

Acid Base Case Problems

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5 yr QH Mare

- Presenting problem
 - Anorexia
 - Not responsive to omeprazole
- Physical Exam
 - Mild fever
 - Lethargic, anorexic
 - Gut sounds decreased
- Gastric distension – not resolve with fasting
- Periods excitement and compulsive walking

5 yr QH Mare

Cr	168 umol/L
BUN	10.57 mmol/L
Na	131.7 mmol/L; 132 mmol/L
K	3.16 mmol/L; 2.4 mmol/L
Cl	115.2 mmol/L; 109 mmol/L
HCO ₃	10.3 mmol/L
Ca ⁺⁺	1.883 mmol/L
Mg ⁺⁺	?? mmol/L
Lac	<1 mmol/L
PO ₄	0.95 mmol/L
Alb	33.4 g/L
Glob	31.0 g/L

pH	7.077
Pco2	34.9
HCO ₃	10.3 mmol/L

UNa	12 mmol/L
UCl	23 mmol/L
UK	16 mmol/L
FxNa	0.07 (0-0.7)
FxCl	0.11 (0.7-2.1)
FxK	7 (15-200)
$(UNa + UK) - UCl = 28$	

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Case 1

- 30 hr old Friesian filly
- Septic Shock – *E. coli* bacteremia
- Other problems:
 - Mild pharyngeal collapse, Neonatal Encephalopathy, Neonatal Gastroenteropathy (reflux, dysmotility), hypothermia, premature ventricular contractions ...
- 12 day hospital stay

Case 1

Cr	398 $\mu\text{mol/L}$
BUN	10 mmol/L
HCO_3	10.3 mmol/L
Na	134.7 mmol/L
K	4.68 mmol/L
Cl	102 mmol/L
Ca^{++}	1.33 mmol/L
Mg^{++}	0.44 mmol/L
Lac	16.4 mmol/L
PO_4	2.38 mmol/L
Alb	23 g/L
Glob	20 g/L



Septic Shock		mEq/L
pH	7.195	
Pco ₂	26.4	
SBE	-15.9	
HCO ₃	10.3 mmol/L	10.3
Na	134.7 mmol/L	134.7
K	4.68 mmol/L	4.68
Cl	102 mmol/L	102
Ca ⁺⁺	1.33 mmol/L	2.66
Mg ⁺⁺	0.44 mmol/L	0.88
Lac	16.4 mmol/L	16.4
PO ₄	2.38 mmol/L	4.34
Alb	23 g/L	5.18
Glob	20 g/L	2.8

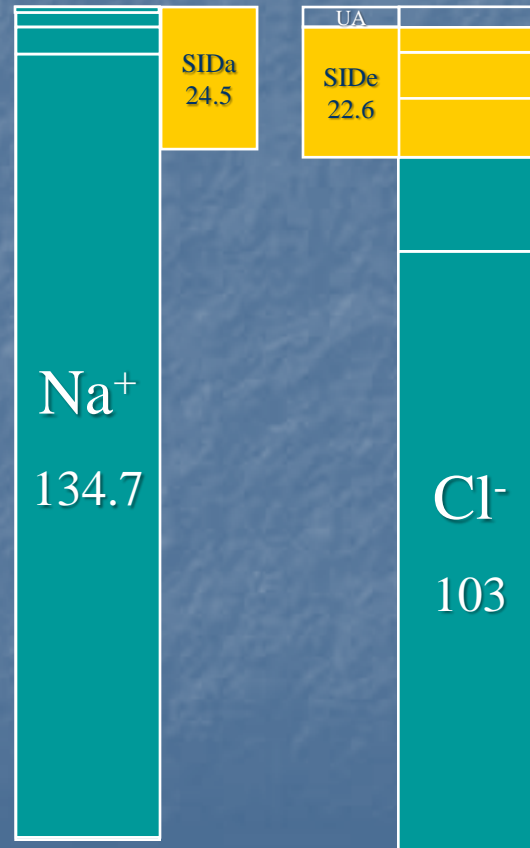
Case 1

Septic Shock

Mg⁺⁺ = 0.88

Ca⁺⁺ = 2.66

K⁺ = 4.68



PO₄⁻ = 4.34

Alb⁻ + Glob = 7.98

HCO₃⁻ = 10.3

Lac⁻ = 16.4

Case 2

- 3 hr old STD filly
- Born 2:30 pm – attended
 - Premature placental separation
 - Birth arrhythmia
- Problems
 - Fetal distress
 - Neonatal Encephalopathy, hypothermia (29.4C), early urination (4 hr), lactic acidosis, hypochloremic alkalosis

Case 2

Cr	2378 $\mu\text{mol/L}$
BUN	6.43 mmol/L
HCO_3	9.2 mmol/L
Na	142 mmol/L
K	4.13 mmol/L
Cl	88 mmol/L
Ca^{++}	1.37 mmol/L
Mg^{++}	1.02 mmol/L
Lac	?? mmol/L
PO_4	8.98 mmol/L
Alb	29.7 g/L
Glob	17.3 g/L



Case 2

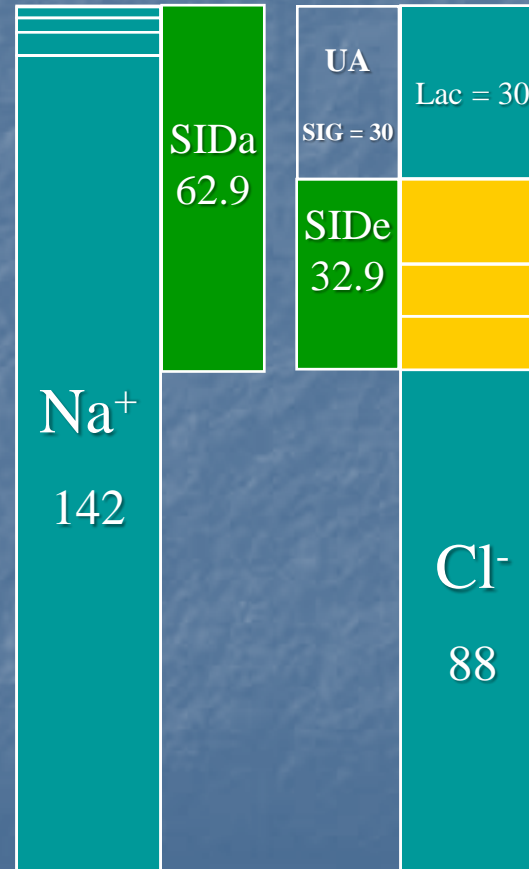
UA

		mEq/L
pH	6.791	
Pco ₂	59.6	
HCO ₃	9.2 mmol/L	9.2
SBE	-22.5 mEq/L	-22.5
Na	142 mmol/L	142
K	4.13 mmol/L	4.13
Cl	88 mmol/L	88
Ca ⁺⁺	1.37 mmol/L	2.74
Mg ⁺⁺	1.02 mmol/L	2.04
Lac	??	??
PO ₄	8.98 mmol/L	16.4
Alb	29.7 g/L	6.7
Glob	17.3 g/L	2.4

Mg⁺⁺ = 2.04

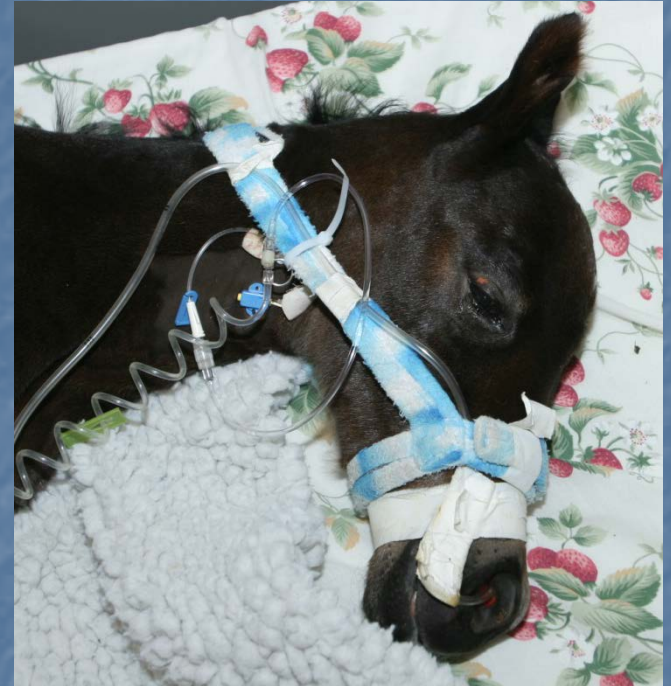
Ca⁺⁺ = 2.74

K⁺ = 4.13



Case 3

- 16 hr old STD filly
- History
 - Foaling unexpected
 - Born in a field
 - Never stood
 - Nursed from bottle
- Problems
 - FIRS/IUGR/prematurity (4 weeks)
 - NE
 - NG (distension, fetal diarrhea)
 - Sepsis, coagulopathy, hypoperfusion
 - Developed respiratory failure
 - $Paco_2 > 100$
 - Refused ventilation



Case 3

Cr	488.9 $\mu\text{mol/L}$
BUN	10 mmol/L
HCO ₃	46.1 mmol/L
Na	142 mmol/L
K	3.4 mmol/L
Cl	75 mmol/L
Ca ⁺⁺	1.17 mmol/L
Mg ⁺⁺	0.32 mmol/L
Lac	9.8 mmol/L
PO ₄	3.71 mmol/L
Alb	24.5 g/L
Glob	30.5 g/L



		mEq/L
pH	7.424	
Pco ₂	69.8	
HCO ₃	46.1 mmol/L	46.1
SBE	20.5	20.5
Na	142 mmol/L	142
K	3.4 mmol/L	3.4
Cl	75 mmol/L	75
Ca ⁺⁺	1.17 mmol/L	2.35
Mg ⁺⁺	0.32 mmol/L	0.65
Lac	9.8 mmol/L	9.8
PO ₄	3.71 mmolL	6.79
Alb	24.5 g/L	5.51
Glob	30.5 g/L	4.3

Case 3

Mg⁺⁺ = 0.68
 Ca⁺⁺ = 2.35
 K⁺ = 3.4



PO₄⁻ = 6.79
 Alb⁻ + Glob = 9.81
 HCO₃⁻ = 46.1
 Lac⁻ = 9.8

Case 4

- 4.5 hr STD filly
- History
 - Mare dripping fluids in field
 - Foaled uneventfully
 - Passed membranes 20 minutes
- Problems
 - Fetal distress – Cr 9.6, fetal diarrhea
 - NE (weakness), NN (slow Cr drop), NG (dsymotility)
- 24 day hospital stay

Case 4

Cr	831 $\mu\text{mol/L}$
BUN	8.6 mmol/L
HCO ₃	39.1 mmol/L
Na	137 mmol/L
K	2.73 mmol/L
Cl	102 mmol/L
Ca ⁺⁺	1.16 mmol/L
Mg ⁺⁺	0.42 mmol/L
Lac	1.3 mmol/L
PO ₄	2.18 mmol/L
Alb	18.2 g/L
Glob	24.8 g/L

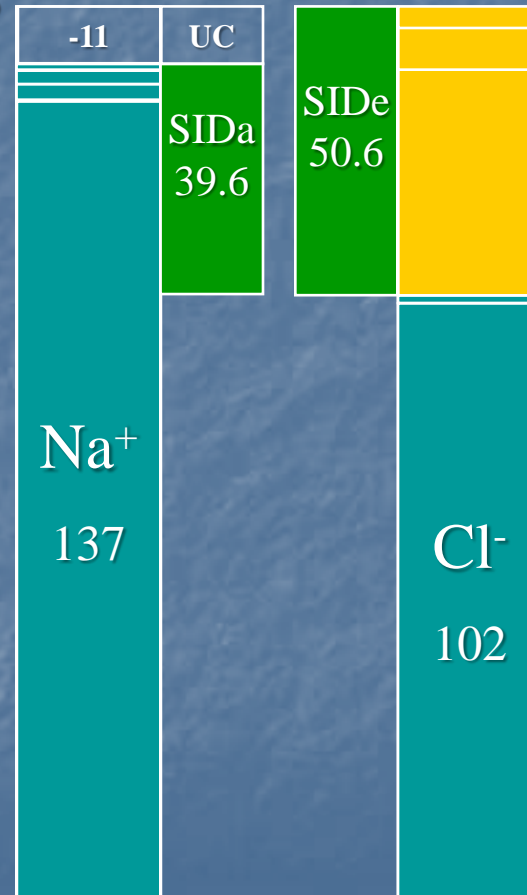


Case 4

UC

		mEq/L
pH	7.361	
Pco ₂	68.3	
HCO ₃	39.1 mmol/L	39.1
SBE	11.6	11.6
Na	137 mmol/L	137
K	2.73 mmol/L	2.73
Cl	102 mmol/L	102
Ca ⁺⁺	1.16 mmol/L	2.31
Mg ⁺⁺	0.42 mmol/L	0.84
Lac	1.3 mmol/L	1.3
PO ₄	2.18 mmol/L	3.98
Alb	18.2 g/L	4.1
Glob	24.8 g/L	3.5

Mg⁺⁺ = 1.05
 Ca⁺⁺ = 2.31
 K⁺ = 2.73



PO₄⁻ = 3.94
 Alb⁻+Glob⁻ = 7.6
 HCO₃⁻ = 39.1
 Lac⁻ = 1.3

Case 5

- 45 min TB colt
- History
 - Mare found passing fetal fluids
 - Eventration of intestines through vagina
 - Dystocia
 - Foal not breathing
 - 3-4 min ventilation
 - Spontaneous breathing, became active
- Problems
 - Intrauterine challenge
 - Fractured ribs
 - Neonatal Encephalopathy
 - Neonatal Vasogenic Nephropathy
 - Necrotizing enterocolitis
- Outcome – euthanized at 48 hr
 - Fractured ribs (8 lt side)
 - NEC (reflux, feeding intolerance)
 - Renal disease

Case 5

Cr	1485 $\mu\text{mol/L}$
BUN	7.8 mmol/L
HCO_3	14 mmol/L
Na	135 mmol/L
K	4.23 mmol/L
Cl	81 mmol/L
Ca^{++}	1.06 mmol/L
Mg^{++}	0.51 mmol/L
Lac	18.6 mmol/L
PO_4	6.62 nmol/L
Alb	28.9 g/L
Glob	17.1 g/L



Case 5

UA

		mEq/L
pH	7.088	
Pco ₂	45.9	
HCO ₃	14 mmol/L	14
SBE	-15.2	-15.2
Na	135 mmol/L	135
K	4.23 mmol/L	4.23
Cl	81 mmol/L	81
Ca ⁺⁺	1.06 mmol/L	2.12
Mg ⁺⁺	0.51 mmol/L	1.06
Lac	18.6 mmol/L	18.6
PO ₄	6.62 nnol/L	12.1
Alb	28.9 g/L	6.5
Glob	17.1 g/L	2.4

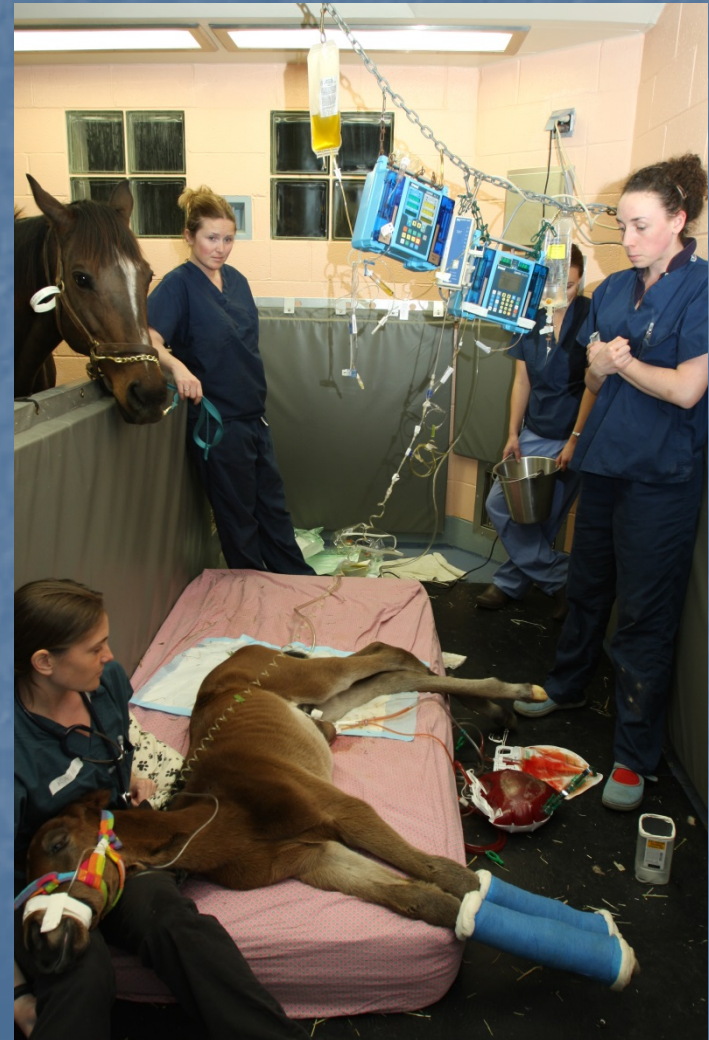
Mg⁺⁺ = 1.06
 Ca⁺⁺ = 2.12
 K⁺ = 4.23



PO₄⁻ = 12.1
 Alb⁻ + Glob⁻ = 8.9
 HCO₃⁻ = 14

Case 6

- 5.5 hr TB colt
- History
 - Unremarkable birth
 - Weakness from birth
 - Unable to rise unassisted
 - Large umbilical hernia
- Problems
 - Fractured ribs
 - Neonatal Encephalopathy, FIRS
 - Urinary
 - NN
 - Patent urachus
 - Urachal tear – uroperitoneum
 - Megacystis
 - Other
 - Entropion, pastern contracture, colic
- 8 day hospital stay



Case 6

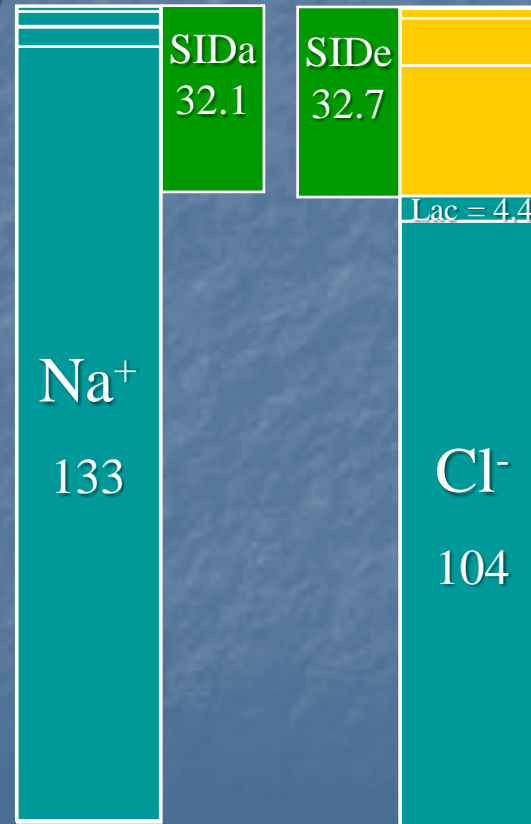
Cr	1087 $\mu\text{mol/L}$
BUN	10.0 mmol/L
HCO_3	22.5 mmol/L
Na	133 mmol/L
K	3.21 mmol/L
Cl	104 mmol/L
Ca^{++}	1.68 mmol/L
Mg^{++}	0.48 mmol/L
Lac	4.4 mmol/L
PO_4	0.885 mmol/L
Alb	24.1 g/L
Glob	22.9 g/L



Case 6

		mEq/L
pH	7.329	
Pco ₂	42.5	
HCO ₃	22.5 mmol/L	
SBE	-2.9	
Na	133 mmol/L	133
K	3.21 mmol/L	3.21
Cl	104 mmol/L	104
Ca ⁺⁺	1.68 mmol/L	3.36
Mg ⁺⁺	0.48 mmol/L	0.96
Lac	4.4 mmol/L	4.4
PO ₄	0.885 mmol/L	1.62
Alb	24.1 g/L	5.42
Glob	22.9 g/L	3.3

Mg⁺⁺ = 0.96
 Ca⁺⁺ = 3.36
 K⁺ = 3.21



PO₄⁻ = 1.62
 Alb⁻ + Glob⁻ = 8.7
 HCO₃⁻ = 22.5

Case 7

- 20 hr old TB filly
- History
 - Evidence of significant umbilical bleeding
 - Down, cold, lethargic, pale
 - HR 80
 - Rx 500 ml whole blood from mare, fluids, dextrose
 - 'Perked up'
 - But some bleeding – unsuccessful suture/clamp artery
 - Nursing?
 - Fade again
 - Referred for blood transfusion
- Problems
 - Umbilical remnant hematoma
 - NE, anemia (20%), sepsis, NN, hepatopathy, NG, contracture
- 10 day hospital course

Case 7

Cr	150.3 $\mu\text{mol/L}$
BUN	3.93 mmol/L
HCO_3	34 mmol/L
Na	132 mmol/L
K	3.62 mmol/L
Cl	99 mmol/L
Ca^{++}	0.95 mmol/L
Mg^{++}	0.375 mmol/L
Lac	0.9 mmol/L
PO_4	1.09 mmol/L
Alb	20.1 g/L
Glob	23.9 g/L

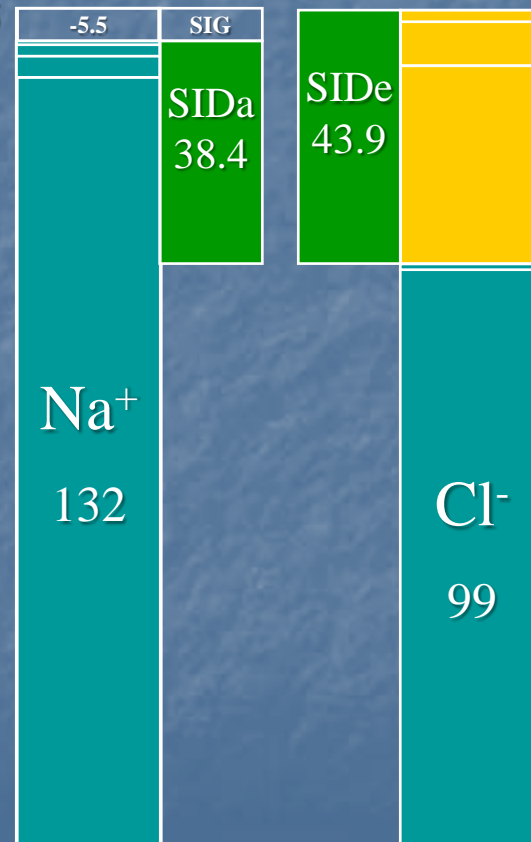


Case 7

UC

		mEq/L
pH	7.455	
Pco ₂	48.6	
HCO ₃	34 mmol/L	34
SBE	10.3	10.3
Na	132 mmol/L	132
K	3.62 mmol/L	3.62
Cl	99 mmol/L	99
Ca ⁺⁺	0.95 mmol/L	1.89
Mg ⁺⁺	0.375 mmol/L	0.75
Lac	0.9 mmol/L	0.9
PO ₄	1.09 mmol/L	1.99
Alb	20.1 g/L	4.52
Glob	23.9 g/L	3.3

Mg⁺⁺ = 0.75
 Ca⁺⁺ = 1.98
 K⁺ = 3.62



PO₄⁻ = 1.99
 Alb⁻ + Glob⁻ = 7.8
 HCO₃⁻ = 34
 Lac = 0.9

Case 7



Case 8

- 3 day old TB filly
- History
 - Never vigorous
 - Contracted left hind
 - Diarrhea 12 hr
 - Colic, abdominal distention
 - Free fluid in abdomen - ruptured bladder?
- Problem: enteritis

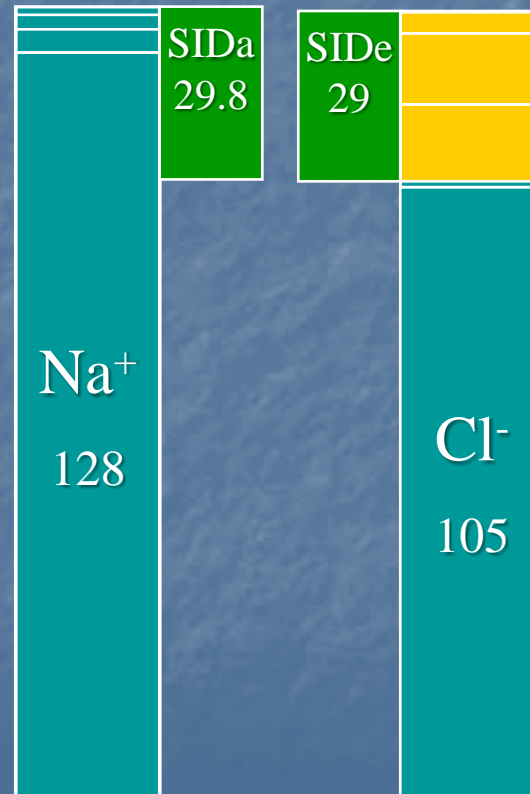
Case 8

Cr	133 umol/L
BUN	5.4 mmol/L
HCO ₃	13.1 mmol/L
Na	128 mmol/L
K	3.93 mmol/L
Cl	105 mmol/L
Ca ⁺⁺	1.4 mmol/L
Mg ⁺⁺	0.62 mmol/L
Lac	1.1 mmol/L
PO ₄	1.96 mmol/L
Alb	27.6 g/L
Glob	43.4 g/L

Case 8

		mEq/L
pH	7.239	
Pco ₂	31.2	
HCO ₃	13.1 mmol/L	13.1
SBE	-12.2	-12.2
Na	128 mmol/L	128
K	3.93 mmol/L	3.93
Cl	105 mmol/L	105
Ca ⁺⁺	1.4 mmol/L	2.77
Mg ⁺⁺	0.62 mmol/L	1.25
Lac	1.1 mmol/L	1.1
PO ₄	1.96 mmol/L	3.58
Alb	27.6 g/L	6.21
Glob	43.4 g/L	6.1

Mg⁺⁺ = 1.25
 Ca⁺⁺ = 2.77
 K⁺ = 3.93



PO₄⁻ = 3.58
 Alb⁻ + Glob⁻ = 12.3
 HCO₃⁻ = 13.1
 Lac = 1.1

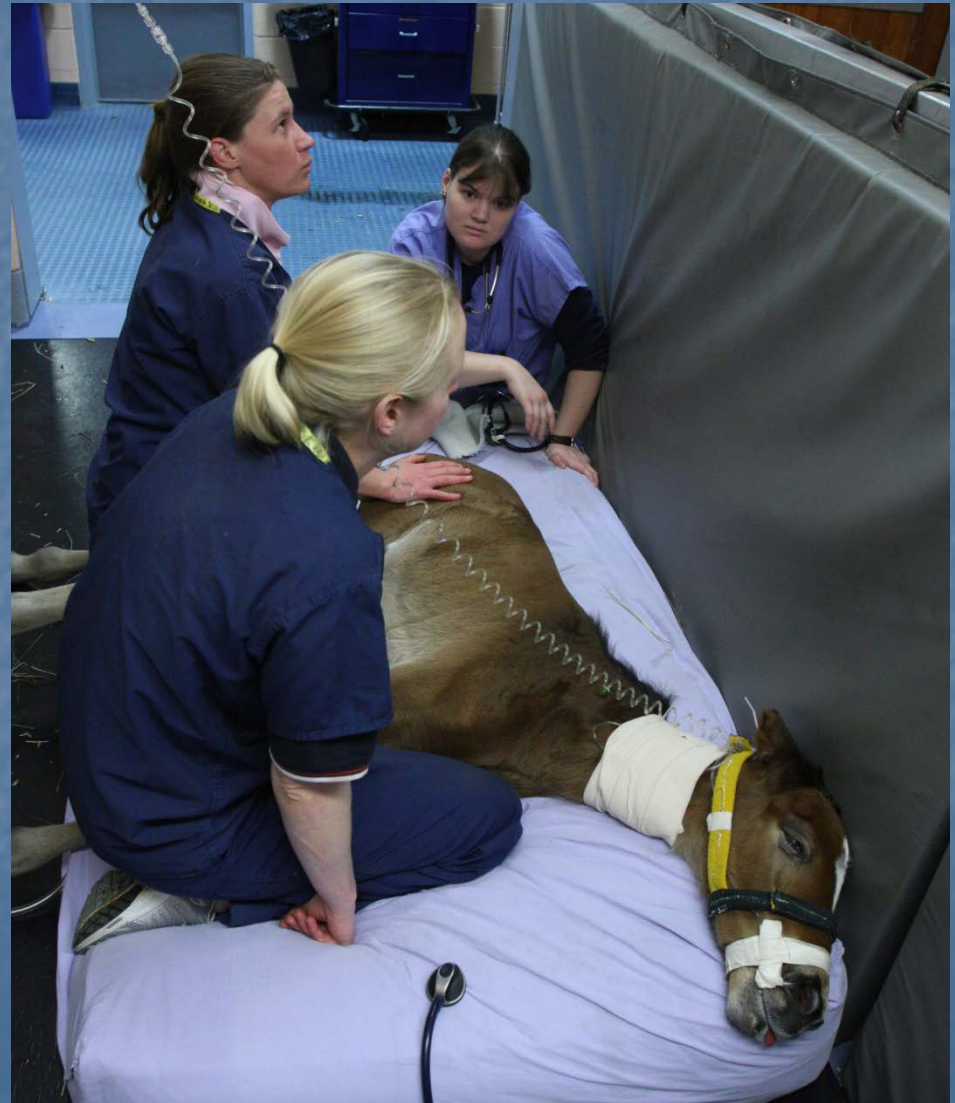
Case 9

- 30 min old TB colt
- History
 - Premature placental separation
 - Upper airway obstruction
- Problems
 - Respiratory distress
 - Pharyngeal collapse
 - Central Tachypnea
 - NE, NG, NN, Shock
 - Respiratory failure
 - Anuria
- Euthanized 48 hr



Case 9

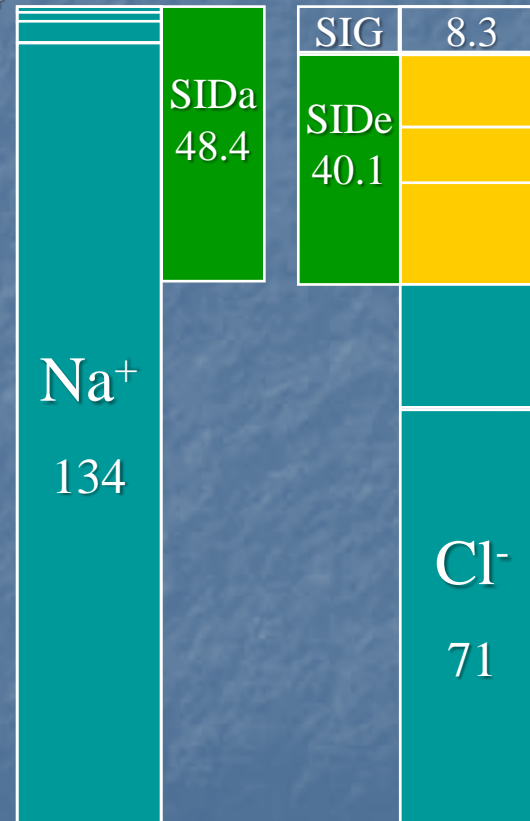
Cr	2431 $\mu\text{mol/L}$
BUN	5.7 mmol/L
HCO_3	17.6 mmol/L
Na	134 mmol/L
K	3.52 mmol/L
Cl	71 mmol/L
Ca^{++}	1.0 mmol/L
Mg^{++}	0.42 mmol/L
Lac	21 mmol/L
PO_4	7.01 mmo/L
Alb	31.8 g/L
Glob	18.2 g/L



Case 9

		mEq/L
pH	7.084	
Pco ₂	58	
HCO ₃	17.6 mmol/L	17.6
SBE	-12.5	-12.4
Na	134 mmol/L	134
K	3.52 mmol/L	3.52
Cl	71 mmol/L	71
Ca ⁺⁺	1.0 mmol/L	2.01
Mg ⁺⁺	0.42 mmol/L	0.84
Lac	21 mmol/L	21
PO ₄	7.01 mmo/L	12.8
Alb	31.8 g/L	7.16
Glob	18.2 g/L	2.5

Mg⁺⁺ = 0.84
 Ca⁺⁺ = 2.01
 K⁺ = 3.52



PO₄⁻ = 12.8
 Alb⁻ + Glob⁻ = 9.66
 HCO₃⁻ = 17.6
 Lac = 21

