

# Etiology profile of stroke in young adults according to ASCO classification

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**Objectives and Purpose:** Stroke in young adults represents the 5-20% of all strokes in different studies and has a high social and economic impact. The etiology is different from stroke in older patients and in many cases is deemed as cryptogenic. Aim of the study is to analyze the proportion of TIAs and Ischemic Strokes occurring in young adults, to assess risk factors and etiology of the events, to evaluate the diagnosis according to ASCO classification and make comparisons with TOAST Classification.

**Materials and methods:** All acute brain ischemic events, either TIA or Stroke, occurring in subjects under 50 years, admitted to the Neurology Department of "S. Salvatore" Hospital in L'Aquila between August 2013 and July 2015 underwent a thorough evaluation to assess the etiology, according to ASCO and TOAST Classifications, and coexisting conditions.

**Results:** Brain ischemic events in young adults were 59 (21.6% TIA and 78.4% Strokes) and represented 13.8% of all events. (**Fig.1**) Males and females were equally affected by stroke, while 70% of TIA occurred in males. The average age is 45.5 years in TIAs and 40 in strokes. The most prevalent risk factors were hyperlipidemia (62.7%), smoking (54.9%), hypertension (49%); familiarity was found in 23.5% of cases. Familiarity, smoking, diabetes, headache, oral contraceptive drugs were more frequent in TIA; hyperlipidemia was mainly associated with stroke (**Fig. 2**). According to the ASCO Classification, a potential cause was definitely identified in 33.5% of cases, cases with uncertain etiology in 19.6%, factors without a direct correlation but often associated with cerebrovascular disease in 41%. Only 5.9% of events were cryptogenic (versus 40.5% with TOAST classification) (**Fig. 3**). The most frequent etiologies were atherosclerosis (47.1%), MTHFR mutation (39.5%), hyperhomocysteinemia (31.5%), small vessel disease (SVD) with lacunar infarcts (37.3%) or leukoaraiosis (13.7%), patent foramen ovale (PFO) or atrial septal defect (23.5%). Severe atherosclerosis, SVD, prosthetic valves, AF, deep vein thrombosis, rheumatic disorders and thrombophilia appeared to be more related to stroke; instead, mitral stenosis, previous myocardial infarction, PFO and atrial septal defects, vessels abnormalities and hyperhomocysteinemia with TIA (**Fig. 4**).

**Conclusion:** Stroke in young adults is not a rare condition in clinical practice. Ischemic stroke and TIA have different etiology profiles. By using the ASCO classification, the number of events classified as cryptogenic decreased. An accurate diagnostic protocol, which screen all factors possibly involved, and specific studies are needed to evaluate which events may be effectively prevented in the young.

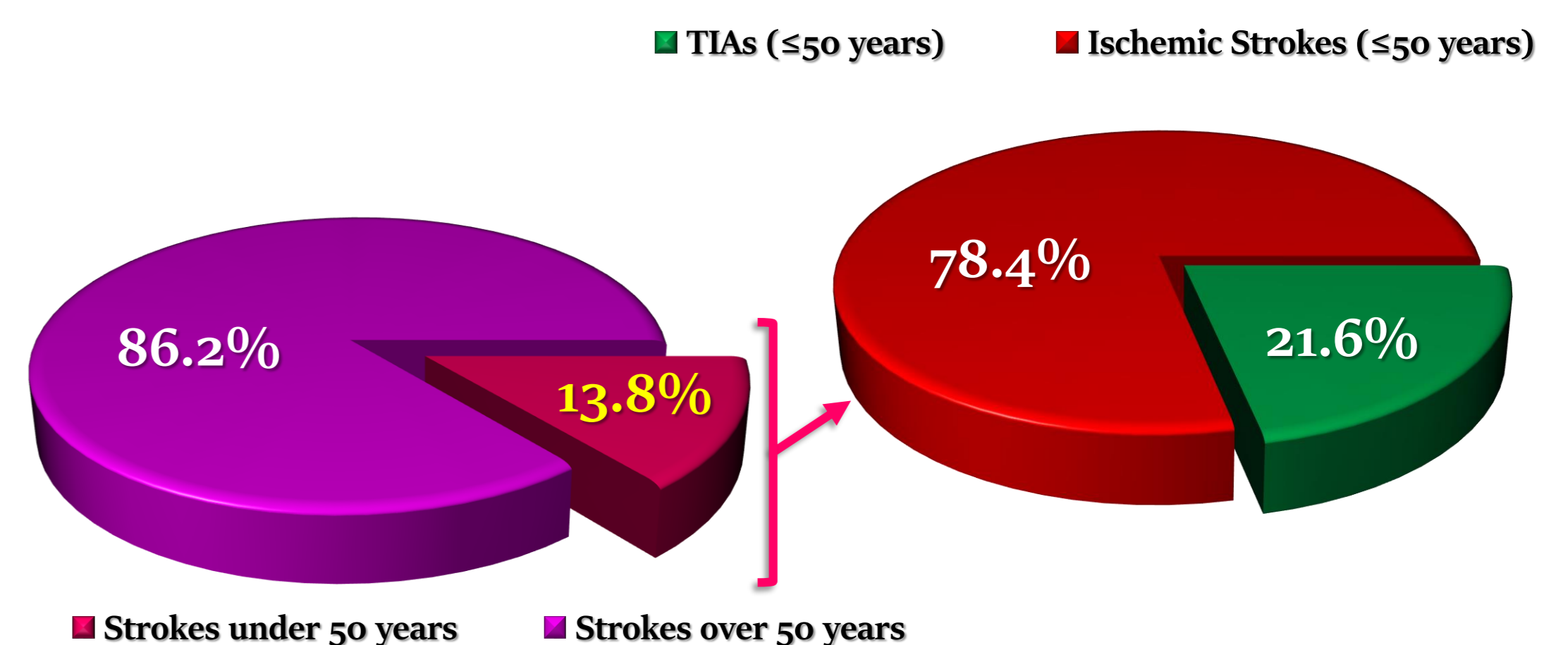


FIGURE 1: Rates of TIAs and Ischemic Strokes in young adults in the study population.

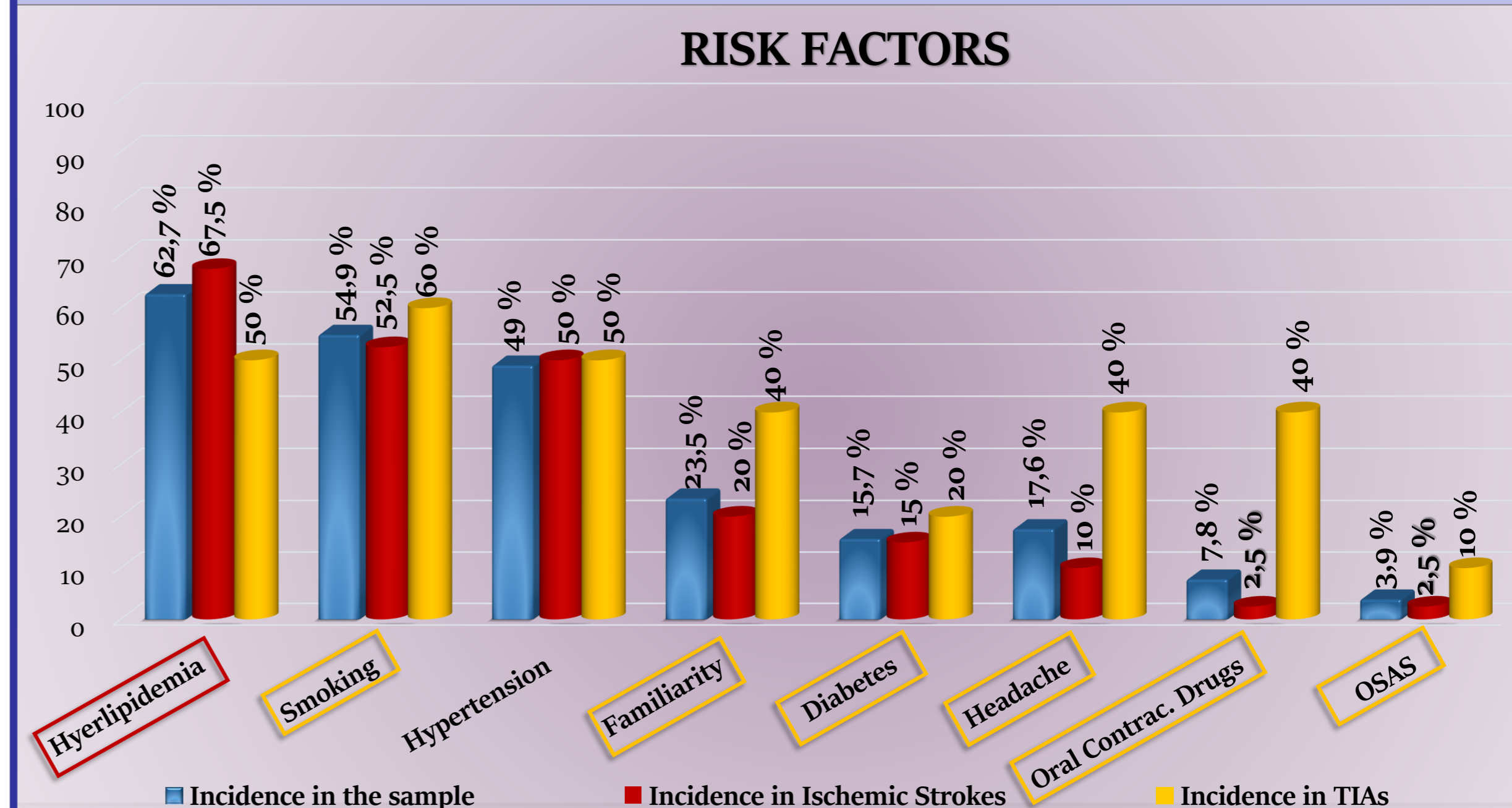


FIGURE 2: Incidence of risk factors in TIAs and Ischemic Strokes.

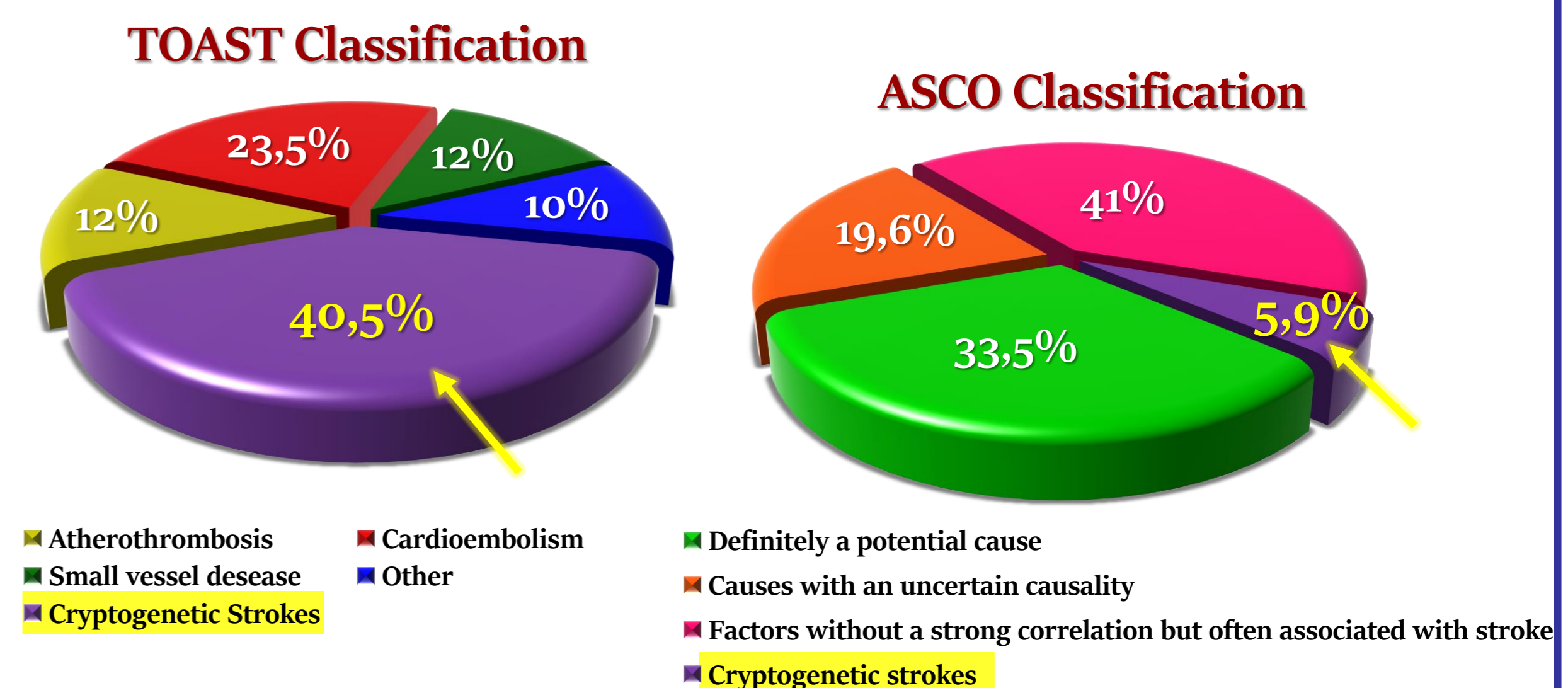


FIGURE 3: Different percentage of cryptogenic strokes according to TOAST and ASCO Classifications.

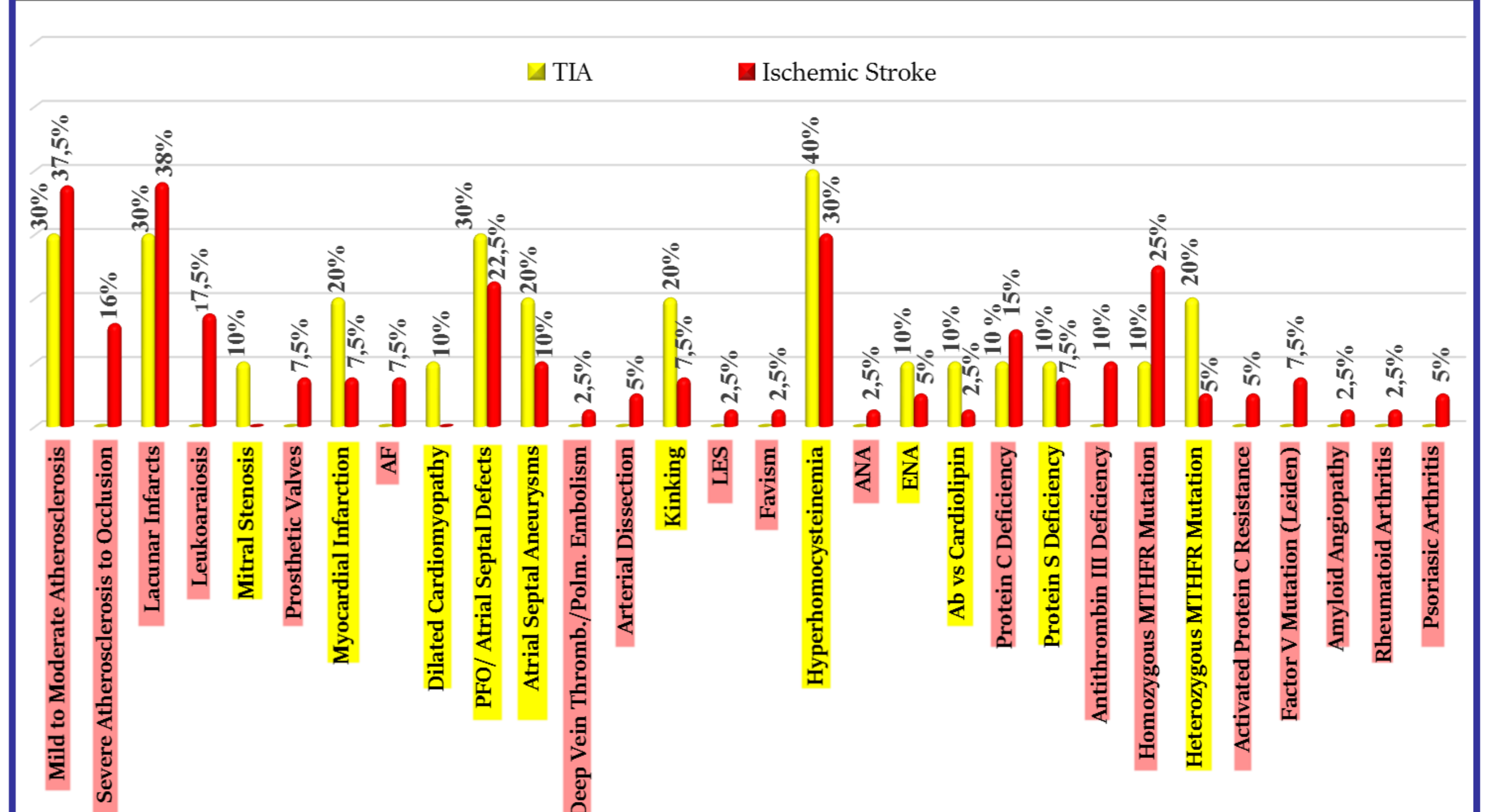


FIGURE 4: Incidence of etiopathogenetic factors in TIAs and Ischemic Strokes.

**References:** 1) Dževdet Smajlović. *Strokes in young adults: epidemiology and prevention*. Vascular Health and Risk Management. 2015; 11: 157-164. 2) C. Marini, T. Russo, G. Felzani. *Incidence of stroke in young adults: a review*. Stroke research and treatment. 2011; 2011: 535672. 3) C. Marini, R. Totaro, F. De Santis, I. Ciancarelli, M. Baldassarre, A. Carolei. *Stroke in young adults in the community-based L'Aquila Registry: incidence and prognosis*. Stroke. 2001 Jan; 32(1):52-6. 4) P. Amarenco, J. Bogousslavsky, L.R. Caplan, G.A. Donnan, M.G. Hennerici. *New Approach to stroke subtyping: the A-S-C-O (Phenotypic) Classification of Stroke*. Cerebrovascular Diseases. 2009; 27:502-508.