Paroxysmal Atrial Fibrillation
This 65-year-old applicant for insurance had been under the care of his physician for 22 years. In 1967 he had hematuria from a ureteral calculus but otherwise had no difficulty until June 1979 when he developed a paroxysmal atrial fibrillation (Tracing #1) and was seen for this in a hospital emergency room. He was converted to normal sinus rhythm with 1.25 mg digoxin and has taken 0.25 mg digoxin daily since then. He has had no further arrhythmias.

The first ECG was recorded in the hospital emergency room and interpreted there as "acute atrial fibrillation with aberrant conduction" and the second ECG was called "sinus rhythm with Right Bundle Branch Block."

Inspection of the first ECG, which shows atrial fibrillation and a wide QRS, reveals an upright QRS (with no S wave) in lead I, aVL, V6; V1 does not show an R', and from V2-V6 QRS is upright without S waves. Hence RBBB is not present. Is this LBBB? In looking for LBBB one searches for RR' in V5 and V6 and here the summit of the QRS in V6 is a single R and there is slurring of the QRS only at its onset. Comparison to the second tracing clarifies the diagnostic dilemma. It shows sinus rhythm with pre-excitation of the WPW type (note short PR, long QRS, and delta waves marked with arrow in lead I). The QRS form in V1-V6 is predominantly upright as is characteristic of a Kent bundle bypass tract located in the mid-posterior AV ring (see Figure). The QRS configuration during atrial fibrillation (Tracing #1) is the same as during sinus rhythm (Tracing #2).

It is the latter finding that is unusual and, because of its implications, allows a correct evaluation of the insurance risk involved in this applicant. If the wide QRS is not correctly diagnosed the applicant could be said to have paroxysmal atrial fibrillation and bundle branch block — a combination which would bring a considerable rating. If it is recognized that the wide QRS results from pre-excitation and not bundle branch disease, the question of the risk of a subject with the WPW syndrome and paroxysmal atrial fibrillation arises. The mortality in WPW syndrome is strictly limited to the very small group of patients with WPW syndrome who develop "runaway," or very rapid, ventricular rates during atrial fibrillation. Such rapid ventricular response is possible because conduction of the impulses from the fibrillating atria to the ventricles is not via the AV node and the bundle branch system but via the anomalous AV connection — i.e., the bypass tract itself. Therefore there may be very little delay in AV conduction since some bypass tracts have a very short refractory period and hence conduct very easily. This would mean that a large number of fibrillation waves could reach the ventricles which would thus respond with a sustained very fast rate — often over 200-260/min. or even up to 300/min. at times. This rate causes cardiac contractile embarrassment, poor coronary perfusion and may provoke fatal ventricular tachycardia or fibrillation.

If the bypass tract conducts much like the AV node however, as is seen in Tracing #1 where the ventricular rate averages 150/min., with periods as slow as 90/min., then the paroxysmal atrial fibrillation is not dangerous and the patient is at a much lower risk. Thus the rating of such an applicant becomes that of pre-excitation and one episode of atrial fibrillation, — a less serious combination than the arrhythmia coupled to a bundle branch block. The tracing (#2) in sinus rhythm confirms that he does not have bundle branch block but has a wide QRS due to pre-excitation.

Figure. Diagrams of the commonest anatomic locations of Kent bundle bypass tracts. The coronal sections are drawn through the A-V ring. R = Right ventricle. L = Left ventricle. IVS = Interventricular septum. The upper diagram includes three sites: — (A) in the mid-posterior A-V ring on either side of or in the IV septum (IVS); (B) in the right anterior lateral area of the A-V ring and (C) in the left lateral area of the A-V ring, usually slightly posterior. In the lower three diagrams the arrows indicate the pathways of excitation through the ventricles from the lower end of each of these three Kent bundles. The locations of precordial leads V1 and V6 are also indicated. In type A there is a positive QRS in both V1 and V6; in type B QRS is negative in V1 and positive in V6; in type C QRS is negative in V6 and positive in V1.
TRACING #2b

V1, V2, V3, V4, V5, V6