CC/NUMBER 12
MARCH 23, 1992

This Week's Citation Classic®

Szewczuk A, Wolny E, Wolny M & Baranowski T. A new method for preparation of D-glyceraldehyde-3-phosphate (Nowa metoda otrzymywania D-gliceraldehydo-3-fosforanu). *Acta Biochim. Pol.* **8:201-7, 1961.** [Dept. Biochemistry, Inst. Immunology and Exp. Therapy, Polish Acad. Sciences, Wroclaw, Poland]

A simple method for preparation of crystalline calcium D-glyceraldehyde-3-phosphate has been described. It is based on the oxidation of D-fructose-1,6-diphosphate with periodic acid. Also, the by-product phosphogiycolate was obtained. [The *SCI*® indicates that this paper has been cited in more than 120 publications.]

Basic Chemistry in Post-World War II Poland

Apolinary Szewczuk
Institute of Immunology and Experimental Therapy
Polish Academy of Sciences
Czerska 12
53-114 Wroclaw
Poland

After graduation in organic chemistry, I began work in the Department of Biochemistry, at the Polish Academy of Sciences, Wroclaw. The head of the department was T. Baranowski, a well-known protein chemist involved in studies on glycolytic enzymes. The postwar years were difficult for Polish scientists. The necessity to rebuild the country, which had been heavily damaged during the Second World War, and the inefficiency of our economic system, exacerbated by the "cold war" between the communist East and the democratic West, caused shortages of chemical reagents. Lacking in resources, we often relied on our dedication and enthusiasm to complete our research, isolating or synthesizing many substrates and coenzymes that were commercially available in Western countries.

In 1959, I was asked by my boss to synthesize D-glyceraldehyde-3-phosphate (G-3-P)—an important metabolite of the glycolytic cycle. It was not an easy task because synthesis from glyceraldehyde[1] was difficult to perform in our laboratory, and we did not have substrates for other syntheses from ribose-5-phosphate[2] or mannitol.[3] At that time, my friend M. Orlowski, at the Third Medical Clinic, obtained glucose-6-phosphate and fructose-1,6-diphosphate (F-1,6-diP) from ordinary sucrose, sodium phosphate, and brewer's yeast.[4] Since this work made F-1,6-diP easily available for us, the idea arose that G-3-P could be obtained by simple oxidation of F-1,6-diP with periodate. At the beginning, my boss did not share my optimism for this simple solution, but he was a good boss and never discouraged young coworkers from checking even crazy ideas. Luckily, my friends Elzbieta and Marian Wolny, who also worked in our department and were familiar with many analytical methods, declared their intention to collaborate on the G-3-P project. After a few weeks of intensive work, optimal conditions for oxidation of F-1,6-diP with periodic acid and isolation of G-3-P were defined. The identity and purity of the D-glyceraldehyde-3-phosphate (calcium salt) were demonstrated by a number of chemical and biochemical methods, and the compound obtained was compared with synthetic G-3-P. The method was published in Polish, with a short English summary, and was presented in English at the Fifth International Congress in Moscow in 1961.

The elaborated one-step preparation of G-3-P from F-1,6-diP was simple, fast, and cheap, which is important for researchers. The method was used for preparation of G-3-P for studies of dehydrogenase activity of myogen B from human muscle[5] and for other studies performed in foreign laboratories.

1. **Baer E & Fischer H O L.** A synthesis of diglyceraldehyde 3-phosphate. *J. Biol. Chem.* 150:223-9, 1943.
2. **Klybas V, Schramm M & Racker E**. The oxidative pentose phosphate cycle. IV. The synthesis of sedoheptulose 1,7-di-phosphate. sedoheptulose 7-phosphate, glyceraldehyde 3-phosphate and glycolaldehyde phosphate. *Arch. Biochem. Biophvs.* 80:229-35, 1959.
3. **Ballou C E & Fischer H O L.** The synthesis of glyceral-dehyde-3-phosphate. *J. Amer. Chem. Sac.* 77:3329-31, 1955.
4. **Orlowski M.** A simple method for preparation of crystalline barium glucose 6-phosphate. *J. Biol. Chem.* 178:1651-2. 1959.
5. **Baranowski T & Wolny M.** Preparation of crystalline D-glyceraldehyde-3-phosphate dehydrogenase from human muscle. *Acta Biol. Med. Germ.* 11:651-9, 1963.

Received November 1, 1990