SHIPPING RECOMMENDATIONS FOR SELECT AGENT TOXINS

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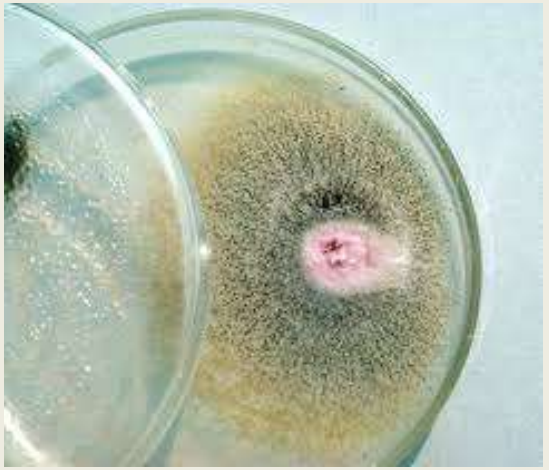
How do I ship my select agent toxin?

Division 6.1, but which packing group?

Select Agent Toxins

Toxin	Amounts
Abrin	100mg
Botulinum neurotoxins	0.5mg
α-Conotoxins (short, paralytic)	100mg
Diacetoxyscirpenol (DAS)	1000mg
Ricin	100mg
Saxitoxin	100mg
Staphylococcal Enterotoxins (Subtypes A,B, C, D and E)	5mg
T-2 toxin	1000mg
Tetrodotoxin	100mg



Division 6.1 Packing Groups UN 3462

Packing Group I

- Forbidden on passenger aircraft
- FedEx does not accept
- Are not permitted under the Limited Quantities provision

Packing Group II

- Allowed on passenger aircraft
- FedEx does not accept

Packing Group III

- Accepted by FedEx
- Must have PGIII label

Packing Group Determination

Assignment of packing group for Division 6.1 solid materials. Adapted from 49 CFR 173.133 and 173.132			
Packing group	Oral toxicity LD_{50}(mg/kg) As determined in young adult albino rats	Dermal toxicity LD_{50} (mg/kg) As determined in albino rabbits	Inhalation toxicity by dusts and mists LC_{50}(mg/L) As determined in young adult albino rats
I	≤5.0	≤50	≤0.2
II	>5.0 and ≤50	>50 and ≤200	>0.2 and ≤2.0
III	>50 and ≤300	>200 and ≤1000	>2.0 and ≤4.0

IATA

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

What packing group for the Select Agent Toxins?

Information that Disagrees

Abrin *(NIOSH)*

Hazardous Materials Warning Labels/Placards

- **Shipping Name:**
  Toxins, extracted from living sources, solid, n.o.s.
- **Identification Number:**
  3462 (Guide 153)
- **Hazardous Class or Division:**
  6.1
- **Subsidiary Hazardous Class or Division:**
- **Label:**
  Poison (Toxic)
  PG III
- **Placard Image:**

Ricin *(NIOSH)*

Hazardous Materials Warning Labels/Placards

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- **Hazardous Class or Division:**
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- **Label:**
  Poison (Toxic)
  PG III
- **Placard Image:**

Information that Disagrees

SEB

14. **TRANSPORT INFORMATION**

IATA
Product #122
UN number: UN3462 Class: 6.1 Packing group: I
Proper shipping name: Staphylococcus aureus

Tetrodotxin

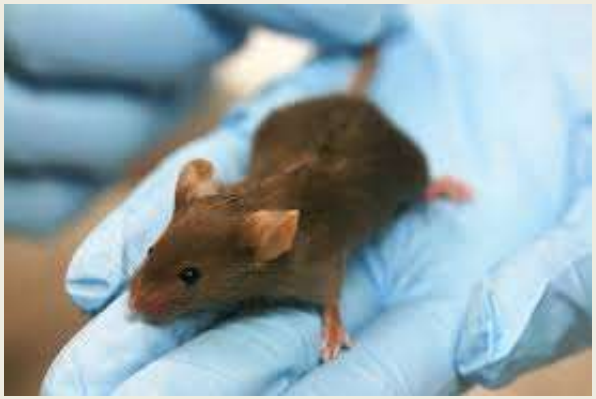
14.3 AIR TRANSPORT (ICAO/IATA):

ICAO/IATA Shipping Name:	Toxins, extracted from living sources, solid, n.o.s. (Tetrodotoxin Citrate)		
UN Number:	3462	**Packing Group:**	I
Hazard Class:	6.1 - POISON	**IATA Classification:**	6.1
Additional Transport Information:	Transport in accordance with local, state, and federal regulations. When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity.		

Why does this matter?

- Uniformity of shipping of regulated and hazardous material
- Decreased shipping costs for downgraded items
- Items shipped incorrectly pose a risk

Misalignment of published data with IATA guidelines



Determination using data

Ricin		
Published LD_{50} values	Route	Animal model
no dermal toxicity was observed at 50-µg	Dermal	Mouse
0.003 to 0.005 mg/kg	inhalation	Mouse
20 mg/kg	intragastric	Mouse
0.002 mg/kg	IP	Mouse
0.022 mg/kg	IP	Mouse
0.0027mg/kg	IV	Mouse
0.005 mg/kg	IV	Mouse
0.003 mg/kg	IV	Mouse
0.024 mg/kg	SQ	Mouse
0.00012mg/L over 50 minutes was 100% lethal	??	Rats

Determination using data

T-2		
Published LD_{50} values	Route	Animal model
3 mg/kg	IP	Mouse
1.2 mg/kg	IV	Mouse

When all else fails, pick up the phone and ask for help.

Compiled Data

Toxin	LD_{50} values (per kg)		
	IV or IP	**Ingestion**	**Inhalation**
Abrin	700 ng (mice)	0.1-1 ug (human)	
Botulinum neurotoxins	0.4-2.5 ng (mice)		0.01 ug (human)
Conotoxins	5.0 mg (mice), 1.45 mg (mice)		
Diacetoxyscirpenol		2140 ug (guinea pig)	11.3 mg (mouse)
Ricin	2.7 ug (mice)		0.24 ug (rat)
Saxitoxin		263 ug (mice), ~15 ug (human)	
Staphylococcal enterotoxins		~14 ug (human)	
T-2 toxin		5-10 mg (rodent)	35 ug (rodent)
Tetrodotoxin		~15 ug (human)	2 ug (human)

Proposed Guidance

Toxin	LD50 values (per kg)		Recommended Packing Group
	Ingestion	Inhalation	
Abrin	0.1-1 ug (human)		I
Botulinum neurotoxins		0.01 ug (human)	I
Conotoxins		Est 15-50mg (mice)	II
Diacetoxyscirpenol	2140 ug (guinea pig)	11.3 mg (mouse)	II
Ricin		0.24 ug (rat)	I
Saxitoxin	263 ug (mice)		I
Staphylococcal enterotoxins	~14 ug (human)		I
T-2 toxin	5-10 mg (rodent)	35 ug (rodent)	I
Tetrodotoxin	~15 ug (human)	2 ug (human)	I

IATA Guidelines		
PGI	<5.0 mg/kg	<0.2 mg/kg
PGII	5.0 to 50 mg/kg	0.2 to 2.0 mg/kg
PGIII	50 to 300 mg/kg	2 to 4 mg/kg
Animal Model	young adult albino rats	young adult albino rats

Where do we stand now?

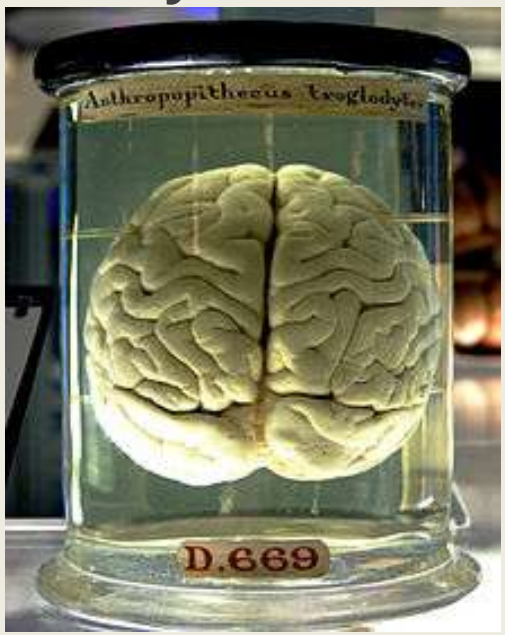
Toxin	Recommended Packing Group
Abrin	I
Botulinum neurotoxins	I
Conotoxins	II
Diacetoxyscirpenol	II
Ricin	I
Saxitoxin	I
Staphylococcal enterotoxins	I
T-2 toxin	I
Tetrodotoxin	I

Moving Forward

- Publication of the Guidelines with DOT and DSAT
- NIOSH recommendations

Wisdom gained

- Even though you think guidance or data should be there, its not always available
- Bureaucracy can be quick and easy
- Other times bureaucracy can be very slow



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