Detailed description of the "Temperature Adjustment CLinIMApp™"

The parameters generated by various brands/models of arterial blood gas ("ABG") analyzers are referable to 37° Centigrade, or normal body temperature. Decades ago, Shapiro and his colleagues published a Table (see below) which compares a normal ABG data set to corresponding

Table 49.1 Temperature-Adjusted Values for a "Normal" ABG

Temperature (°C)	pH	$Paco_2$ (mm Hg)	Pao_2 (mm Hg)
20	7.65	19	27
30	7.50	30	51
35	7.43	37	70
37	7.40	40	80
39	7.37	44	91

Source: Shapiro, Harrison & Walton, Clinical Application of Blood Gases

arterial pH (pH_a), arterial carbon dioxide tension (p_aCO_2) and arterial oxygen tension (p_aO_2) values at various *in vivo* temperatures[1]. I composed three equations which succeeded in replicating the results of Shapiro and co-workers. In other words, the coefficients and exponents of my equations were selected so that they "fit" the findings of Shapiro et al precisely (see next page). These equations were then imported into a computer spreadsheet using commercially-available software (Numbers™, Apple, Inc., Cupertino, CA). Initially, I had intended to simply post this spreadsheet on the internet, but decided against that after failing to identify a mechanism whereby the equations behind each cell could be protected from inadvertent revision of those equations by users. Consequently, the spreadsheet was coded into a computer application ("app") by Javier A. Morquecho to create the "Temperature Adjustment CLinIMApp™". This app can be accessed, free of charge, using any desktop, laptop, tablet or hand-held computer or smartPhone which incorporates browser software.

I was careful not to embed any patient-identifiable data in the images generated by the app, so as not to run afoul of Health Insurance Portability and Accountability Act (HIPAA) regulations. Users can feel free to generate screenshots of any images displayed by the app for non-commercial

in vitro Temp in C°	*in vitro* pH_a	*in vitro* p_aCO_2 in torr	*in vitro* p_aO_2 in torr	*in vivo* Temp in C°	Shapiro et al pH_a	Demers pH_a	Shapiro et al p_aCO_2 in torr	Demers p_aCO_2 in torr	Shapiro et al p_aO_2 in torr	Demers p_aO_2 in torr
37.0	7.40	40.0	80.0	37.0	7.40	7.40	40	40.0	80	80.0
37.0	7.40	40.0	80.0	36.0		7.41		38.3		75.0
37.0	7.40	40.0	80.0	35.0	7.43	7.43	37	36.7	70	70.3
37.0	7.40	40.0	80.0	34.0		7.44		35.2		65.9
37.0	7.40	40.0	80.0	33.0		7.46		33.7		61.8
37.0	7.40	40.0	80.0	32.0		7.47		32.3		58.0
37.0	7.40	40.0	80.0	31.0		7.49		31.0		54.3
37.0	7.40	40.0	80.0	30.0	7.50	7.50	30	29.7	51	50.9
37.0	7.40	40.0	80.0	29.0		7.52		28.4		47.8
37.0	7.40	40.0	80.0	28.0		7.53		27.3		44.8
37.0	7.40	40.0	80.0	27.0		7.55		26.1		42.0
37.0	7.40	40.0	80.0	26.0		7.56		25.0		39.4
37.0	7.40	40.0	80.0	25.0		7.58		24.0		36.9
37.0	7.40	40.0	80.0	24.0		7.59		23.0		34.6
37.0	7.40	40.0	80.0	23.0		7.60		22.0		32.4
37.0	7.40	40.0	80.0	22.0		7.62		21.1		30.4
37.0	7.40	40.0	80.0	21.0		7.63		20.2		28.5
37.0	7.40	40.0	80.0	20.0	7.65	7.65	19	19.4	27	26.7

purposes, provided that the copyright language embedded in those images is included as an integral component of the copied image(s).

Any (positive or negative) feedback which users might be prompted to furnish to me (at BobDemers@AOL.com) would be gratefully accepted.

Reference:

1. Shapiro BA, Harrison RA, Walton JR. Clinical Application of Blood Gases, 3rd Edition, Chicago, IL, Year Book Medical Publishers, 1977, Table 49.1.