DNA Mixture Interpretation:

Principles and Practice in Component Deconvolution and Statistical Analysis

Numbers and Types of Casework Mixtures



AAFS 2008 Workshop #16 Washington, DC February 19, 2008



ann.gross@state.mn.us



Mixtures.....

- · How often are mixtures obtained
- · What types of mixtures are we seeing
 - Where should we focus our attention for training
 - What info can we give to the forensic community regarding mixtures
- What types of samples most often yield mixtures

Torres et al. 4 year Spanish study

- Four year study (1/1997 to 12/2000)
- 2412 samples typed
 - 955 samples from sexual assaults
 - 1408 samples from other offenses
 - 49 samples from human remains identifications
- 163/2412 samples (6.7% showed mixed profile)

Torres et al Spanish Case Summary Data

Biological Fluid

Sample type

N = 1	63	Blood	Semen	Saliva
Victims	N = 60	23%	73%	
Clothing/ bedding	N = 76	70%	30%	
Weapons	N = 15	100%		
Crime scene	N = 12	75%		25%

Spreadsheet Information Requested

http://www.cstl.nist.gov/biotech/strbase/mixture.htm

Labs requested to also provide info on kit, PCR volume used, etc.

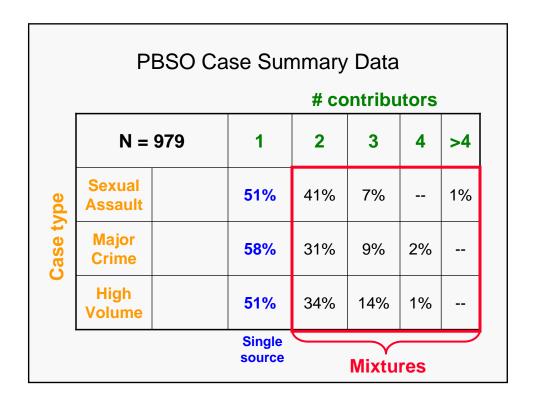
- Case#
- This information retained by lab and not returned...
- Item#
- Type of sample (biological material if ID'd)
- Type of substrate
- · Quantity amp'd
- Minimum # of contributors (1, 2, 3, 4, or >4)
- Predominant type (major profile) determined?
- Stats reported
- Comments

We would love to have your lab mixture numbers...
Email information to ann.gross@state.mn.us

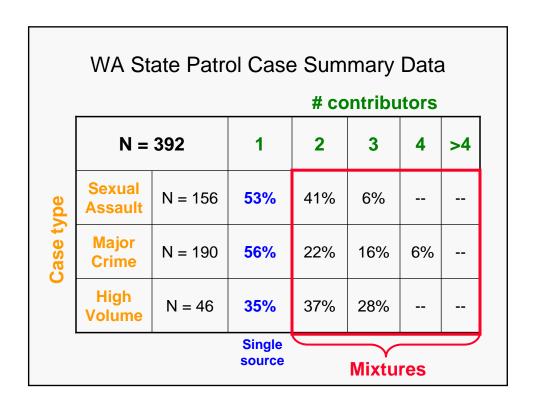
Labs submitting data

- Palm Beach Sheriff's Office Crime Lab, Florida
- Centre for Forensic Science. Toronto
- Connecticut State Police
- Washington State Police
- New Jersey State Police
- Georgia Bureau of Investigation
- Royal Canadian Mounted Police, Ottawa
- USACIL, Georgia
- Michigan State Police
- Kern County Crime Lab, California
- CAL DOJ
- Minnesota Bureau of Criminal Apprehension

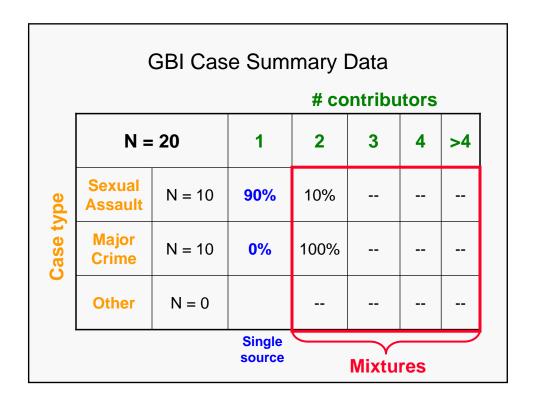
	CFS	Toronto	Case		nary D		
	N =	276	1	2	3	4	>4
be	Sexual Assault	N = 152	42%	52%	7%	1%	
Case type	Major Crime	N = 68	59%	34%	7%		
O	High Volume	N = 56	69%	16%	16%		
			Single source		Mixtu	res	



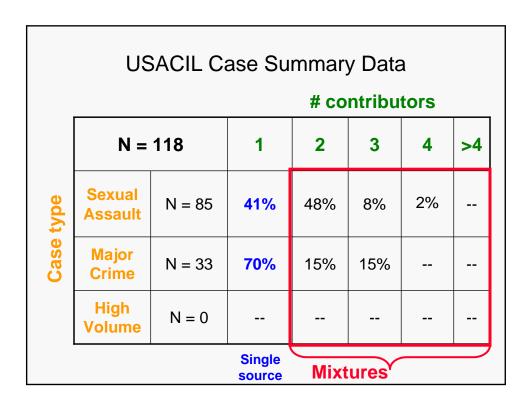
	CT Sta	ate Polic	e Case		mary ontribu		
	N =	71	1	2	3	4	>4
pe	Sexual Assault	N = 57	75%	21%	4%		
Case type	Major Crime	N = 13	69%	31%			
	Other	N = 1	100%	31%			
			Single source		Mixtu	res	



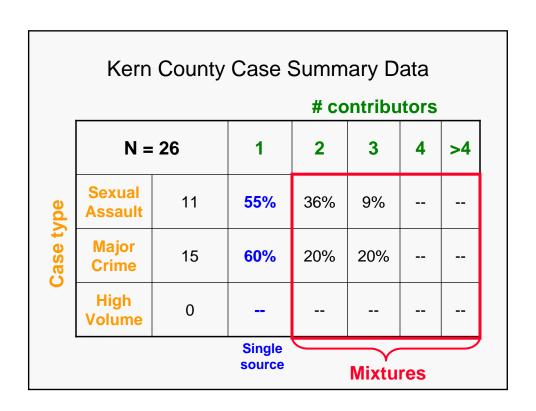
	NJ Sta	ate Polic	e Case		mary			
	N =	100	1	2	3	4	>4	
rpe	Sexual Assault	N = 15	47%	53%				
Case type	Major Crime	N = 23	96%	4%				
0	High Volume	N = 62	66%	27%				
			Single source		Mixtu	res		



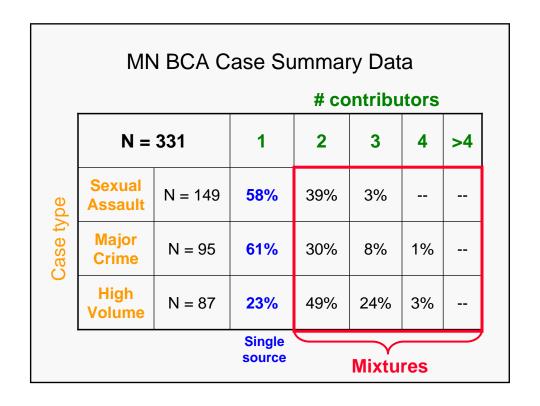
	R	CMP Ca	se Sur	nmary	/ Data		
				# co	ntribu	tors	
	N = 1554		1	2	3	4	> 4
be V	Sexual Assault	N = 651	53%	37%	10%		
Case type	Major Crime	N = 895	71%	22%	6%	1%	
)	High Volume*	N = 8	100%				
,			Single source		Mixtu	res	

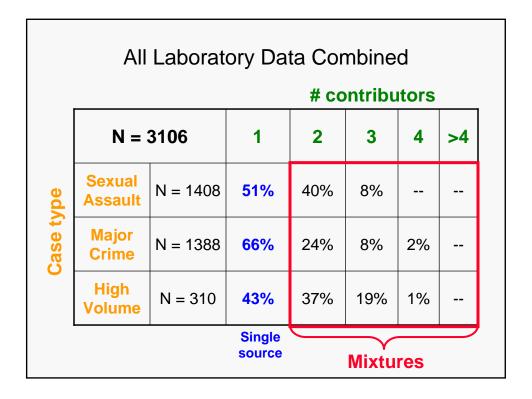


	N	ISP Cas	se Sum	mary	Data			
,	# contributors							
	N = 220		1	2	3	4	>4	
ре	Sexual Assault	86	10%	73%	15%	1%		
Case type	Major Crime	48	25%	52%	23%			
)	High Volume	86	38%	37%	24%			
	Single source Mixtures							



	CA	L DOJ C	Case Su	umma	ry Da	ta			
	# contributors								
	N = 274		1	2	3	4	>4		
/be	Sexual Assault	188	59%	33%	7%	1%			
Case type	Major Crime	66	53%	32%	9%	6%			
O	High Volume	20	75%	25%					
			Single source		Mixtu	res			

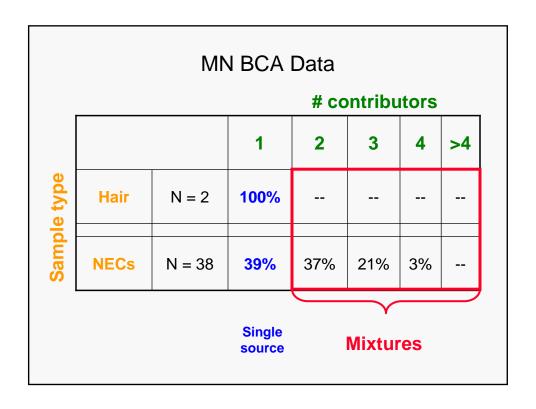


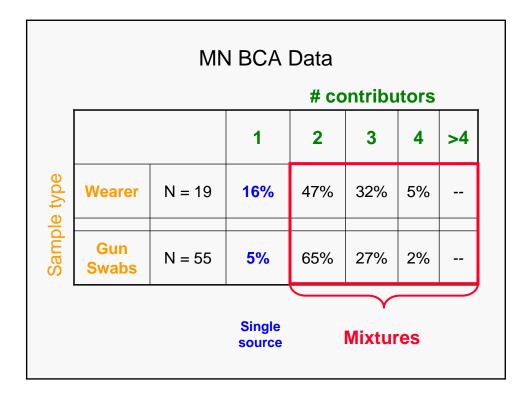


Overall Summary – 3106 samples

- 57% of samples from all types of cases are single source
- 43% of samples from all types of cases are mixtures
 - 33% of mixtures of at least two contributors
 - 9% of mixtures of at least three contributors
 - 1% of mixtures of at least four contributors

		MN	I BCA	Data				
	# contributors							
			1	2	3	4	>4	
e type	Blood	N = 77	79%	18%	3%			
Sample type	Saliva	N = 16	75%	19%		3%		
3)	Semen	N = 120	54%	43%	3%			
			Single source		Mixtu	res		





Conclusion/Further analysis

- Focus training on 2-person mixtures
- Look at all the data based on sample type and quantity of DNA amplified
- Publish the results of the survey

Thanks to the labs who took the time to fill out the spreadsheet!!

- Palm Beach Sheriff's Office Crime Lab, Florida
- Centre for Forensic Science, Toronto
- Connecticut State Police
- Washington State Police
- New Jersey State Police
- Georgia Bureau of Investigation
- Royal Canadian Mounted Police, Ottawa
- USACIL, Georgia
- Michigan State Police
- Kern County Crime Lab, California
- CAL DOJ
- Minnesota Bureau of Criminal Apprehension

