Temperature Sensitivity of Vaccines

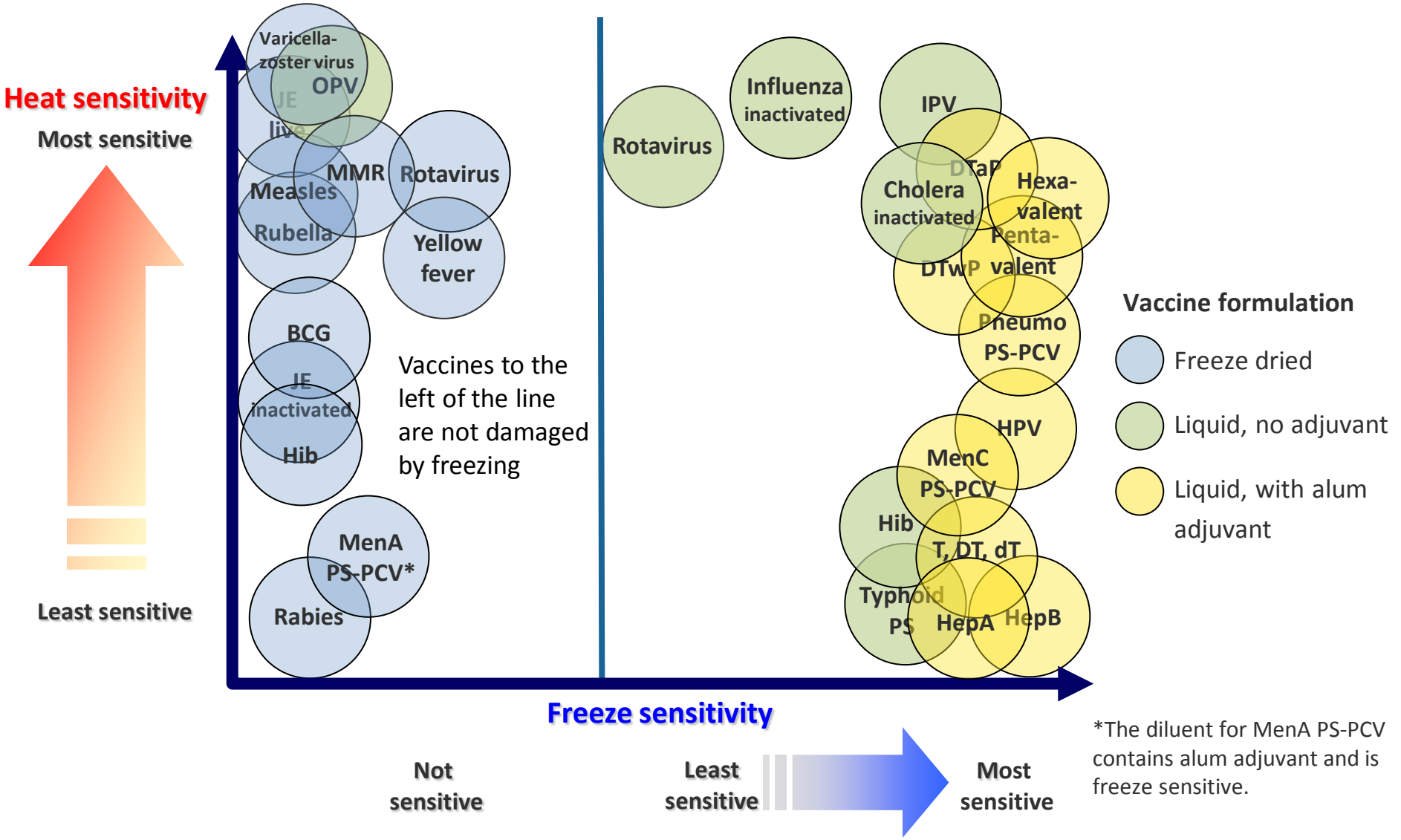
March 2014

World Health Organization

PATH
A catalyst for global health

PATH/Patrick McKern

Temperature sensitivity of vaccines



*The diluent for MenA PS-PCV contains alum adjuvant and is freeze sensitive.

Vaccine sensitivity to heat

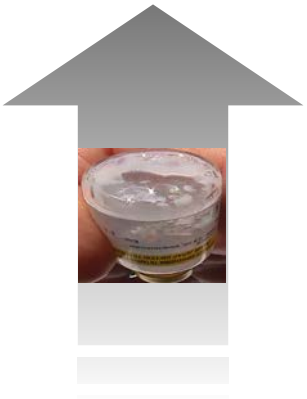
Heat sensitivity	Vaccine
Most sensitive	Oral poliovirus **Varicella-zoster virus**
	Influenza (inactivated, split)
	Inactivated poliovirus **Japanese encephalitis (live)** **Measles, mumps, rubella**
	Cholera (inactivated) DTaP DTwP DTaP-hepatitis B-Hib-IPV (hexavalent) DTwP-hepatitis B-Hib (pentavalent) Hib (liquid) **Measles** Rotavirus (liquid and **freeze dried**) **Rubella** **Yellow fever**
	Bacillus Calmette-Guérin Human papillomavirus **Japanese encephalitis (inactivated)** T, DT, dT
Least sensitive	Hepatitis A Hepatitis B **Hib (freeze dried)** **Meningitis A (polysaccharide-protein conjugate)** Meningitis C (polysaccharide-protein conjugate) Pneumococcal (polysaccharide-protein conjugate) **Rabies** Typhoid PS

✓ **Use vaccine vial monitors to monitor heat exposure.**

All freeze-dried vaccines become much more heat sensitive after they are reconstituted.

Note: Bolded vaccines are freeze dried.

Vaccine sensitivity to freezing

Freeze sensitivity	Vaccine
Most sensitive	DTaP DTaP-hepatitis B-Hib-IPV (hexavalent) DTwP DTwP-hepatitis B-Hib (pentavalent) Hepatitis A Hepatitis B Human papillomavirus Meningitis C (polysaccharide-protein conjugate) Pneumococcal (polysaccharide-protein conjugate) T, DT, dT
	Cholera (inactivated) Influenza (inactivated, split) Hib (liquid) Inactivated poliovirus Typhoid PS Rotavirus (liquid)*
Least sensitive	
These vaccines are not damaged by freezing.	**Meningitis A (polysaccharide-protein conjugate)†** **Yellow fever**
	Bacillus Calmette-Guérin **Hib (freeze dried)** **Japanese encephalitis (live and inactivated)** **Measles** **Measles, mumps, rubella** Oral poliovirus **Rabies** **Rotavirus** **Rubella** **Varicella-zoster virus**

Cautions:

- ✓ **Never expose these vaccines to zero or subzero temperatures.**
- ✓ **Avoid the use of ice for transport.**

* While the stability data for liquid rotavirus vaccines demonstrate some resistance to freezing, the temperature handling recommendations in the vaccine product insert should be followed.

† The diluent for MenA PS-PCV contains alum adjuvant and is freeze-sensitive.

Note: Bolded vaccines are freeze dried.

Abbreviations

BCG:	bacillus Calmette-Guérin
DTaP:	diphtheria, tetanus, acellular pertussis
DTwP	diphtheria, tetanus, whole-cell pertussis
HepA:	hepatitis A
HepB:	hepatitis B
Hexavalent	DTaP-hepatitis B-Hib-IPV
Hib:	*Haemophilus influenzae* type b
HPV:	human papillomavirus
Influenza:	influenza (inactivated, split vaccine)
IPV:	inactivated poliovirus vaccine
JE:	Japanese encephalitis
Men A:	meningitis A
Men C:	meningitis C
MMR:	measles, mumps, rubella
OPV:	oral polio vaccine
Pentavalent	DTwP-hepatitis B-Hib
Pneumo:	pneumococcal
PS:	polysaccharide
PS-PCV:	PS-protein conjugate vaccine
T, DT, dT:	tetanus, diphtheria tetanus, diphtheria (low-dose) tetanus

Information sources

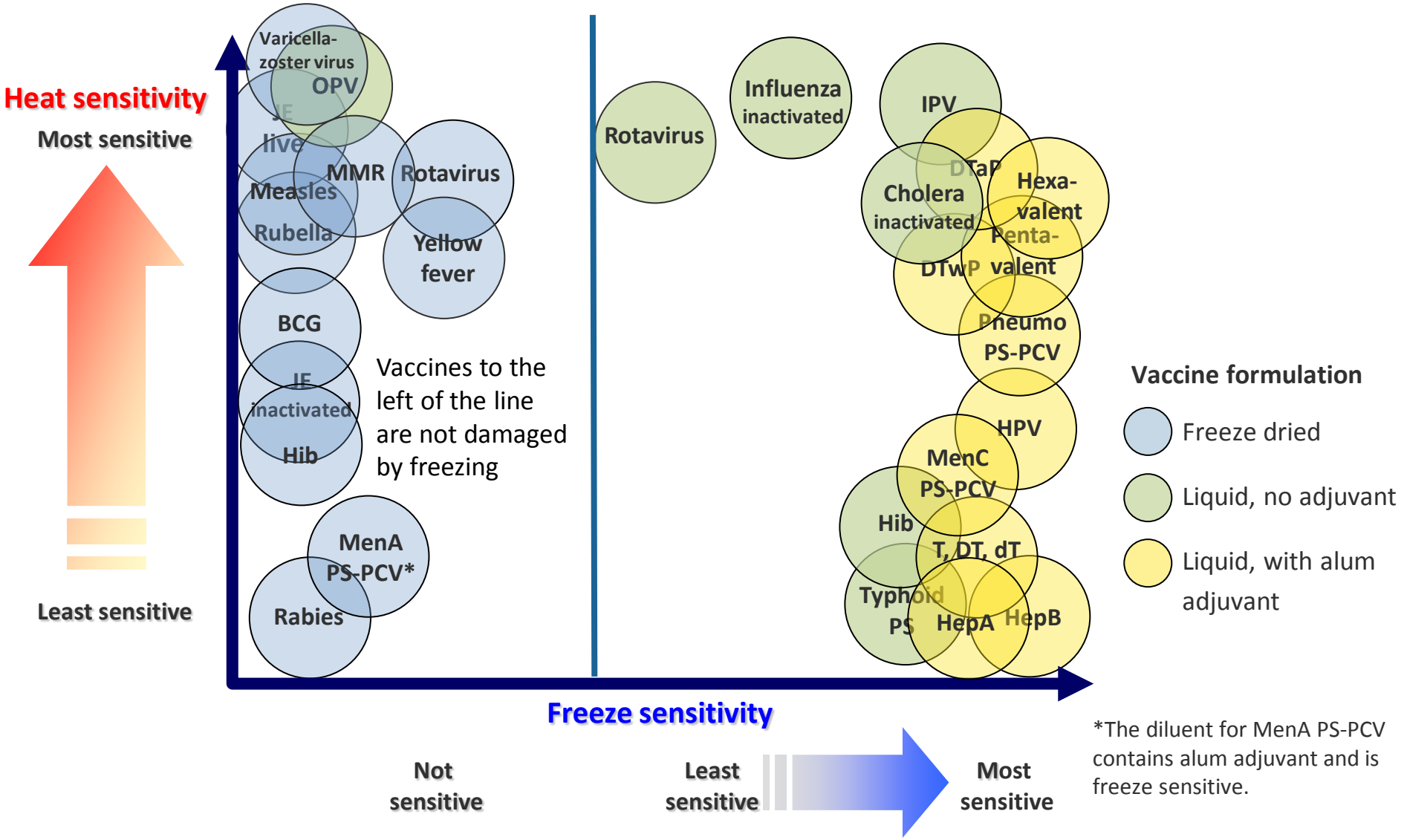
1. PATH, Working in Tandem. *Summary of Vaccine Stability Data*. Seattle: PATH; 2012. Available at: http://www.path.org/publications/detail.php?i=1696.
2. World Health Organization. *Temperature Sensitivity of Vaccines*. Geneva: WHO; 2006. Available at: http://www.path.org/vaccineresources/files/Temp_sensitivity_WHO.pdf.

Acknowledgments

These slides have been adapted from an original slide set produced by Julie Milstien and John Lloyd at the Technet 2006 consultation.

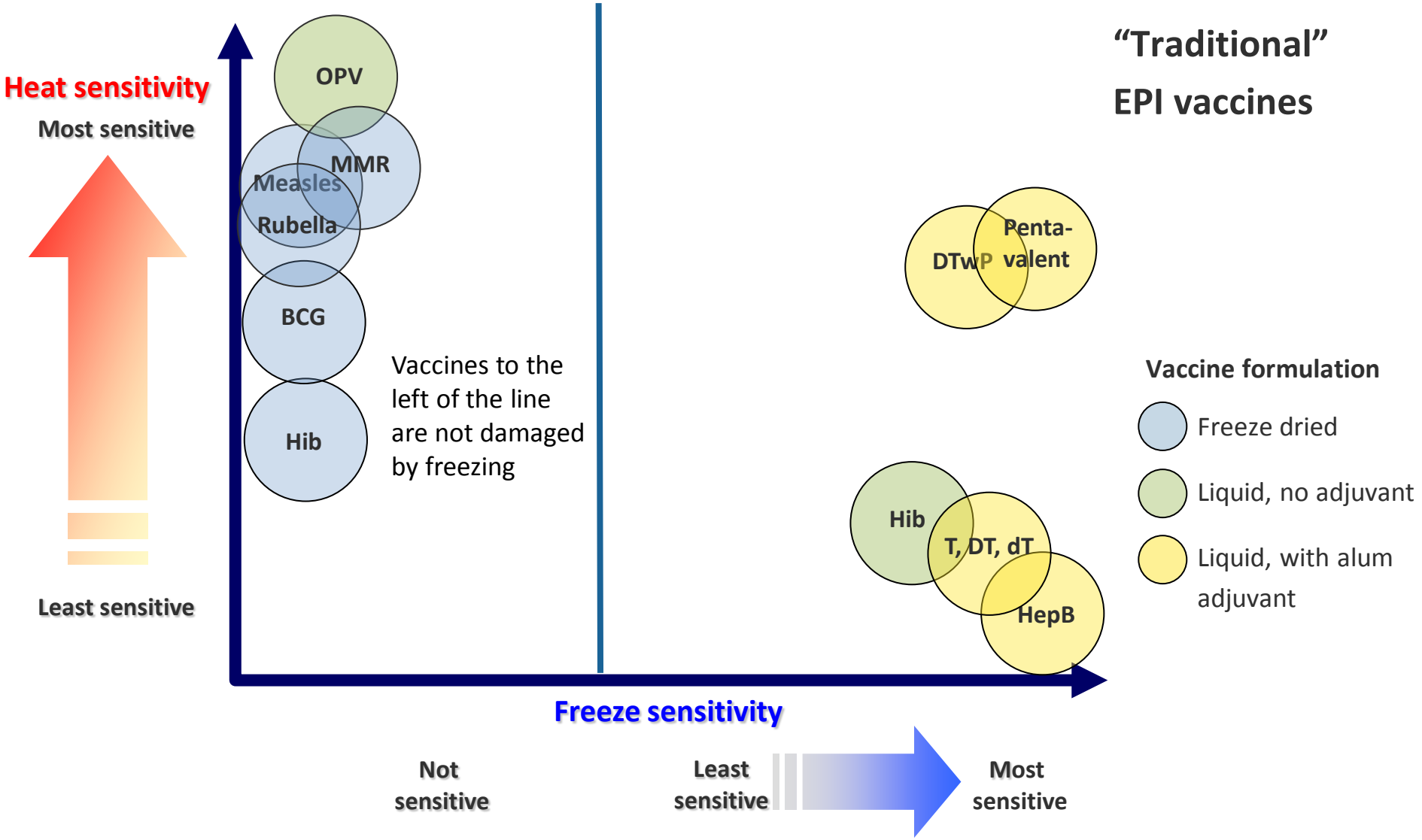
Extra slides for adaptation

Temperature sensitivity of vaccines

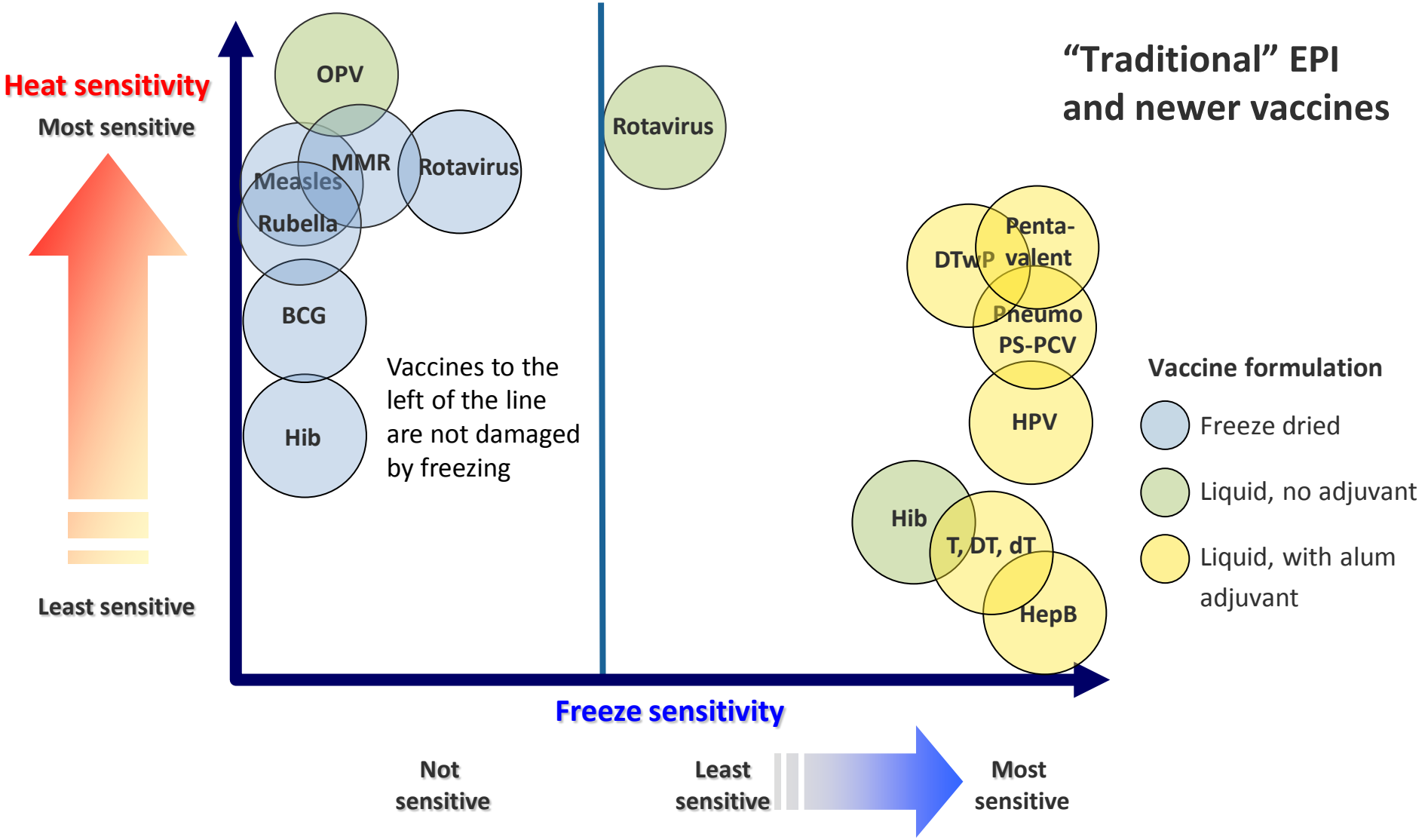


*The diluent for MenA PS-PCV contains alum adjuvant and is freeze sensitive.

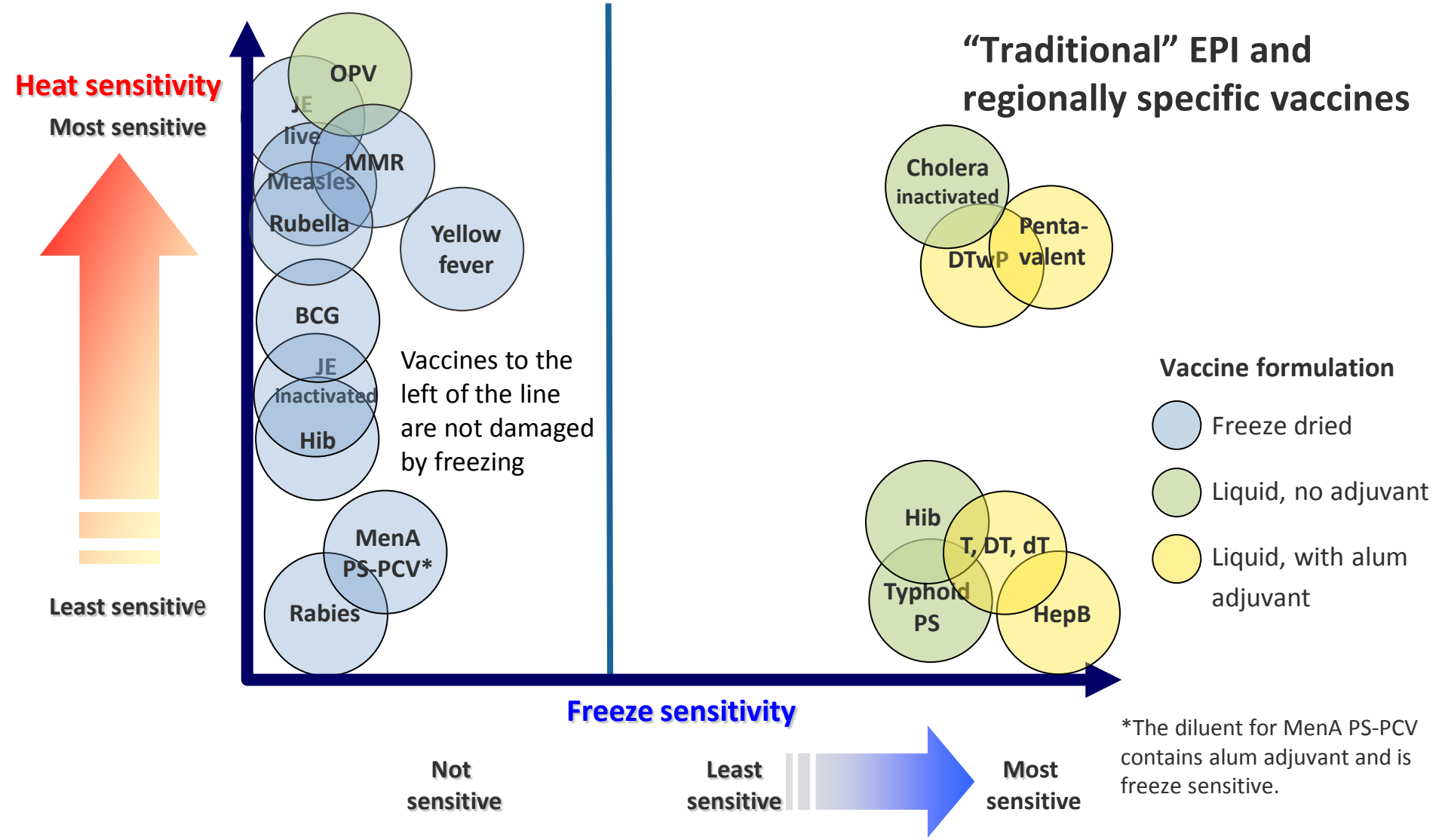
Temperature sensitivity of vaccines



Temperature sensitivity of vaccines

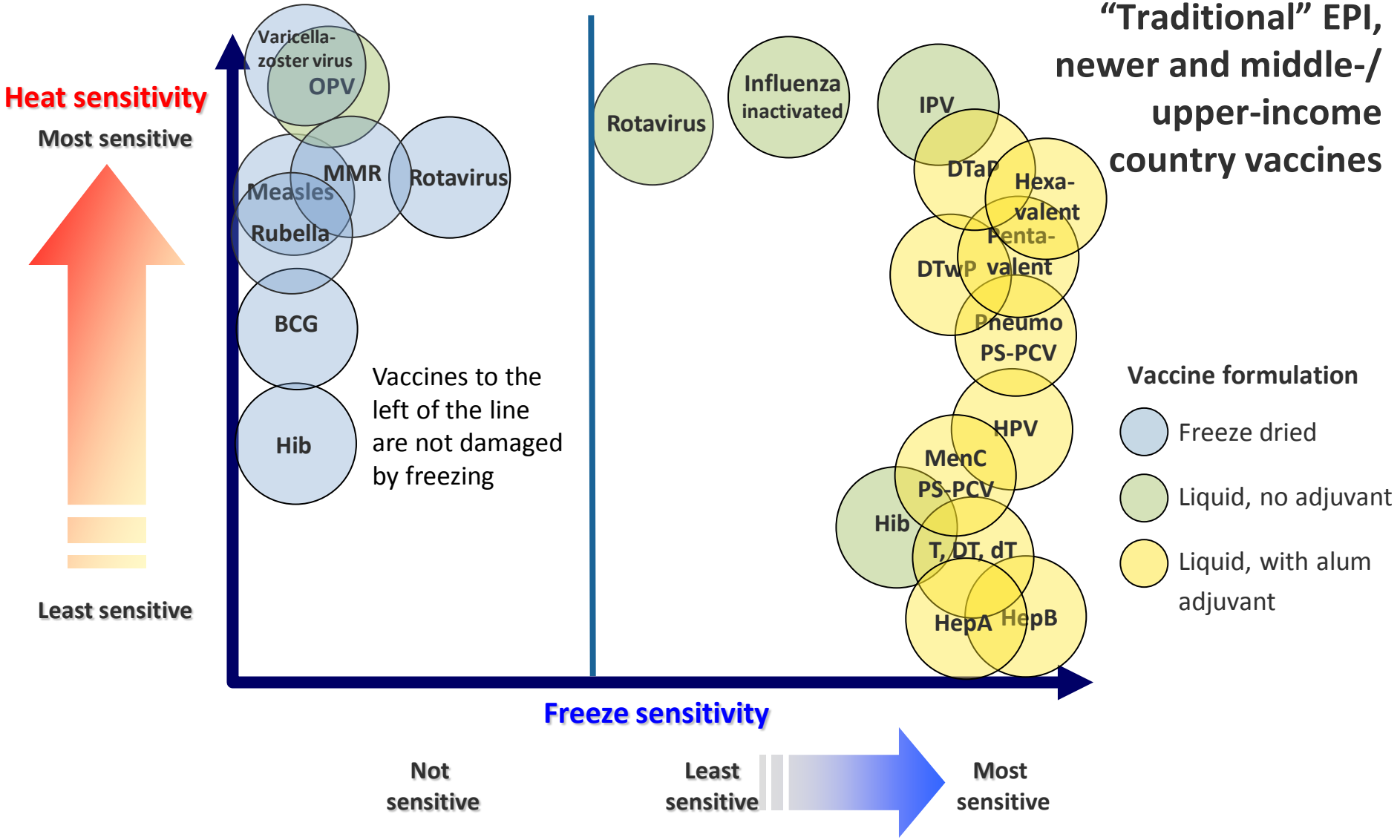


Temperature sensitivity of vaccines



*The diluent for MenA PS-PCV contains alum adjuvant and is freeze sensitive.

Temperature sensitivity of vaccines



Temperature sensitivity of vaccines