of gene-expression profiling to assess cancer prognosis and guide therapy; the use of genotyping to stratify patients according to the risk of a disease, such as prolonged QT interval syndrome or myocardial infarction; the use of genotyping to increase our understanding of drug pharmacokinetics and pharmacodynamics; and the use of genetics for tissue engineering and the cloning of several different species.\(^1\)\(^4\) Recently, the National Human Genome Research Institute announced the formation of the International HapMap project, which will attempt to improve the ease and accuracy of human genetic risk profiling by creating a haplotype map consisting of approximately 500,000 tag single nucleotide polymorphisms from the more than 10 million that exist within the human genome. Even in diseases such as Huntington chorea, in which identification of the specific causative mutation has yet to lead to improved treatment, patients and their families have benefited from genetic counseling.\(^5\) All of these mind-boggling accomplishments have occurred within a single generation.

Is perioperative functional genomics ready for prime time? Maybe not quite yet. But one thing is assured: If genetic advances continue to occur at the current rate and the discipline of anesthesiology remains on the sidelines, we may very well find ourselves in the scientific “reruns” instead of at the forefront of novel, cutting-edge research.

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**References**


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**Table 1. Normal Values for the Base Excess (BE) from Venous Blood (n = 50)**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.352 ± 0.023</td>
</tr>
<tr>
<td>PaCO₂, mmHg</td>
<td>51.2 ± 4.9</td>
</tr>
<tr>
<td>PaO₂, mmHg</td>
<td>28.6 ± 10.2</td>
</tr>
<tr>
<td>SO₂, %</td>
<td>49.2 ± 22.0</td>
</tr>
<tr>
<td>BE, mmol/l</td>
<td>-0.10 ± 1.0</td>
</tr>
</tbody>
</table>

*BE is calculated from measured venous pH, PaCO₂, SO₂, and total Hb. PaCO₂ = partial pressure of carbon dioxide; PaO₂ = partial pressure of oxygen; SO₂ = oxygen saturation.

Medical Association (Bundesärztekammer 2002, Köln, Germany) for the electrolyte concentrations in the plasma are Na 142 ± 2.8 mmol/l (2.0%); K 4.5 ± 0.2 mmol/l (3.7%); Cl 103 ± 4.1 mmol/l (4%); and lactate 1.5 ± 0.1 mmol/l (6%). Using these figures, the normal value of the strong ion difference (Na + K – Cl – lactate) is calculated as 42 ± 5.0 mmol/l, with high inaccuracy from propagation of errors. Hence, reliability is strongly reduced, dominated by the largest errors (Na: ± 2.8 mmol/l, Cl: ± 4.1 mmol/l).

In comparison, normal BE is 0 ± 2.2 mmol/l when calculated from normal values of pH 7.40 ± 0.02, PaCO₂ 40 ± 1.6 mmHg (4%), hemoglobin 15 ± 0.5 g/dl (2%), and full oxygen saturation ~ 100%. Reliability of BE is mainly affected by the inaccuracy of measurement for pH and PaCO₂, whereas that for hemoglobin is negligible.

**BE as a prognostic factor:** The diagnostic use and prognostic value of BE is well documented. Among 10 clinical hemodynamic and 20 blood laboratory parameters tested, change in BE proved to be the best predictor of blood volume changes in a canine hemorrhagic shock model.\(^1\) In critically ill patients BE has been established as an independent predictor of mortality\(^5\) and endpoint of resuscitation. On the basis of 8,200 polytrauma patients, statistically selected out of 15,200 from four clinical studies, mortality increased significantly with a decrease in BE, e.g., approximately by 25% if the assessed BE was -6 mmol/l within the first 24 h after admission (see figure 4 in reference 6).\(^6\)

**Conclusions:** Because mortality may increase considerably (~8%) when BE is decreased by only 2 mmol/l, the clinical requirements for
To the Editor.—Size selection of the Laryngeal Mask Airway™ (LMA™). Laryngeal Mask Company Limited, San Diego, CA) is important for avoiding complications and is based on patient body weight. The previously proposed formula for determining the appropriate LMA™ size is impractical because it contains the square root of the patient’s body weight. We advocate here an alternative formula:

LMA™ size = \( \frac{1}{2} \) BWru/20, where BWru indicates body weight (in kilograms) rounded up at the first digit. For example, if a patient’s body weight of 14 kg (BWru) is 20 because 14 can be rounded up to 20 at the first digit, the calculation would be as follows: LMA™ size = 1 + 20/20 = 1 + 1 = 2.

If the calculation of LMA™ size shows 3.5 or 4.5, we choose LMA™ #3 or #4. This manner of size selection agrees with the recommendation by Brimacombe and Brain. Alternatively, if the calculated LMA™ size is 3.5 or 4.5, we can also use LMA™ #4 or #5. This size selection is similar to the sex-based LMA™ size recommendation for adult patients.

Our formula is convenient for pediatric patients, although it cannot be used in infants weighing less than 5 kg. In addition, the formula does not require a pocket calculator.

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References

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Delayed Postoperative Arousal following Remifentanil-based Anesthesia in a Myasthenic Patient Undergoing Thymectomy

To the Editor.—Remifentanil (Ultiva, GlaxoSmithKline, Middlesex, UK) is an “ultra-short”-acting opioid that is rapidly hydrolyzed by circulating and tissue nonspecific esterases. Discontinuation of remifentanil infusion will be followed by a rapid recovery regardless of the duration of infusion. The present report used the remifentanil-based technique of anesthesia, without the use of muscle relaxants, in a myasthenic gravis patient undergoing transternal thymectomy. However, the patient manifested unexpected delay of postoperative arousal for 12 h. This is the first case report about a significant delay of postoperative arousal following discontinuation of remifentanil infusion. A 19-yr-old female patient (body weight, 57 kg) presented with myasthenia gravis (Osserman 2A) associated with a thymoma. Pyridostigmine, 60 mg, four times daily was administered for 2 months, to be followed by transternal thymectomy. The pyridostigmine regimen was maintained until the morning of surgery.

Premedication was limited to 0.2 mg intramuscular glycopyrrolate and 1 mg intravenous midazolam. Anesthesia was induced with 100 mg lidocaine and 2 mg/kg propofol intravenously, to be followed by 3.0 µg/kg remifentanil over 50 s, and tracheal intubation. Anesthesia was maintained by sevoflurane 1–2% in 100% oxygen, supplemented with remifentanil infusion (0.1–0.25 µg · kg⁻¹ · min⁻¹). Neuromuscular transmission was monitored by electromyography using a Datex relayograph (NMT-100–23–01; Datex-Ohmeda Division, Instrumentarium Corp. Helsinki, Finland), using the electromyographic response to ulnar nerve stimulation by the train-of-four. Intraoperatively, blood pressure ranged between 75/50 mmHg and 105/55 mmHg, heart rate ranged between 55 and 90 bpm, and electromyography showed normal T1/control and T4/T1 ratios. The duration of surgery was 2 h. Thirty minutes before the end of surgery, 5 mg intramuscular morphine was administered. Twenty minutes before the end of surgery, sevoflurane was turned off, and on completion of surgery remifentanil infusion was discontinued. The total dose of remifentanil administered throughout surgery amounted to about 2,000 µg.

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