
Survey of New Terms in Version 2 Nomenclatures

Rupert Kellner



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Terminology of developmental abnormalities in common laboratory mammals (version 2)^{☆,☆☆}

Susan L. Makris^{a,*}, Howard M. Solomon^{b,1,4}, Ruth Clark^{c,2,4}, Kohei Shiota^{d,3,4},
Stephane Barbellion^{e,2}, Jochen Buschmann^{f,2}, Makoto Ema^{g,3}, Michio Fujiwara^{h,3},
Konstanze Grote^{i,2}, Keith P. Hazelden^{j,1}, Kok Wah Hew^{k,1}, Masao Horimoto^{l,3},
Yojiro Ooshima^{m,3}, Meg Parkinson^{n,2}, L. David Wise^{o,1}

^a U.S. Environmental Protection Agency, Washington, DC, USA

^b GlaxoSmithKline, King of Prussia, PA, USA

^c Ruth Clark Associates, Ltd., North Lincolnshire, United Kingdom

^d Kyoto University, Kyoto, Japan

^e Sanofi Aventis R&D, Vitry sur Seine Cedex, France

^f Fraunhofer Institute of Toxicology and Experimental Medicine, Hannover, Germany

^g National Institute of Health Sciences, Tokyo, Japan

^h Astellas Pharma Inc., Osaka, Japan

ⁱ Charité University Medical School, Berlin, Germany

^j Medimmune Ltd., Cambridge, United Kingdom

^k Takeda Global Research & Development, Inc., Lake Forest, IL, USA

^l Chiba Institute of Science, Chiba, Japan

^m Sin Nippon Biomedical Laboratories, Ltd., Kagoshima, Japan

ⁿ GlaxoSmithKline Services, Hertfordshire, United Kingdom

^o Merck Research Laboratories, West Point, PA, USA

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ABSTRACT

This update (version 2) of the *Terminology of developmental abnormalities in common laboratory mammals (version 1)* by Wise et al. [Wise LD, Beck SL, Beltrame D, Beyer BK, Chahoud I, Clark RL, Clark R, Druga AM, Fueston MH, Guittin P, Henwood SM, Kimmel CA, Lindstrom P, Palmer AK, Petrere JA, Solomon HM, Yasuda M, York RG. *Terminology of developmental abnormalities in common laboratory mammals (version 1)*. *Teratology* 1997;55:249–92] incorporates improvements and enhancements to both content and organization of the terminology, to enable greater flexibility in its application, while maintaining a

Implementation in *DevTox*

Summary of the changes necessary in the *DevTox* Nomenclature

Diagnoses	External	Skeletal	Soft Tissue	Maternal-Fetal
Number old	151	467	277	(2)
- deleted	38	11	17	
- renamed	113	456	260	2
- added	54	567	273	17
Number new	167	1023	533	19

www.devtox.org

Example from *DevTox*

Skeletal Findings: Mandible

Mandible	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Absent	malformation	malformation	malformation	malformation	malformation	malformation	malformation	malformation	malformation
Bent	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Fused	malformation	malformation	malformation	malformation	malformation	malformation	malformation	malformation	malformation
Hole	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Incomplete ossification	variation	variation	variation	variation	variation	variation	variation	variation	variation
Increased ossification	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Isolated ossification site	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Large	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Long	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Malpositioned	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Misaligned	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Misshapen	present	present	present	present	present	present	present	present	present
Short	image(s) available	not classified	not classified	image(s) available	not classified	not classified	not classified	image(s) available	not classified
Single incisor socket	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Small	image(s) available	image(s) available	present	present	present	present	present	present	present
Splayed	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Supernumerary	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Supernumerary site	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Thick	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Thin	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified
Unossified	present	present	present	present	present	present	present	present	present
Unossified area	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified	not classified

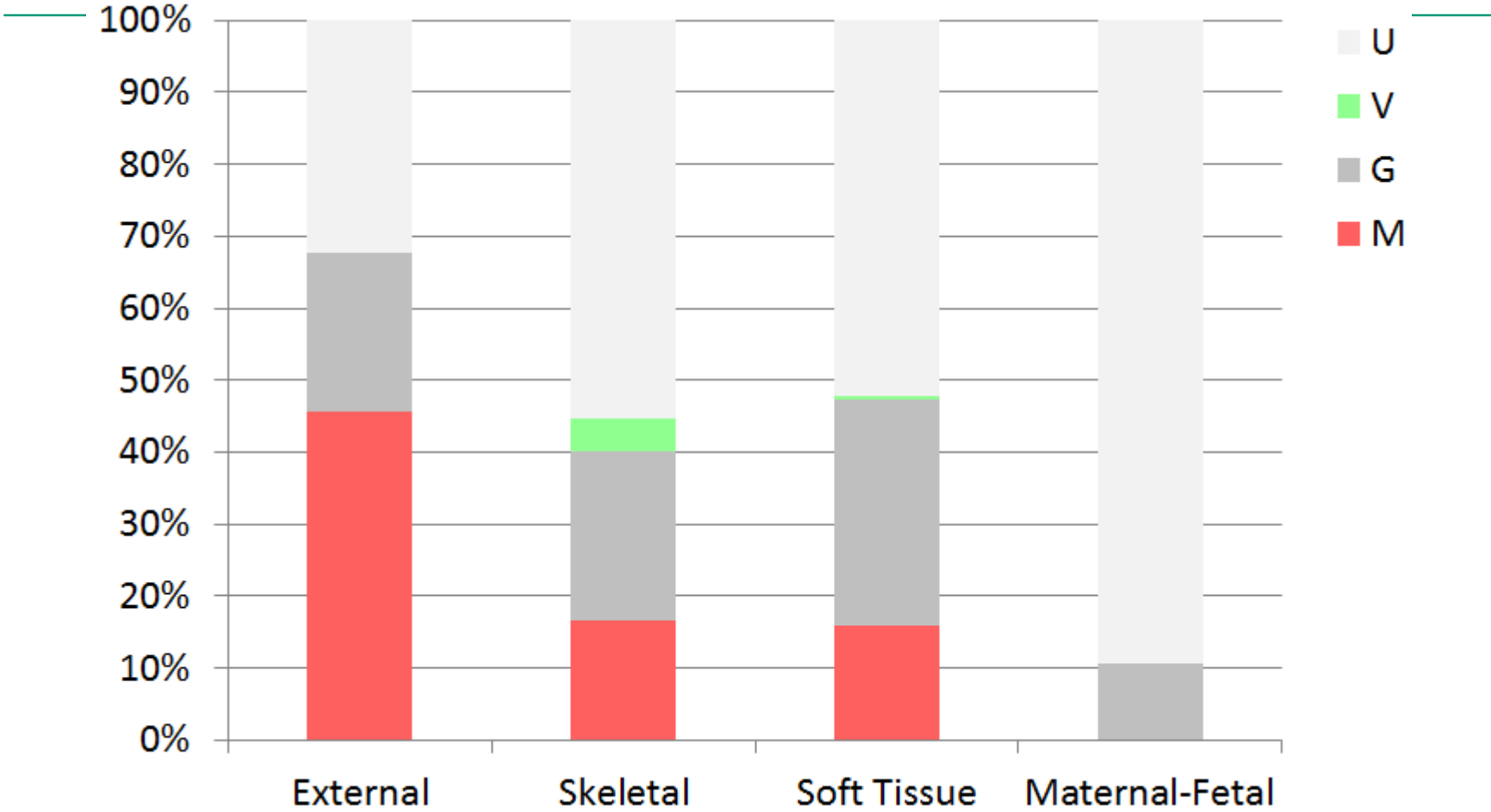
- Symbols:**
- ① : Rat (Ra)
 - ② : Mouse (Mo)
 - ③ : Rabbit (Rb)
 - ④ : Hamster (Ha)
 - ⑤ : Primate (Pr)
 - ⑥ : Guinea Pig (Gp)
 - ⑦ : Minipig (Mp)
 - ⑧ : Dog (Do)
 - ⑨ : Bird (Bi)
 - : absent in species
 - malformation
 - present
 - variation
 - not classified
 - ✓ : image(s) available
 - P : post-natal image(s) available

Implementation in *DevTox*

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Number new	167	1023	533	19

Current classification in *DevTox*



Survey

- Compilation of all terms with open classification
 - External: 54 added terms
 - Skeletal: 567 added + 16 inconsistent terms (Calcaneus, Talus)
 - Soft Tissue: 273 added + 7 inconsistent terms (Gallbladder)
 - Maternal-Fetal: 17 added terms

Calcaneus	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Absent	-	-	■	-					
Bent									
Fused	-	-	■	-					
Incomplete ossification	-	-	■	-					
Increased ossification									
Isolated ossification site									
Large									
Malpositioned	-	-	■	-					
Misshapen	-	-	■	-					
Small	-	-	■	-					
Supernumerary	-	-	■	-					
Supernumerary site									
Unossified	-	-	■	-					

Symbols:

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A1		fx		Code			
A	B	C	D	E	F	G	
1	Code	Diagnosis	Classification	Reason for uncertainty	Should be discussed during workshop		
2			M V U G	G S P			
3	1.1244.5088	Anus - Large				M	Malformation
4	1.1049.5340	Digit - Few				V	Variation
5	1.1049.5341	Digit - Pendulous				U	Unknown
6	1.1049.5211	Digit - Small				G	Grey zone
7	1.1224.5075	Fetus or pup / neonate - Discolored					
8	1.1224.5088	Fetus or pup / neonate - Large					
9	1.1224.5189	Fetus or pup / neonate - Pale				G	Grade, severity
10	1.1224.5211	Fetus or pup / neonate - Small				S	Size
11	1.1246.5088	Genital tubercle - Large				P	Persistence
12	1.1246.5172	Genital tubercle - Misshapen					
13	1.1046.5172	Head - Misshapen					
14	1.1075.5331	Head / Neck - External aural fistula					
15	1.1075.5332	Head / Neck - Meningohydro-encephalocele					
16	1.1075.5333	Head / Neck - Narrow head					
17	1.1229.5053	Jaw, lower (Mandible) - Cleft					
18	1.1247.5347	Large intestine - Prolapsed					
19	1.1050.5109	Limb (fore- or hind-) - Fused					
20	1.1050.5112	Limb (fore- or hind-) - Hemimelia					
21	1.1073.5172	Mouth - Misshapen					
22	1.1076.5109	Naris - Fused					
23	1.1233.5002	Palatal rugae - Absent					
24	1.1233.5135	Palatal rugae - Interrupted					
25	1.1233.5231	Palatal rugae - Supernumerary					
26	1.1232.5119	Palate - High arched					
27	1.1234.5002	Papillae - Absent					
28	1.1234.5109	Papillae - Fused					
29	1.1234.5147	Papillae - Malpositioned					
30	1.1248.5183	Pelvic region - Narrow					
31	1.1225.5075	Skin - Discolored					
32	1.1225.5328	Skin - Lesion					
33	1.1225.5329	Skin - Tag					
34	1.1235.5002	Snout - Absent					
35	1.1235.5088	Snout - Large					
36	1.1235.5147	Snout - Malpositioned					
37	1.1235.5172	Snout - Misshapen					
38	1.1104.5075	Tail - Discolored					
39	1.1104.5086	Tail - Long					
40	1.1104.5172	Tail - Misshapen					
41	1.1236.5336	Tongue - Altered surface texture					

Adjustment of questionnaires

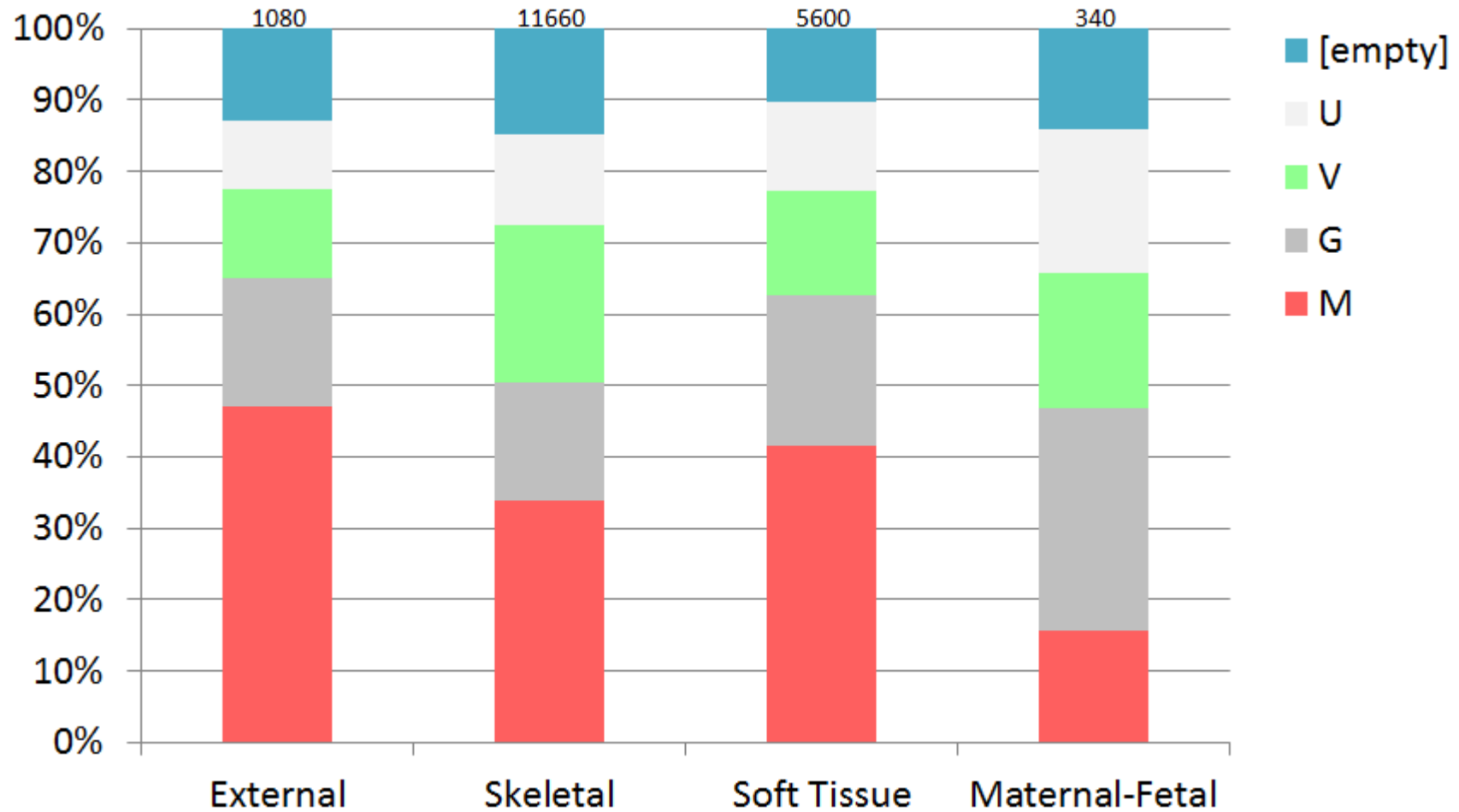
Classifications:

- M = Malformation
- V = Variation
- G = Grey zone
- U = Unknown

Adjustments:

- N (obvious typo) → M
- M or V ? → G
- M, V → G
- ? → U
- N/A → U
- Other texts → U

Individual counts on questionnaires



Evaluation of results

- According to fourth Berlin Workshop (Solecki 2003)

As in the previous survey, the options for classification were 'M' (Malformation), 'V' (Variation), 'U' (Undetermined, i.e. cannot decide between malformation or variation) and 'N' (Not known/not used in the laboratory). Likewise, the formula used to give an index of agreement (IA) was the same as that used for the previous survey:

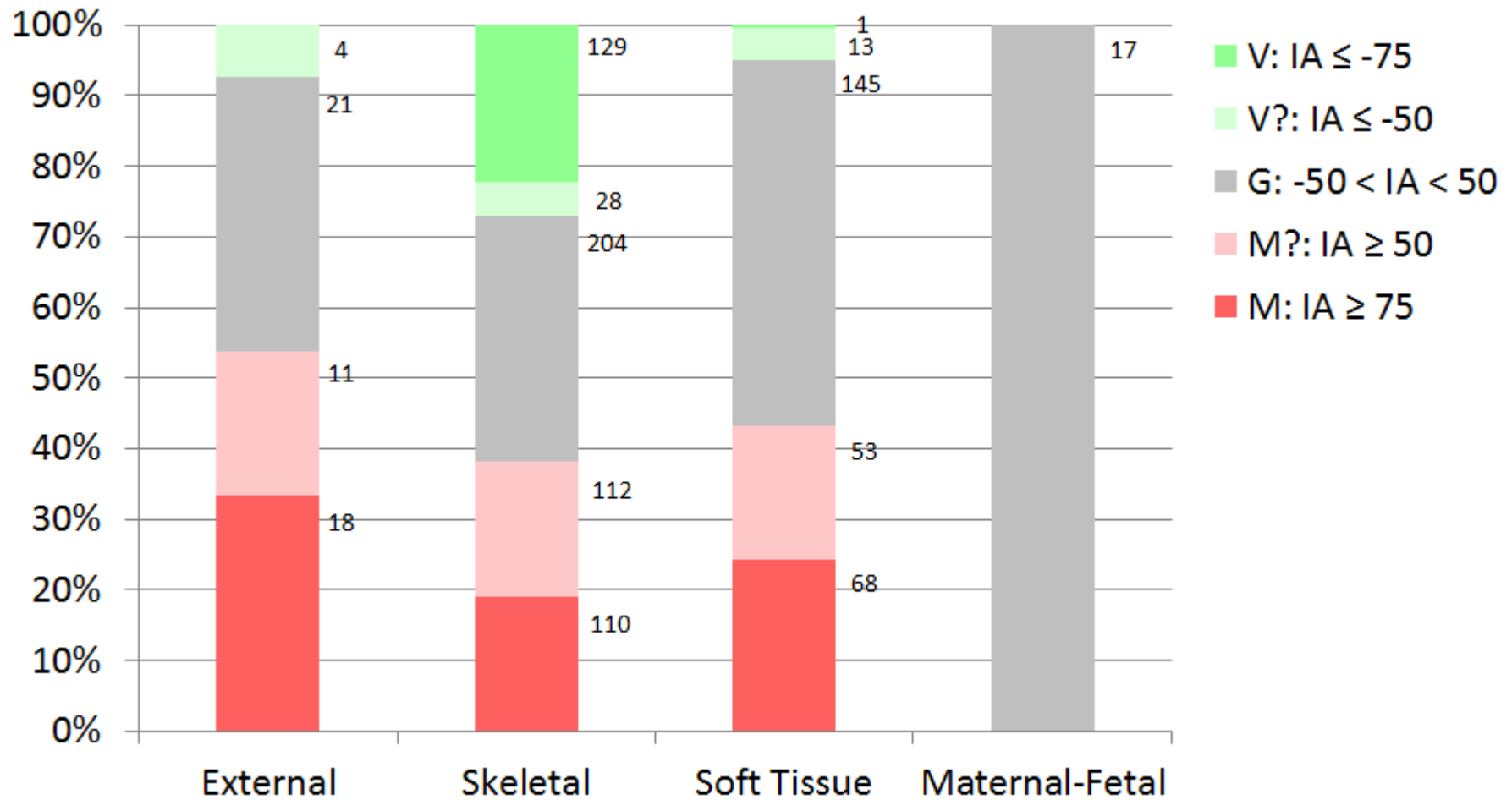
$$IA = \left(\frac{M - V}{M + V + U} \right) \times 100$$

The maximum scores for agreement were +100% for malformations and -100% for variations. The minimum score for agreement (i.e. the maximum score for disagreement) was 0. Good agreement was indicated when IA was $\geq 75\%$. Poor agreement was indicated when IA was $\leq 25\%$.

Current identifiers:

- M → M
- V → V
- G → U
- U not considered

Result of the survey



Overlap of survey with existing classification

Skeletal Findings: Calcaneus

DevTox

Survey

Symbols:

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- ⑧: Dog (Do)
- ⑨: Bird (Bi)
- : absent in species
- (red) : malformation
- (grey) : present
- (green) : variation
- (white) : not classified
- ✓ : image(s) available
- P : post-natal image(s) available

Calcaneus	①	②	③	④	⑤	⑥	⑦	⑧	⑨	IA
Absent	-	-	■ (red)	-						88.89
Bent										73.33
Fused	-	-	■ (red)	-						100.00
Incomplete ossification	-	-	■ (green)	-						-94.12
Increased ossification										-90.91
Isolated ossification site										-68.75
Large										12.50
Malpositioned	-	-	■ (red)	-						66.67
Misshapen	-	-	■ (red)	-						66.67
Small	-	-	■ (grey)	-						11.76
Supernumerary	-	-	■ (grey)	-						100.00
Supernumerary site										46.67
Unossified	-	-	■ (grey)	-						-82.35

Overlap of survey with existing classification

Skeletal Findings: Talus

DevTox

Survey

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- ⑤: Primate (Pr)
- ⑥: Guinea Pig (Gp)
- ⑦: Minipig (Mp)
- ⑧: Dog (Do)
- ⑨: Bird (Bi)
- : absent in species
- (red) : malformation
- (grey) : present
- (green) : variation
- (white) : not classified
- ✓ : image(s) available
- P : post-natal image(s) available

Talus	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Absent	-	-	■ (red)	-					
Bent									
Fused	-	-	■ (red)	-					
Incomplete ossification	-	-	■ (green)	-					
Increased ossification									
Isolated ossification site									
Large	-	-	■ (grey)	-					
Malpositioned	-	-	■ (red)	-					
Misshapen	-	-	■ (red)	-					
Small	-	-	■ (grey)	-					
Supernumerary									
Supernumerary site									
Unossified	-	-	■ (grey)	-					

	IA
Talus - Absent	100.00
Talus - Bent	62.50
Talus - Fused	100.00
Talus - Incomplete ossification	-93.75
Talus - Increased ossification	-90.91
Talus - Isolated ossification site	-78.57
Talus - Large	12.50
Talus - Malpositioned	76.47
Talus - Misshapen	64.71
Talus - Small	18.75
Talus - Supernumerary	100.00
Talus - Supernumerary site	64.29
Talus - Unossified	-100.00

Overlap of survey with existing classification

Soft Tissue Findings: Gallbladder

DevTox

Survey

Gallbladder	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Absent	-		✓						
Bilobed	-								
Diverticulum									
Large	-		✓						
Malpositioned	-								
Misshapen	-		✓						
Small	-								
Supernumerary	-		✓						

	IA
Gallbladder - Absent	55.56
Gallbladder - Bilobed	0.00
Gallbladder - Diverticulum	14.29
Gallbladder - Large	-38.89
Gallbladder - Malpositioned	22.22
Gallbladder - Misshapen	55.56
Gallbladder - Small	-33.33
Gallbladder - Supernumerary	55.56

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- : absent in species
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