hypertrophy & reduce fat deposition
- ★ Used as animal feed
- ★ Outbreaks from taking Pig lung & pork





Clenbuterol

- ★ Incubation 15 min. to 8 hrs.
- ★ Most have palpitation, headache, tremor
- ★ Some dizziness, weakness, G.I. Symptom, flushing, numbness & weakness
- ★ Investigation: hypokalaemia and hyperglycemia
- ★ Diagnosis: food sample or patient's urine
- ★ Treatment: β -blocker





Scombroid



- ★ Ingestion of preformed histamine on fish skin
- ★ Enzymatic decarb of fish fresh histadine by marine bacteria
- ★ Burning of mouth/flushing/headache/dizziness
- ★ ± G.I.Symptoms
- ★ ± Urticaria, bronchospasm
- ★ Incubation period 5 min. to 1 hr.
- ★ Duration few hours





Management of Chemical food Poisoning

- ★ High index of suspicion
- ★ Diagnosis of specific food poisoning –
poison/agent/source
- ★ Reporting to CENO(CHP) & FEHD
- ★ Save sample (residue food/vomitus/stool) for Ix.
- ★ Epidemiological assessment





Management of Chemical Food Poisoning



- ★ Supportive treatment for most illness
 - fluid replacement for dehydration
 - symptomatic treatment for G.I. symptoms
 - beware in children, fatality cases
- ★ monitor respiratory function (PFR) in paralytic type - may need ventilatory support





Management of Chemical Food Poisoning



- ★ Paralytic shellfish, ciguatera, puffer fish, botulism
 - Consider activated charcoal /gastric lavage if present early (1-2 hours)
- ★ Anti-toxin for botulism
- ★ Antihistamine for scombroid
- ★ Ciguatera: consider mannitol





Thank you

