**Abstract 1**

The history of tomato breeding has been dominated by a focus on traits that benefit the grower, such as yield, storage characteristics, and field performance. As a result there has been an unintentional loss of consumer quality traits such as flavor and nutritional value. Fruit flavor is influenced both by volatile and nonvolatile metabolites. Of the nonvolatile metabolites, the balance between sugars and acidic compounds is a major determinant of flavor. A network analysis of several tomato genotypes demonstrated a strong correlation between tomato fruit flavor and the main acidic metabolites: carboxylic acids, Glu, and Asp. The authors have used a biochemical analysis of a tomato introgression line with increased levels of fruit citrate and malate at late ripening to identify a metabolic engineering target that was subsequently tested in transgenic plants. In this introgression line there was a significant decrease in the maximum catalytic activity of aconitase, an enzyme that isomerizes citrate into isocitrate, in total tissue extracts, suggesting that a cytosolic isoform of aconitase was affected. To test the role of cytosolic aconitase in controlling fruit citrate levels, the authors analyzed fruit of transgenic lines expressing an antisense construct against SlAco3b, one of the two tomato genes encoding aconitase. A GFP fusion of S1Aco3b was expressed in the cytosol and mitochondria, whereas the other aconitase, S1Aco3a, was exclusively mitochondrial when transiently expressed in N. tabacum leaves. Both aconitase transcripts were decreased in fruit from transgenic lines and aconitase activity was reduced by about 30% in the transgenic lines. Other measured enzymes of carboxylic acid metabolism were not significantly altered. Both citrate and malate levels were increased in ripe fruit of the transgenic plants and, as a consequence, total carboxylic acid content was increased by 50% at maturity.

**Abstract 2**

Obesity is a growing trend in the United States today. The 1999-2002 National Health and Nutrition Examination Survey revealed that 65% of adults over the age of 20 are overweight or obese. Therefore, it is no surprise that the sale of dietary supplements is a $19.4 billion per year industry, a significant portion of which is advertised to promote weight loss by boosting metabolism. Manufacturers do not have to prove their product produces results as advertised and that it is not harmful. The Federal Drug Administration, the government agency that polices this industry, allots only $10 million and 60 persons to investigate claims that a product has caused harm and does not investigate efficacy at all. The purpose of this experiment was to study if two dietary supplements that contain caffeine, a known thermogenic drug, increased the metabolic rate and promoted weight loss in rats. The two supplements included in this study were One a Day Weight Smart and Stacker 2 Ephedra Free. Groups of 10 rats each received one of these supplements ground and added to its rat chow. Weight and metabolic rate were measured at the outset of the experiment and at weekly intervals for four weeks. Results indicated that the group of rats receiving Stacker 2 Ephedra Free gained statistically significantly less weight and gained it at a statistically significantly slower rate than rats receiving One a Day Weight Smart or the control group. However, there was no statistically significant difference in metabolic rate of the three groups across time. These results present evidence that One A Day Weight Smart does not promote weight loss or stimulate metabolic rate and that Stacker 2 Ephedra Free does promote weight loss, but does not do so by stimulating metabolic rate.

**Abstract 3**

Conventional semiconductor devices use electric fields to control conductivity, a scalar quantity, for information processing. In magnetic materials, the direction of magnetization, a vector quantity, is of fundamental importance. In magnetic data storage, magnetization is manipulated with a current-generated magnetic field (Oersted-Ampere field), and spin current (1,2] is being studied for use in non-volatile magnetic memories (3,4). To make control of magnetization fully compatible with semiconductor devices, it is highly desirable to control magnetization using electric fields. Conventionally, this is achieved by means of magnetostriction produced by mechanically generated strain through the use of piezoelectricity (5-8). Multiferroics (9,10) have been widely studied in an alternative approach where ferroelectricity is combined with ferromagnetism. Magnetic-field control of electric polarization has been reported in these multiferroics using the magnetoelectric effect, but the inverse effect-direct electrical control of magnetization--has not so far been observed (11). Here we show that the manipulation of magnetization can be achieved solely by electric fields in a ferromagnetic semiconductor, (Ga,Mn)As. The magnetic anisotropy, which determines the magnetization direction, depends on the charge carrier (hole) concentration in (Ga,Mn)As. By applying an electric field using a metal-insulator-semiconductor structure (12-14) the hole concentration and, thereby, the magnetic anisotropy can be controlled, allowing manipulation of the magnetization direction.